PERRIS UNION HIGH SCHOOL DISTRICT

BID DOCUMENTS

Bid #022516

California Military Institute HVAC Upgrades

NOTICE INVITING BIDS

Your company is listed in Perris Union High School District's Contractor's database to bid Public Projects pursuant to the provisions of Public Contract Code Section 22030-22040, the Uniform Public Construction Cost Accounting Act. **NOTICE IS HEREBY GIVEN** that the Perris Union High School District ("District") is seeking sealed bids from qualified contractors for construction of the following public-works project ("Project"): **Bid #022516 California Military Institute HVAC Upgrades.**

DESCRIPTION OF JOB: Provide all labor, equipment, and materials to complete the project per Construction Documents. **The project will start on March 17, 2016 and must be completed no later than June 24, 2016**. Please see the Construction Documents for details.

PLACE FOR SUBMITTING SEALED BIDS: Sealed Bids must be submitted to the District at the following location ("Place for Submitting Sealed Bids"):

Perris Union High School District,
Purchasing: Nick Newkirk
155 East 4th Street, 2nd floor
Perris, CA 92570

BID DEADLINE: Bids must be received at the Place for Submitting Bids no later than ***Thursday, February 25, 2016*** at ***2:00 p.m.*** ("Bid Deadline"), at which time the District will publicly open and read all bids. The District shall return, unopened, each bid received after the Bid Deadline.

BID DOCUMENTS: Bidders may obtain the documents necessary to submit a bid ("Bid Documents") **via email from Nick Newkirk at nick.newkirk@puhsd.org *or via the District website at*** http://www.puhsd.org/blogs/contracting-opportunities.

CONTRACTOR LICENSE: The class of California contractor license required to bid on and perform the Work is Class B *and/or* C10/C20 license classification.

MANDATORY PRE-BID CONFERENCE: The District will conduct a mandatory pre-bid conference and site visit on ***Wednesday, February 10, 2016***, at ***9:00 a.m.***, and will commence at: ***California Military Institute, 755 North A Street, Perris, CA 92570.*** Attendance at the pre-bid conference and site visit is mandatory. Any bidder that does not attend the entire conference and/or does not arrive on-time shall be deemed non-responsive.

QUESTIONS REGARDING THE BID DOCUMENTS, SCOPE OF WORK, AND/OR SPECS OF THE PROJECT: All questions concerning this Bid shall be submitted in writing by e-mail to the Director of Purchasing, Nick Newkirk at nick.newkirk@puhsd.org on or before February 18, 2016 at 4:30pm. Please indicate the Bid title in the subject line. Contact with District personnel shall be made only through e-mail; telephone calls will not be accepted. Answers to questions will be posted on the District Website as RFIs.

All notices, clarifications, and addenda to this Bid shall be posted on the District website at http://www.puhsd.org/blogs/contracting-opportunities. The District shall not be responsible for sending individual notification of changes or updates to any respondents. ***It is the sole responsibility of the bidders to remain apprised of changes to this Bid as shown on the District website.***

REQUIRED BID SECURITY: Each bid must be submitted with security in an amount equal to 10% of the maximum bid, in one of the following forms: (i) a cashier's or certified check payable to the District; or (ii) a bid bond. The security must be submitted with a completed copy of the "Bid Security" form included as one of the Required Bidding Forms. Each bid bond must be an executed copy of the "Bid Bond" form included as one of the Required Bidding Forms and must be issued by a California-admitted surety as defined in Code of Civil Procedure Section 995.120. Unless forfeited, the District will return security to the bidders within a reasonable time, but not more than sixty days after award of the Contract for the Work.

SURETY BONDS: The successful bidder must provide a Performance Bond and a separate Payment Bond, in the forms included as Required Contract Forms, each in an amount equal to 100% of the total Contract Price, and each issued by a California-admitted surety as defined in Code of Civil Procedure Section 995.120.

LABOR LAW: The Project is a "public work" project that is subject, among other provisions, to Labor Code Sections 1720 through 1861, inclusive. As described in the Instructions For Bidders, each contractor (including subcontractors) must be registered with the California Department of Industrial Relations ("DIR") in accordance with Labor Code Section 1725.5, and bidders must provide evidence of registration for themselves and their subcontractors. Each worker on the Project must be paid not less than the applicable prevailing rates of per-diem wages in the locality in which the Work is to be performed for each craft or type of worker needed to execute the Contract ("Prevailing Wages"). A copy of the applicable rates of Prevailing Wages is on file and available for review at the Place for Submitting Bids, and a copy will be posted at the Project Site. The Project is subject to compliance monitoring and enforcement by the DIR. The successful bidder will be required to post all job-site notices required by DIR regulations and other applicable law. If so specified in the Special Provisions, the District will conduct a mandatory conference for the purpose of describing labor-law requirements.

RETENTION: Substitution of securities in lieu of retention, pursuant to Public Contract Code Section 22300, will be permitted as provided in the General Provisions.

DEFINED TERMS: Capitalized terms used, but not defined, in this Notice Inviting Bids shall have the meanings ascribed to such terms in other of the Bid Documents.

INSTRUCTIONS FOR BIDDERS

Caution: Read these Instructions For Bidders and other Bid Documents carefully. Do not assume that the documents are the same as similar documents you previously may have obtained from the District. Capitalized terms used, but not defined, in these Instructions For Bidders shall have the meanings ascribed to such terms in other of the Bid Documents.

1. Project Delivery Method and Coordination. The Project is being completed on the basis of a single general contract for all or the majority of the Project. If the District either contracts for work in connection with the Project in addition to the Work or performs such work using its own forces ("Work by Others"), the scheduling, performance and priority of the Work is subject to coordination with the Work by Others. In submitting a bid for the Work, a bidder shall be deemed and construed to have acknowledged that the time for completion of the various portions of the Work, as specified in the Bid Documents, is sufficient and reasonable considering the scope of the Work and the Project, and considering the need to coordinate the Work with the Work by Others; and (ii) if the Contract is awarded to the bidder, the bidder shall have no Claim for delay arising from the need to coordinate the Work with any Work by Others.

2. Architect. The Architect for the Project is identified in the Special Provisions. The Architect's role is described in the General Provisions and is subject to the provisions of the agreement between the District and the Architect. The Architect will be the District's representative during construction and close-out of the Work in accordance with Title 24 of the California Code of Regulations and provisions of the agreement between the District and the Architect. Communications from the District to bidders prior to award of the Contract may be directed through the Architect.

3. Project Manager. Notwithstanding that the Project is being completed on a general contract basis, the District may contract for the services of a project management consultant or other consultant ("Project Manager") in connection with the Project. If known, the Project Manager is identified in the Special Provisions. The Project Manager's role is described in the General Provisions and is subject to provisions of the agreement between the District and the Project Manager. The Project Manager will be the District's representative during the bidding, construction and close-out of the Work and will assist the District in the administration of the Contract. Communications from the District to bidders prior to award of the Contract may be directed through the Project Manager. If the District does not contract for the services of a Project Manager in connection with the Project, or if the District terminates and does not replace the Project Manager, then the District may delegate some or all of the Project Manager's responsibilities pursuant to the Contract Documents to the Architect, District staff and/or others.

4. Pre-Bid Review of Plans and Specifications. Each bidder, prior to submitting a bid for the Work and at its own expense, must thoroughly review and become familiar with all of the Drawings, Specifications, and other requirements for the Work. A bidder is required to review the Drawings and Specifications only in its capacity as a contractor, not as a licensed design professional, but the bidder must, promptly and prior to submitting a bid for the Work, report to the District any errors or omissions in the Drawings and Specifications revealed through such review.

5. Examination of Project Site and Contract Documents. Each bidder, prior to submitting a bid for the Work and at its own expense, must visit the site where the Project is located and the on-site portion of the Work is to occur ("Project Site") and become fully acquainted with the conditions in and under which the Work will be performed, so that the bidder fully understands the facilities, difficulties, restrictions and requirements attendant to the performance of the Work on and at the Project Site. Subject to District approval and evidence of adequate insurance coverage satisfactory to the District, a bidder that attended the mandatory pre-bid conference and site visit specified in the Notice Inviting Bids, at its own expense, may

subsequently conduct additional inspections of the Project Site. In addition, each bidder must thoroughly examine and develop an understanding of all of the Contract Documents, including, without limitation, the Drawings, Specifications, Agreement, General Provisions, Special Provisions, Required Bidding Forms, Required Contract Forms, and Required Project Forms. The failure of a bidder to understand the conditions in and under which the Work is to be performed, or to examine and understand any of the Contract Documents, shall not relieve the bidder from any obligations pursuant to its bid or the Contract Documents.

6. Interpretation of Contract Documents. If a bidder is in doubt as to the true meaning of any part of the Contract Documents, or finds any conflict, omission or other discrepancy in any Drawings, Specifications or other Contract Documents, the bidder must submit a written request to the Architect for an interpretation or correction of the applicable Contract Documents. The bidder submitting the request must provide copies of the request to the District and the Project Manager, and must ensure that the request is delivered to the Architect sufficiently in advance of the scheduled bid opening to permit the Architect a reasonable amount of time to respond considering the nature and scope of the overall Project. Prior to the opening of bids, the Architect will issue interpretations or corrections of the Contract Documents only by addendum or addenda to the Contract Documents. A copy of each addendum will be mailed or delivered to each contractor that has obtained a copy of the Bid Documents by paying a deposit. No person or entity shall be authorized to provide any oral interpretation of any provision of the Contract Documents, and no oral interpretation shall be binding on the District. If the Architect does not issue an addendum to interpret or correct any conflict, omission or other discrepancy in the Drawings, Specifications or other Contract Documents, the bidder must include in its bid the material, item, process, method, *et cetera*, that results in the higher bid amount. **THE SUBMISSION OF A BID SHALL BE DEEMED AND CONSTRUED AS A REPRESENTATION AND WARRANTY BY THE BIDDER THAT IT HAS COMPLIED WITH THE REQUIREMENTS OF THIS SECTION AND SECTION 5 OF THESE INSTRUCTIONS FOR BIDDERS, AND AT NO TIME AFTER SUBMITTING A BID MAY THE BIDDER ASSERT, CLAIM OR ALLEGE THAT IT HAD ANY DOUBT OR MISUNDERSTANDING AS TO THE NATURE OR SCOPE OF THE WORK.**

7. Ethics in Bidding. The District expects each bidder to maintain high ethical standards with respect to bidding on the Work. Prior to the award of the Contract, no bidder shall disclose the amount of any prospective Subcontractor's bid or proposal, or any element thereof, to any other prospective Subcontractor. Bidders must not engage in or permit either of the unethical and unfair practices commonly known as bid shopping (e.g., the bidder uses a Subcontractor's proposal in an attempt to obtain a lower-cost proposal from another Subcontractor) and bid peddling (e.g., a Subcontractor attempts to obtain a job by offering to work for less than the amount specified in another Subcontractor's proposal). If the District determines prior to opening of bids that any bidder has violated any of the foregoing requirements or any other prohibitions set forth in the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section 4100 *et seq*.), the District may reject the bidder's bid as non-responsive and report the bidder's actions to the Contractors State License Board.

8. Contractor Licensing. At the time it submits its bid for the Work, each bidder must have Class B General Contractor license issued by and in good standing with the State of California. A bidder's failure to be so properly licensed shall result in the bidder being deemed non-responsive, and the bidder will be disqualified from work on the Project. Each bidder must clearly specify its California contractor's license number where indicated in the Bid Form. The bidder to which the District awards the Contract must maintain the required license throughout the duration of the Work.

9. Listing of Subcontractors. In accordance with the Subletting and Subcontracting Fair Practices Act, each bidder must submit with its bid a list of the names and locations of the places of business of each Subcontractor that will perform any portion of the Work, or that, under subcontract to the bidder, will specially fabricate and install a portion of the Work, in an amount in excess of ½ of 1 percent of the total

amount of the bidder's bid. A bidder may not list more than one Subcontractor for any one portion of the Work. A bidder that fails to list a Subcontractor for any portion of the Work represents that it is fully qualified to, and agrees that it shall, perform such Work using its own forces. If the Bid Documents require the bidder to submit alternate bids and the bidder intends to use different or additional Subcontractors for the alternates, the bidder must submit a separate list of Subcontractors for each such alternate. A bidder must submit its lists of Subcontractors only on the "Subcontractor Listing" form included in the Required Bidding Forms. In addition to providing the Subcontractor lists, within one business day after the bids are opened, each bidder must provide the address, telephone number and contractor's license number for each listed Subcontractor.

10. DVBE Requirements. Bidders must comply with the requirements of this Section 10 only if made applicable pursuant to Section 19 of the Special Provisions. The District has adopted a goal for DVBE participation in the Project of three percent of the overall amount expended for certain new-construction and modernization projects each year. Each bidder must comply with DVBE requirements by making and documenting its reasonable efforts to obtain DVBE services in connection with the Work. In order to be considered reasonable efforts, a bidder's efforts should include advertising in appropriate publications and contacting any responding DVBE. Alternatively, if so provided in Section 20 of the Special Provisions, the Project Manager will advertise for DVBE for the Work, and bidders must contact the Project Manager to obtain information regarding any responding DVBE. The bidder also should contact any known DVBE that could perform a portion of the Work. Each bidder must complete, execute and submit with its bid the "Certification of DVBE Compliance" form and the "DVBE Participation Statement" form included in the Required Bidding Forms. The District may reject as non-responsive any bid that does not comply with such DVBE requirements.

11. Use of Bid Form is Mandatory. Each bid must be submitted on the Bid Form included in the Required Bidding Forms. Unless expressly permitted by the Bid Documents, a bidder shall not: (i) make any changes, additions or other modifications to the Bid Form or other documents to be submitted with the Bid Form; (ii) restate or recharacterize the Work in the bid; or (iii) make any alternative proposals not permitted by the Bid Documents. The District may reject as non-responsive any bid that does not strictly comply with the foregoing.

12. Preparing the Bid. Bidders must fully and properly complete all information required to be included on the Bid Form. Amounts must be stated in both words and numbers where indicated. Prices, wording and notations must be in ink or typewritten. The signatures and/or initials of each person signing the bid and other documents to be submitted with the bid must be in permanent ink, preferably blue in color. A bid may contain an erasure, interlineation, or other correction only if the correction is made to the information entered by the bidder (not to the Bid Form), does not result in any inconsistency or ambiguity, and is authenticated by affixing, in the margin immediately adjacent to the correction, the initials of the person or persons signing the bid. In the event of inconsistency between words and numbers, words shall govern over numbers.

13. Required Bidding Forms. Each bidder must complete, execute and submit with its bid each of the forms included in the Required Bidding Forms other than the "Bidder References and Information" form, which, if required, must be submitted in accordance with Section 25 of these Instructions For Bidders. If a bidder fails to properly complete, execute and submit any of the Required Bidding Forms, the District may determine that the bid is non-responsive to the Notice Inviting Bids.

14. Signing the Bid and Other Required Documents. The Bid Form and other Required Bidding Forms, the bid bond, and all other documents to be submitted with the bid that require an original signature of the bidder must be signed in permanent ink, preferably blue in color, by a person or persons duly

authorized to sign documents and contractually bind the bidder in connection with the Work (each an "Authorized Contractor Officer"). The District may reject as non-responsive any Bid Form containing a stamped or mechanically-printed signature. Depending on whether the bidder is an individual or the type of business entity, signatures must comply with the following:

14.1 Corporations. If bidder is a corporation, each document must set forth the full, legal name of the corporation and must be signed by both the bidder's President and the bidder's Secretary or Assistant Secretary as the Authorized Contractor Officers for the bidder. Alternatively, the signature of another Authorized Contractor Officer may be affixed to the document if the bidder includes with its bid a certified copy of a resolution of the corporation's board of directors authorizing such person to sign the document as an Authorized Contractor Officer of the bidder. Documents submitted with the bid must include the title of each signatory below the signature and must bear the corporate seal.

14.2 Limited Liability Companies. If bidder is a limited liability company, each document must set forth the full, legal name of the company and the names of all members of the company, and all such members must sign the document as the Authorized Contractor Officers for the bidder. Alternatively, the document may be signed by a representative of the managing member of the company if the bidder includes with its bid a certified copy of a statement of the managing member's authority and the specific signatory's authority to sign the document as an Authorized Contractor Officer of the bidder.

14.3 Partnerships. If bidder is a partnership of any type, each document must set forth the full, true name of the partnership and the names of all persons and/or entities comprising the partnership, and all such persons and entities (or their legal representatives as determined pursuant to this Section 14) must sign the document. Alternatively, the document may be signed by a general partner of the partnership if the bidder includes with its bid a certified copy of a statement of the partnership acknowledging the signatory as a general partner (or a representative of the general partner) with authority to sign the document.

14.4 Sole Proprietorships. If the bidder is a sole proprietorship, each document must set forth the true name of the sole proprietorship and its owner, and such owner must sign the document. Alternatively, an agent of the owner may sign a document if the bidder has included in the bid a certified copy of a current and valid power-of-attorney authorizing the agent to sign the document.

14.5 Fictitious Names and Joint Ventures. If the bidder is an entity using a fictitious business name or a joint venture of two or more parties, documents must satisfy the requirements set forth above for signatures on behalf of corporations or partnerships, as applicable. The signature on any document signed on behalf of any entity using a fictitious business name must so indicate in the signature block. Documents submitted by parties acting as joint venturers must so indicate in the signature block and must be signed by or on behalf of each and every joint venturer.

15. Sealing and Labeling the Bid. The completed Bid Form, other Required Bidding Forms, and all additional documents and other materials to be submitted with the bid must be enclosed in a sealed envelope. The sealed bid must be labeled with the project/bid name and contractor name. The District may reject any bid if the outside of the bid envelope is not properly labeled or shows extraneous information or marks.

16. Submitting the Bid. For purposes of the Notice Inviting Bids and these Instructions For Bidders, any reference to the "Bid Deadline" shall mean the date and time specified as the Bid Deadline in the Notice Inviting Bids and any authorized extension(s) thereto. The District must receive any bids prior to the Bid Deadline and at the Place for Submitting Bids set forth in the Notice Inviting Bids. The clock located at the

Place for Submitting Bids and designated as the official bid clock shall be used in determining whether bids have been timely received by the District, regardless of whether the time shown on the official bid clock is precisely accurate. Each bidder is solely responsible for ensuring that its bid is timely received by the District. A bidder must submit its bid to the District via personal or other delivery. The District will not accept any oral bid or bid sent via facsimile or electronic transmission. At no time will District telephones or facsimile machines be available for use by bidders. Any bid received by the District after the Bid Deadline will be returned to the bidder unopened.

17. Interests in More Than One Bid. No person or entity shall submit or have any interest in more than one bid for the Work except to the extent the Bid Documents expressly call for alternate bids. The District will not accept more than one bid for the Work from any person or entity, under the same or different names. A reasonable belief by the District that any person or entity has an interest in more than one bid or has submitted more than one bid for the Work may result in the District rejecting all bids in which the bidder has an interest. A person or entity that has submitted to a bidder any sub-bid or proposal to furnish labor, materials or services in connection with the Work is not thereby prohibited from submitting a sub-bid or proposal to any other bidder(s) on the Work, but that person or entity shall be prohibited from submitting its own bid for the Work. Any person or entity that has participated in the preparation of any Specifications for the Work (other than submitting manufacturer specifications) shall be prohibited from bidding on the Work, and the District shall deem any such bid to be non-responsive.

18. Modifying a Bid. Not later than the Bid Deadline, a bidder may modify its original bid by submitting the written modification to the District. The bid modification must be submitted in a sealed and labeled envelope as provided in Section 15 of these Instructions For Bidders, but must also include the words "Bid Modification" on the label. The District shall reject any bid modification that is not received by the District prior to the Bid Deadline. The late receipt and rejection of a bidder's bid modification shall not be deemed or construed to constitute a withdrawal of the original bid by the bidder, and the District still may accept the original bid if responsive and the bidder is a responsible contractor. The District may reject any modified bid if the modification creates an ambiguity or inconsistency, including, without limitation, if the modification makes the bid unintelligible. A bidder must submit any bid modification to the District via personal or other delivery. The District will not accept any oral bid modification or any bid modification sent via facsimile or electronic transmission. Any bid modification received by the District after the Bid Deadline will be returned to the bidder unopened.

19. Superseding a Bid. Not later than the Bid Deadline, a bidder may supersede its original bid by withdrawing its original bid in accordance with Section 20 of these Instructions For Bidders and concurrently submitting a new bid for the Work to the District. The superseding bid must be submitted in a sealed and labeled envelope as provided in Section 15 of these Instructions For Bidders, but must also include the words "Superseding Bid" on the label. The District shall reject any withdrawal and superseding bid that is not received by the District prior to the Bid Deadline. The late receipt and rejection of a bidder's withdrawal and superseding bid shall not be deemed or construed to constitute a withdrawal of the original bid by the bidder, and the District still may accept the original bid if responsive and the bidder is a responsible contractor. A bidder must withdraw its original bid and submit its superseding bid to the District via personal or other delivery. The District will not accept any oral withdrawal and superseding bid, or any withdrawal and superseding bid sent via facsimile or electronic transmission. Any withdrawal and superseding bid received by the District after the Bid Deadline will be returned to the bidder unopened.

20. Withdrawing a Bid. A bidder may withdraw its bid at any time prior to the Bid Deadline by submitting a written request to the District via personal or other delivery. The District will not accept any oral withdrawal request or any withdrawal request sent via facsimile or electronic transmission. A withdrawal request must be signed by an Authorized Contractor Officer determined in accordance with

Section 14 of these Instructions For Bidders. A withdrawal request received by the District after the Bid Deadline shall in no event be deemed or construed to constitute a withdrawal of the bid, and the District still may accept the bid if it is responsive and the bidder is a responsible contractor. After receipt of a timely withdrawal request, the District shall return the bidder's bid security upon request. Except as provided in Public Contract Code Section 5100 *et seq*., if a bidder has not withdrawn its bid prior to the Bid Deadline, the bidder thereafter may not withdraw its bid for a period of sixty days after the Bid Deadline.

21. Requesting Substitution of Specified Item. Except for any Sole-Source Items described in Section 8 of the Special Provisions, the requirement for any Specified Item shall be interpreted as if followed by the words "or equal," and a bidder may offer in place of such Specified Item any material, product, service, or other thing that the bidder can demonstrate is, in every respect, materially equal to or better than the Specified Item and that will completely accomplish the intended aesthetics, purposes and/or functions of the Specified Item. Each substitution request is subject to and must conform with the requirements of Sections 14.4 through 14.10, inclusive, of the General Provisions, including, without limitation, requirements for submitting documentation in support of the request. Requests for substitution must be made in writing on the "Substitution Request" form included in the Required Contract Forms.

The bidder shall be responsible for establishing that a proposed substitution satisfies all requirements of the Contract Documents, including, without limitation, that the proposed substitute item is, in every respect, materially equal to or better than the Specified Item. The District may at any time request any additional information regarding the proposed substitute item. The District, in consultation with the Architect and the Project Manager as applicable, will decide whether to approve a substitution based on the information provided by the bidder. The District has the sole discretion to determine whether a proposed substitute item is equal to or better than a Specified Item. Any request for substitution that is granted by the District shall be documented and processed by means of a Change Order after execution of the Contract. The District may condition its approval of any substitution upon delivery to the District of an extended warranty or other assurances of adequate performance of the substitute item. The bidder shall be responsible for and shall bear any and all risks, expenses and costs of delay arising from review or approval of a substitution by the DSA or other governmental agency.

A substitution request must be submitted to the District not later than seven days prior to the Bid Deadline specified in the Notice Inviting Bids. The District will not consider any substitution request received thereafter, except to the extent provided in Section 14.5 of the General Provisions. Concurrently with submitting a substitution request, the bidder must provide all information required pursuant to Section 14.6 of the General Provisions to substantiate the request. The District shall not be required to make a determination in regard to any substitution request and/or substantiating information prior to award of the Contract. If the District gives a Notice of Award for the Contract to a bidder, but subsequently disapproves a substitution proposed by that bidder, the bidder must provide the Specified Item in accordance with the Contract Documents and at no additional cost to the District.

22. District Waiver of Bid Irregularities. The District, in accordance with applicable law, may waive any minor irregularity or informality in any bid or in the bidding process.

23. District Rejection of Irregular Bids. The District will reject as non-responsive to the Notice Inviting Bids any bids containing irregularities that are not minor irregularities, including, by way of example and not as a limitation, any bid that is materially incomplete and any bid that includes any additions or conditional or alternate bids not permitted pursuant to the Bid Documents. In addition, the District may reject as non-responsive any bid in which component bid amounts are obviously unbalanced or inconsistent. The District may, but is not required to, seek information from any bidder that may resolve an ambiguity in the bidder's bid.

24. District Rejection of Non-Responsive Bids. If a bid fails to conform to requirements set forth in the Notice Inviting Bids, these Instructions For Bidders, or any of the other Bid Documents (including, without limitation, if the District reasonably determines that the bid is unintelligible, internally inconsistent, or otherwise ambiguous), the District may reject the bid as not responsive. The District may, but is not required to, seek information from any bidder that may resolve an ambiguity in the bidder's bid.

25. Bidder Evidence of Responsibility. In determining whether a bidder is a responsible bidder, the District may consider, among other possible factors, the financial standing and general competency of the bidder with respect to the Work being bid. Within two business days of the District's request, a bidder must provide to the District a completed copy of the "Bidder References and Information" form included in the Required Bidding Forms. The purpose of the Bidder References and Information is to document the bidder's construction experience, current and anticipated workload, organizational resources available for performance of the Contract, any terminations from projects prior to completion, references for public works and public school projects, financial resources, surety and insurance claims experience, stop notice and other legal proceedings, and other factors pertinent to determining the responsibility of the bidder.

26. District Award of Contract. Prior to award of the Contract, the District may provide to a bidder notice that it is the apparent low bidder and that the District may award the Contract to such bidder. In its discretion, the District Board may award the Contract to such bidder, may award the Contract to another bidder in the event of a bid protest or other issue, or may reject all bids and either rebid or not rebid the Work. If the District Board awards the Contract, the award will be to the responsible bidder with the lowest responsive bid from among all responsible and responsive bidders ("Successful Bidder"). If two or more responsive and responsible bidders have submitted the same low bid, the District shall determine the Successful Bidder by means of a coin toss or some other random method. The District will issue notice of the award of the Contract to the Successful Bidder ("Notice of Award").

27. Bidder Execution of Contract. The Successful Bidder shall have seven calendar days after the date of the Notice of Award to execute and deliver to the District the Construction Services Agreement and all other documents required in accordance with the Contract Documents. If the bidder fails to execute and provide all such documents within that seven-day period: (i) the bidder will forfeit the bid security submitted with its bid; and (ii) the District may award the Contract to one of the other responsible and responsive bidders or release all bidders.

28. Refund of Deposit for Bid Documents. A contractor may obtain a refund of its deposit for the Bid Documents by returning them to the Place for Submitting Bids specified in the Notice Inviting Bids not later than seven days after the opening of bids. A contractor will be entitled to refund of its deposit only if the Bid Documents are complete, in a useable condition, and free of any pen, pencil or other markings, erasure marks, rips, tears, *et cetera*.

29. Bid Protests. Any bidder that has duly submitted a bid for the Work may protest the process used to seek bids for the Work, another bid for the Work and/or the intended award of the Contract for the Work only by filing a written protest with the District in accordance with the procedures set forth in this Section 29 (each a "Bid Protest"). The District will not accept or consider any oral Bid Protest (e.g., by telephone) or any Bid Protest sent via electronic transmission (e.g., e-mail). In order for a Bid Protest to be valid and be considered by the District, the Bid Protest:

(i) Must be received by the District not later than 4:00 p.m. on the fifth business day following the opening of bids;

(ii) Must clearly identify the bidder that is filing the Bid Protest, together with the name, address and telephone number of the person representing the bidder for purposes of the Bid Protest;

(iii) Must clearly identify the specific bid, bidding process, or other matter that is the subject of the Bid Protest;

(iv) Must clearly identify the specific provisions of all documents relevant to the Bid Protest;

(v) Must clearly identify and describe in detail the specific basis (or bases) for the Bid Protest and all facts relevant thereto;

(vi) Must clearly identify and describe in detail all arguments in support of the Bid Protest, including, without limitation, citations to applicable statutory requirements; and

(vii) Must be submitted with all documentation the bidder desires to submit that is relevant to and supports the basis or bases underlying the Bid Protest.

If a Bid Protest does not comply with each and all of the foregoing requirements (provided that a bidder will be deemed to have submitted all documentation that it desires in accordance with clause (vii) of the foregoing), the District will reject the Bid Protest as invalid. Upon receipt of a valid Bid Protest, the District and/or its legal counsel will review the Bid Protest and all relevant information and documents and will provide a written response to the protesting bidder setting forth a recommendation for District Board action in response to the Bid Protest. A bidder may at any time withdraw its Bid Protest. In response to a Bid Protest that a bidder has not withdrawn, the District Board may decline to award the Contract, may award the Contract to a bidder other than as previously intended, or may award the Contract to a bidder as previously intended despite the Bid Protest. Such action by the District Board shall be a condition precedent to the filing of any claim or demand and to the initiation of any action (legal or equitable) or other proceeding arising from the matter(s) protested.

Compliance with the foregoing Bid Protest requirements is mandatory. Each bidder that desires to protest must file its own Bid Protest in accordance with the foregoing requirements, and no bidder may rely on a Bid Protest by another bidder as a means of satisfying such requirements. Compliance with the foregoing requirements is the sole and exclusive means of protesting a bid, the bidding process and/or the intended award of the Contract, and failure to so comply shall be deemed and construed as a waiver of any and all rights the bidder may have to pursue a claim, demand or action arising from any such matter.

30. Public Works Project. The Project is a "public work" and "public project" within the meaning of various provisions of the Public Contract Code, Labor Code, Civil Code, and other applicable legal requirements. Therefore, the performance of the Work is subject to such requirements. The Contract Documents include various provisions relating to public works and public projects as provided by law, and each bidder must thoroughly review and become familiar with the Contract Documents as described above in these Instructions For Bidders. However, the Contract Documents do not include comprehensive statements of all requirements of law applicable to public works and public projects, and each bidder shall be deemed and construed to have acknowledged that fact by submitting a bid for the Work. In addition, by submitting a bid for the Work, each bidder represents and warrants that it is familiar and knowledgeable with respect to all requirements of law applicable to public works and public projects generally and to the Work specifically.

31. Subcontractor Eligibility and Licensing. The Successful Bidder shall in no event permit a Subcontractor to perform any of the Work if that Subcontractor is ineligible to work on a public works or

public project. Each Subcontractor that the Successful Bidder intends shall perform any portion of the Work must be licensed in accordance with law by the Contractors State License Board prior to commencing its portion of the Work.

32. Prevailing Wages and Labor-Law Compliance Monitoring. The Successful Bidder and each of its Subcontractors of any tier shall pay not less than the applicable Prevailing Wages for each craft or type of worker needed to execute the Contract. A copy of the per-diem rates of Prevailing Wages applicable to the Work is on file with the District and is available for review at the location specified in the Notice Inviting Bids as the Place for Submitting Bids, and a copy will be posted at the Project Site. If so provided in Section 13 of the Special Provisions, the Work will be subject to monitoring by the DIR and/or CMU as to compliance with labor-law requirements, as described in more detail in the Special Provisions and General Provisions.

33. Apprenticeable Trades and Crafts. Not later than twenty-four hours after receiving the Notice of Award, the Successful Bidder must provide written notice to the District if, as described in Labor Code Section 1777.5, workers in any apprenticeable trade or craft will be employed to perform any of the Work.

34. Fingerprinting and Employee Background Checks. In circumstances that may involve workers having more than limited contact with students, the District may require that any or all persons on, at or in the vicinity of the Project Site on account of the Work (including, without limitation, employees of both the bidder and its Subcontractors) undergo criminal-history background checks requiring submission of fingerprints to the Department of Justice. The District may impose other requirements designed to protect students regardless of whether it requires such criminal-history background checks. The Successful Bidder shall be responsible for compliance with any and all such requirements by its own forces and by its subcontracted forces.

35. Discrimination Prohibited. No bidder, in preparing and submitting its bid for the Work, shall discriminate in violation of any applicable law, including, without limitation, those specified in Section 3.6 of the General Provisions. In connection with performance of the Work, neither the Successful Bidder nor any of its Subcontractors of any tier shall illegally discriminate against any prospective or active employee in violation of applicable law, including, without limitation, those specified in Section 3.6 of the General Provisions. The Successful Bidder must comply with applicable federal and California laws prohibiting such discrimination and must require like compliance by any Subcontractors performing any of the Work.

36. Bidder Investments in Iran. Subject to certain exceptions, the Iran Contracting Act of 2010 (Public Contract Code Section 2200 *et seq*.) prohibits a party that engages in investment activities in Iran, as described in Public Contract Code Section 2202.5, from entering into any contract of $1,000,000 or more for goods or services to be provided to a public entity. Using the "Iran Contracting Act Certification" form, which is one of the Required Bidding Forms, each bidder must certify to the District that: (i) the bidder is not identified on any list prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203; (ii) the bidder is not a financial institution that, for 45 days or more, extends $20,000,000 or more in credit to any other person or entity identified on any list prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203, if that person or entity uses or will use the credit to provide goods or services in the energy sector in Iran; (iii) the District has exempted the bidder from the prohibition after making a public finding that, absent the exemption, the District will be unable to obtain the goods and/or services to be provided pursuant to the Contract; or (iv) the bidder's bid, including any and all additive alternates, does not exceed $1,000,000. Each bidder must submit the

completed and signed Iran Contracting Act Certification to the District concurrently with the bidder's bid.

37. Time for Completion of Work and Liquidated Damages. The Successful Bidder must complete the Work in accordance with the Contract Documents and within the time period specified in the Special Provisions and the Master Construction Schedule as adjusted in accordance with the Contract Documents. The failure of such bidder to fully complete the Work within such time period(s) may result in the District assessing liquidated damages against the bidder as provided in the General Provisions.

(End of Instructions For Bidders.)

BakerNowicki
design studio

PROJECT MANUAL

CONSTRUCTION DOCUMENTS

California Military Institute
HVAC Upgrades

Perris Union High School District
Perris, California

BNds Project Number 15040-00
January 29, 2016

731 Ninth Avenue, Suite A
San Diego, CA 92101

619.795.2405
www.bndesignstudio.com

PROJECT MANUAL

for the construction of

California Military Institute HVAC Upgrades

for

Perris Union High School District

Prepared by
BakerNowicki Design Studio
731 Ninth Avenue, Suite A
San Diego, CA 92101

SIGNATURES

PROJECT

California Military Institute HVAC Upgrades
BNds Project No. 15040-00

OWNER

Perris Union High School District
Perris, CA

ARCHITECT

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LICENSED ARCHITECT
ALFRED F. GESSEL
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RENEWAL DATE
STATE OF CALIFORNIA

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REGISTERED PROFESSIONAL ENGINEER
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REGISTERED PROFESSIONAL ENGINEER
GARY D. JOHNSON
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EXP. 6/30/2016
ELECTRICAL
STATE OF CALIFORNIA

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work by Owner.
5. Future work.
6. Purchase contracts.
7. Owner-furnished products.
8. Contractor-furnished, Owner-installed products.
9. Access to site.
10. Work restrictions.
11. Specification and drawing conventions.
12. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: California Military Institute HVAC Upgrades.

1. Project Location: 755 North 'A' Street, Perris CA 92570

B. Owner: Perris Union High School District

C. Architect: BakerNowicki Design Studio.

1.4 PERFORMANCE REQUIREMENTS

A. All work shall conform to 2013, Title 24, California Building Code (CBC).

B. Changes to the approved Drawings and Specifications shall be made by addenda or a construction change document (CCD).

1.5 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. HVAC Upgrades at Buildings 'O' & 'J'.

1.6 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.7 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

1.8 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: When school is not in session, work shall be generally performed during normal business hours of 7:00 a.m. to 5:30 p.m., Monday through Friday. When school is in session, work shall be generally performed after school hours from 3:30 p.m. to 6:00 a.m., Monday through Friday. The District’s school calendar is posted on the District’s website and is updated periodically.

1. Work Outside Regular Hours: Work outside regular working hours requires Owner approval and is subject to the following restrictions:

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than two days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

G. Employee Identification: Cotractor will provide identification tags for contractor personnel working on Project site. Require personnel to use identification tags at all times.

H. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with Owner's representative.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations and are scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.10 INDEMNIFICATION

A. Any contractor using or building these plans or using these specifications agrees to defend, indemnify and hold harmless Architect from any claim, demand, lawsuit, cost, fees (including attorney fees), and/or liability arising from or related to the use of these plans or specifications or the construction of the project depicted or described therein.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:
   1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

   1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

   1. Substitution Request Form: Use form provided by Architect.
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

      a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
      b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.

c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Contractor agrees to compensate Architect, at Architects current billing rates, for substitution requests that require modification to the Contract Documents. Compensation shall be made by an adjustment to the Contract amount.

4. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within a reasonable period after the Architect receives final documentation.

   a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
   b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor. Submit requests for substitution immediately on discovery of need for change, but not later than 30 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
i. A maximum of one substitution request shall be submitted for any one item\

B. Substitutions for Convenience: Requests are restricted to before bid opening.

C. The Instruction to bidders specify time restrictions for submitting request for Substitution during the bidding periods according to the requirements specified in this section. In the event that the bidder does not agree in the request form to provide the specified item and the District denies the request substation, the bidder's bid shall be considered non-responsive and the District may award the contract to the next lowest bidder or in its sole discretion, release all bidders.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions.".

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Contractor will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Contractor are not instructions either to stop work in progress or to execute the proposed change.
2. Within10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.

d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Contractor.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Contractor will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

B. Change Orders must be signed by all the following: Architect/Engineer of record and Owner.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Work Change Directive: Contractor may issue a Work Change Directive on AIA Document G714 EJCDC Document C-940 form included in Project Manual. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect through Construction Manager at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

    a. Project name and location.
    b. Name of Architect.
    c. Architect's project number.
    d. Contractor's name and address.
    e. Date of submittal.

2. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

    a. Related Specification Section or Division.
    b. Description of the Work.
    c. Name of subcontractor.
    d. Name of manufacturer or fabricator.
    e. Name of supplier.
    f. Change Orders (numbers) that affect value.
    g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

        1) Labor.
        2) Materials.
        3) Equipment.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

    a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the WorRetain "Allowances" Subparagraph below if Specifications include unit-cost allowances. Do not confuse unit-cost allowances with unit prices. See the Evaluations in Section 012100 "Allowances" for discussion on unit-cost allowances.
7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and Construction Manager and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Forms: Use forms acceptable to Architect and Owner for Applications for Payment. Submit forms for approval with initial submittal of schedule of values.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.

2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Construction Manager by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. Evidence that claims have been settled.
7. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Requests for Information (RFIs).
3. Project meetings.

B. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner, Construction Manager, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 7 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect and Construction Manager.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716 or as approved by Architect .

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect or Construction Manager after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for approval of Contractor's means and methods.
d. Requests for coordination information already indicated in the Contract Documents.
e. Requests for adjustments in the Contract Time or the Contract Sum.
f. Requests for interpretation of Architect's actions on submittals.
g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly.

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect and Construction Manager.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's and Construction Manager's response was received.

F. On receipt of Architect's and Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT MEETINGS

A. General: Construction Manager will schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.

2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Owner will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Lines of communications.
    f. Procedures for processing field decisions and Change Orders.
    g. Procedures for RFIs.
    h. Procedures for testing and inspecting.
    i. Procedures for processing Applications for Payment.
    j. Distribution of the Contract Documents.
    k. Submittal procedures.
    l. Preparation of record documents.
    m. Use of the premises and existing buildings.
    n. Work restrictions.
    o. Working hours.
    p. Owner's occupancy requirements.
    q. Responsibility for temporary facilities and controls.
    r. Procedures for moisture and mold control.
    s. Procedures for disruptions and shutdowns.
    t. Construction waste management and recycling.
    u. Parking availability.
    v. Office, work, and storage areas.
    w. Equipment deliveries and priorities.
    x. First aid.
    y. Security.
    z. Progress cleaning.

4. Minutes: Contractor will record and distribute meeting minutes.

C. Progress Meetings: Contractor will conduct progress meetings at weekly intervals.

1. Coordinate dates of meetings with Owner.
2. Meetings will extend through project closeout.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting schedules and reports.
2. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Event: The starting or ending point of an activity.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.
3. Two paper copies.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing work stages.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.

a. Contractor shall provide Architect with 7 days notice to consider request for electronic files.

b. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

c. Digital Drawing Software Program: The Contract Drawings are available in ACAD 2012.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. **Architect reserve** the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect'sreceipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. The Architect's action will be taken within a reasonable time period, while allowing sufficient time, in the Architect's professional judgement, to permit adequate review.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.

2. Provide a space approximately on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Name of subcontractor.
    f. Name of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.

        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.
    l. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

    a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will submittals received from sources other than Contractor.

    a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software electronic form acceptable to Owner, containing the following information:

F. Options: Identify options requiring selection by Architect.

G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect'saction stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Post electronic submittals as PDF electronic files directly to Dropbox specifically established for Project.

a. Architect,, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Submit electronic submittals via email as PDF electronic files.

a. Architect, , will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

3. Action Submittals: Submit paper copies of each submittal unless otherwise indicated. Architect, , will return copies.
4. Informational Submittals: Submit paper copies of each submittal unless otherwise indicated. Architect will not return copies.
5. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Transmit submittals within time periods established by the General Conditions and as required to maintain orderly and sequential progress of the work.

C. Maintain complete and current submittal log, indicating status of all submittals and re-submittals. Provide summary of submittal status at pay request meeting.

D. Failure to make timely submittals will not be reason for extension of Contract Time.

E. Architect's review of submittals shall not relieve the Contractor for compliance with the Contract Documents, or for responsibility for deviations from Contract Documents.

1. In review of submittals, Architect will not provide dimensions or elevations for field conditions, or for conditions available from a detailed review of documents.

F. Copying of Contract Documents for use as submittals is not acceptable. Contractor shall produce original documents for shop drawings and other submittals.

G. Transmit each submittal separately with Architect accepted form.

1. Combine required material for a single specification Section into a single submittal. Incomplete or partial submittals will be returned without action for re-submittal in proper form.
2. Do not combine data from more than one specification section or drawing component into a single submittal. Such submittals received will be returned without action for re-submittal in proper form.
3. Submittals not reviewed by General Contractor will be returned without action for proper review and re-submittal.

H. Schedule submittals to expedite the Project, and deliver to Architect at business address. Coordinate submission of related items.

I. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

1. Clearly identify, with bold clouding, or other graphic notation, all deviations from Contract Documents. Provide boxed note at clouded deviation specifically requesting approval of proposed change. Provide documentation of proposed change, including additional graphics and data as required by Architect.

J. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1. Distribute all copies of reviewed submittals at no additional cost to Owner for duplication, blueprinting, mailing or other costs.

K. Architect will notify Contractor of availability of documents for pickup at Architect's office, and log such date as the date returned to Contractor. Architect is not obligated to transmit or deliver submittals to Contractor.

L. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's catalog cuts.
b. Manufacturer's product specifications.
c. Standard color charts.
d. Statement of compliance with specified referenced standards.
e. Testing by recognized testing agency.
f. Application of testing agency labels and seals.
g. Notation of coordination requirements.
h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.
b. Printed performance curves.
c. Operational range diagrams.
d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.

6. Submit Product Data in the following format:

    a. PDF electronic file.

M. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
3. Submit Shop Drawings in the following format:

    a. PDF electronic file.

N. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.
    e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

a. Number of Samples: Submit full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect,, will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit three sets of Samples. Architectwill retain Sample sets; remainder will be returned.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

O. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:

a. PDF electronic file.
b. paper copies of product schedule or list unless otherwise indicated. Architect,, will return copies.

P. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

Q. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

R. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."

S. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

T. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

U. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

V. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

W. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

X. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

Y. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

Z. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

AA. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

BB. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

CC. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

DD. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

EE. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

FF. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

GG. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

HH. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. Action Submittals: Architect and Construction Manager will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate

B. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

C. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

D. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.

C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 AGENCY REQUIREMENTS

A. Project inspector must be employed by the owner and approved by all of the following: Architect/Engineer of record, Structural Engineer and DSA.

1.5 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 REPORTS AND DOCUMENTS

A. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

B. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.8 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and Construction Manager's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

	www.aluminum.org	
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists www.aatcc.org	(919) 549-8141
ABAA	Air Barrier Association of America www.airbarrier.org	(866) 956-5888

ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	American Concrete Institute www.concrete.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AHRI	Air-Conditioning, Heating, andRefrigeration Institute, The www.ahrinet.org	(703) 524-8800
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
ALSC	American Lumber Standard Committee, Incorporated www.alsc.org	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. www.aosaseed.com	(405) 780-7372

APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9500
ATIS	Alliance for Telecommunications Industry Solutions www.atis.org	(202) 628-6380
AWCMA	American Window Covering Manufacturers Association (Now WCMA)	
AWCI	Association of the Wall and Ceiling Industry www.awci.org	(703) 534-8300
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636

AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association) www.awpa.com	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
CCC	Carpet Cushion Council www.carpetcushion.org	(610) 527-3880
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.canelect.ca	(613) 230-9263
CEA	Consumer Electronics Association www.ce.org	(866) 858-1555 (703) 907-7600
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919

CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPA	Composite Panel Association www.pbmdf.com	 (703) 724-1128
CRI	Carpet and Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200 (800) 328-6306
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CSA	Canadian Standards Association www.csa.ca	(800) 463-6727 (416) 747-4000
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
ECA	Electrical Components Association www.ec-central.org	(703)907-8024
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (770) 968-7945

EJCDC	Engineers Joint Contract Documents Committee http://content.asce.org/ejcdc/	(703) 295-6000
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association (Electrostatic Discharge Association) www.esda.org	(315) 339-6937
ETL SEMCO	Intertek ETL SEMCO (Formerly: ITS - Intertek Testing Service NA) www.intertek-etlsemko.com	(800) 967-5352
FIBA	Federation Internationale de Basketball (The International Basketball Federation) www.fiba.com	41 22 545 00 00
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation) www.fivb.ch	41 21 345 35 35
FM Approvals	FM Approvals LLC www.fmglobal.com	(781) 762-4300
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridaroof.com	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0
GA	Gypsum Association www.gypsum.org	(301) 277-8686
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GRI	(Part of GSI)	
GS	Green Seal www.greenseal.org	(202) 872-6400

GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HI/GAMA	Hydronics Institute/Gas Appliance Manufacturers Association Division of Air-Conditioning, Heating, and Refrigeration Institute (AHRI) www.ahrinet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAPSC	International Association of Professional Security Consultants www.iapsc.org	(515) 282-8192
ICBO	International Conference of Building Officials www.iccsafe.org	(888) 422-7233
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
ICPA	International Cast Polymer Association www.icpa-hq.org	(703) 525-0320
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IES	Illuminating Engineering Society of North America www.iesna.org	(703) 525-0320
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 255-1561
IGMA	Insulating Glass Manufacturers Alliance	(613) 233-1510

	www.igmaonline.org	
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
ISA	Instrumentation, Systems, and Automation Society, The www.isa.org	(919) 549-8411
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
ISSFA	International Solid Surface Fabricators Association www.issfa.net	(877) 464-7732 (801) 341-7360
ITS	Intertek Testing Service NA (Now ETL SEMCO)	
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LGSEA	Light Gauge Steel Engineers Association www.arcat.com	(202) 263-4488
LMA	Laminating Materials Association (Now part of CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MCA	Metal Construction Association www.metalconstruction.org	(847) 375-4718
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(888) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc. www.metalframingmfg.org	(312) 644-6610
MH	Material Handling (Now MHIA)	
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190

MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937 (604) 298-7578
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(630) 942-6591
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6223 (281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAGWS	National Association for Girls and Women in Sport www.aahperd.org/nagws/	(800) 213-7193, ext. 453
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 222-2300
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200

NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (269) 488-6382
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NGA	National Glass Association www.glass.org	(866) 342-5642 (703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association) www.nofma.org	(901) 526-5016
NOMMA	National Ornamental & Miscellaneous Metals Association www.nomma.org	(888) 516-8585
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com	(800) 323-9736 (540) 751-0930
NWFA	National Wood Flooring Association www.nwfa.org	(800) 422-4556 (636) 519-9663

PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute http://pgi-tp.cee.uiuc.edu	(217) 333-3929
PTI	Post-Tensioning Institute www.post-tensioning.org	(248) 848-3180
RCSC	Research Council on Structural Connections www.boltcouncil.org	
RFCI	Resilient Floor Covering Institute www.rfci.com	(706) 882-3833
RIS	Redwood Inspection Service www.redwoodinspection.com	(925) 935-1499
SAE	SAE International www.sae.org	(877) 606-7323 (724) 776-4841
SCAQMD	South Coast Air Quality Management District www.aqmd.com	(909) 396-2000
SCTE	Society of Cable Telecommunications Engineers www.scte.org	(800) 542-5040 (610) 363-6888
SDI	Steel Deck Institute www.sdi.org	(847) 458-4647
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(877) 294-5424 (516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SIA	Security Industry Association www.siaonline.org	(866) 817-8888 (703) 683-2075
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association	(561) 533-0991

	www.smacentral.org	
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWPA	Submersible Wastewater Pump Association www.swpa.org	(847) 681-1868
TCA	Tilt-Up Concrete Association www.tilt-up.org	(319) 895-6911
TCNA	Tile Council of North America, Inc. www.tileusa.com	(864) 646-8453
TEMA	Tubular Exchanger Manufacturers Association www.tema.org	(914) 332-0040
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700

TPI	Truss Plate Institute, Inc. www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tileroofing.org	(312) 670-4177
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(800) 795-1747
USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association www.wcmanet.org	(212) 297-2122
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (312) 321-6802
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 570-5441
WWPA	Western Wood Products Association	(503) 224-3930

www.wwpa.org

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DIN	Deutsches Institut fur Normung e.V. www.din.de	49 30 2601-0
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

COE	Army Corps of Engineers www.usace.army.mil	(202) 761-0011
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce www.commerce.gov	(202) 482-2000
DOD	Department of Defense http://dodssp.daps.dla.mil	(215) 697-6257
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322
FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322

FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(800) 488-3111
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-4000
NCHRP	National Cooperative Highway Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
PBS	Public Buildings Service (See GSA)	
PHS	Office of Public Health and Science http://www.hhs.gov/ophs/	(202) 690-7694
RUS	Rural Utilities Service (See USDA)	(202) 720-9540
SD	State Department www.state.gov	(202) 647-4000
TRB	Transportation Research Board http://gulliver.trb.org	(202) 334-2934
USDA	Department of Agriculture www.usda.gov	(202) 720-2791
USP	U.S. Pharmacopeia www.usp.org	(800) 227-8772
USPS	Postal Service www.usps.com	(202) 268-2000

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA)	(800) 872-2253
	Architectural Barriers Act (ABA)	(202) 272-0080
	Accessibility Guidelines for Buildings and Facilities Available from U.S. Access Board www.access-board.gov	
CFR	Code of Federal Regulations	(866) 512-1800
	Available from Government Printing Office	(202) 512-1800
	www.gpoaccess.gov/cfr/index.html	
DOD	Department of Defense Military Specifications and Standards	(215) 697-2664
	Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification	(215) 697-2664
	Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil/	
	Available from Defense Standardization Program www.dsp.dla.mil	
	Available from General Services Administration	(202) 619-8925
	www.gsa.gov	
	Available from National Institute of Building Sciences	(202) 289-7800
	www.wbdg.org/ccb	
FTMS	Federal Test Method Standard (See FS)	
MIL	(See MILSPEC)	
MIL-STD	(See MILSPEC)	
MILSPEC	Military Specification and Standards	(215)

697-2664

Available from Department of Defense Single Stock Point
http://dodssp.daps.dla.mil

UFAS	Uniform Federal Accessibility Standards	(800) 872-2253
	Available from Access Board	(202) 272-0080
	www.access-board.gov	

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF	State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation	(800) 952-5210
	www.dca.ca.gov/bhfti	(916) 574-2041
CCR	California Code of Regulations	(916) 323-6815
	www.calregs.com	
CDHS	California Department of Health Services	(916) 445-4171
	www.dhcs.ca.gov	
CDPH	California Department of Public Health, Indoor Air Quality Section	
	www.cal-iaq.org	
CPUC	California Public Utilities Commission	(415) 703-2782
	www.cpuc.ca.gov	
TFS	Texas Forest Service Forest Resource Development	(979) 458-6606
	http://txforestservice.tamu.edu	

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES

A. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

B. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

B. Security Enclosure and Lockup: Lock entrances at end of each work day.

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.3 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.

2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.5 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

    a. Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Installation of the Work.
2. Cutting and patching.
3. Progress cleaning.
4. Starting and adjusting.
5. Protection of installed construction.
6. Correction of the Work.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

C. Qualification Data: For land surveyor professional engineer.

1.4 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

   a. Primary operational systems and equipment.
   b. Fire separation assemblies.
   c. Air or smoke barriers.
   d. Fire-suppression systems.
   e. Mechanical systems piping and ducts.
   f. Control systems.
   g. Communication systems.
   h. Fire-detection and -alarm systems.
   i. Conveying systems.
   j. Electrical wiring systems.
   k. Operating systems of special construction.
   l. Sprayed fire-resistive material.
   m. Equipment supports.
   n. Piping, ductwork, vessels, and equipment.
   o. Noise- and vibration-control elements and systems.

3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

   a. Use containers intended for holding waste materials of type to be stored.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 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. Burning: Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

D. Disposal: Remove waste materials and dispose of at designated spoil areas on Owner's property.

E. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 017300 "Execution" for progress cleaning of Project site.
2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.4 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by . Label with manufacturer's name and model number where applicable.
5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of five days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.5 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of five days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.6 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

1.7 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.

q. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
b. Enable inserted reviewer comments on draft submittals.

2. Two paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.

C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.

2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
   b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.

3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."

G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up record prints.

B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.

d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations below first floor.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j. Changes made by Change Order or Construction Change Directive.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

a. See Section 013300 "Submittal Procedures" for requirements related to use of Architect's digital data files.
b. Architect will provide data file layer information. Record markups in separate layers.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.

D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.

B. Format: Submit record Specifications as annotated PDF electronic file paper copy scanned PDF electronic file(s) of marked-up paper copy of Specifications.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

1.4 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   h. Performance curves.

2. Documentation: Review the following items in detail:

   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project record documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner, through Construction Manager, with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

END OF SECTION 017900

SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 INFORMATIONAL SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.

3. Coordination for shutoff, capping, and continuation of utility services.
4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

B. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

C. Predemolition Photographs or Video: Submit before Work begins.

D. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

E. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

D. Storage or sale of removed items or materials on-site is not permitted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
   1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

   1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Disconnect, demolish, and remove HVAC systems, equipment, and components indicated to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

    1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

    1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
    2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
    3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
    4. Cover and protect furniture, furnishings, and equipment that have not been removed.
    5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

B. Removed and Salvaged Items:
1. Pack or crate items after cleaning. Identify contents of containers.
2. Store items in a secure area until delivery to Owner.
3. Transport items to Owner's storage area designated by Owner.
4. Protect items from damage during transport and storage.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Miscellaneous fabricated ferrous metal items, galvanized, plated and primed painted.

1.3 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.5 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A 500, cold-formed steel tubing.

C. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: As indicated.

2.3 NONFERROUS METALS

A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.

B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.

D. Eyebolts: ASTM A 489.

E. Machine Screws: ASME B18.6.3.

F. Lag Screws: ASME B18.2.1.

G. Wood Screws: Flat head, ASME B18.6.1.

H. Plain Washers: Round, ASME B18.22.1.

I. Lock Washers: Helical, spring type, ASME B18.21.1.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.7 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.8 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, or unless otherwise indicated.

2.9 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

END OF SECTION 055000

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Rooftop curbs.
3. Wood blocking and nailers.
4. Wood furring and grounds.

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NHLA: National Hardwood Lumber Association.
3. NLGA: National Lumber Grades Authority.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

A. Lumber Grading Rules: APA, NFoPA, RS, WCLIB, and WWPA.

1. Lumber Materials: Comply with Chapter 23, Part 2, Title 24.
2. Wood blocking: Provide Douglas Fir No.2 grade for use as blocking, nailers, and similar applications.

2.2 ACCESSORIES

A. Fasteners

1. Common nails complying with Chapter 23, Part 2, Title 24, CCR, size as required to suit condition, as specified.
2. Screws: Stainless steel, minimum # 10 screw, length and type as required for fastening.
3. Provide hot dip galvanized steel fasteners at the following applications:

a. Exterior framing exposed to weather.
b. Framing of preservative treated lumber.

4. Box nails or "sinkers" are not permitted.

B. Framing Connectors:

1. Connector references, unless noted otherwise, are based on products as defined in the latest edition of the Simpson Strong-Tie catalog.
2. Use only fasteners as approved for listed connector. Where more than one type of fastener in the referenced series is scheduled, provide fastener with greatest capacity.

C. Bolts:

1. Bolts: A 307, machine bolts, size and type as indicated, with washers under head and nut Provide hot dipped galvanized at all conditions defined above for nail fasteners.

2. Lag Bolts: A 307, cut thread, size and type as indicated, with washers under head. Provide hot dipped galvanized at all conditions defined above for nail fasteners.

2.3 OTHER MATERAILS

A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

D. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Do not splice structural members between supports unless otherwise indicated.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

H. Erect wood framing members level and plumb. Place horizontal members laid flat, crown side-up.

I. Predrill holes for nails when fiecessary to prevent splitting, maximum hole size not more than 0.90 times nail diameter.

J. Drill holes for threaded fasteners as follows:

1. Wood Screws larger than # 14: Drill lead holes for shank and threaded portion to 7/8 times shank and thread root diameter, respectively.
2. Lag screws: Drill lead hole same diameter and depth as shank; drill hole for threaded portion to 0.7 times shank diameter.
3. Bolts: Oversize hole by not more than 1/16 inch.

K. Re-tighten all threaded fasteners before covering-up.

L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 PROTECTION

A. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 075552 - ROOF PATCHING - EXISTING WARRANTY

PART 1 - GENERAL

1.1 Summary

A. Patch existing roofing to ensure existing 30 year warranty stays in place. Existing roofing is Garland hot asphalt built-up roofing. Install new 4lb lead flashings at all new penetrations and include clamping and caulking. Match existing roofing system to keep existing warranties in place and verify compatibility. Contact Jason Busanovitch with the Garland Company at 951-300-8377 for information.

1.2 RELATED SECTIONS

A. The General Conditions and Division 1 requirements apply to the work of this Section

1.3 REFERENCES

A. American Society of Civil Engineers (ASCE):
   1. ASCE 7-05, Minimum Design Loads for Buildings and Other Structures.
B. American Society for Testing and Materials (ASTM):
   1. ASTM D41 Standard Specification for Asphalt Primer Used in Roofing, Dampproofing and Waterproofing.
   2. ASTM D312 Standard Specification for Asphalt Used in Roofing.
   3. ASTM D451 Standard Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.
   4. ASTM D2822 Standard Specification for Asphalt Roof Cement.
   5. ASTM D5147 Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.
   6. ASTM D6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
C. National Roofing Contractors Association (NRCA):
   1. Roofing and Waterproofing Manual. Follow this manual for any conditions not indicated herein or on the drawings.

1.4 SUBMITTALS PRIOR TO AWARD

A. Manufacturer's Installation Instructions: Submit installation instructions and recommendations indicating special precautions required for installing the membrane.
B. Letter from existing manufacturer stating that installing contractor is certified to install the necessary materials to keep existing warranty in place.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Base Flashing Ply: HPR Torchbase; SBS Torch Grade Base Sheet with woven fiberglass scrim reinforcement with the following minimum performance requirements according to ASTM D5147. Properties: (Finished Membrane):

1. Tensile Strength (ASTM D-5147)
   a. 2 in/min. @ 73.4 ± 3.6°F MD 210 lbf/in CMD 210 lbf/in
2. Tear Strength (ASTM D5147)
   a. 2 in/min. @ 73.4 ± 3.6°F MD 250 lbf CMD 250 lbf
3. Elongation at Maximum Tensile (ASTM D5147)
   a. 2 in/min. @ 73.4 ± 3.6°F MD 4.0% CMD 4.0%

B. Modified Mineral Capsheet Membrane Properties (Finished Membranes): Stressply IV Mineral; ASTM D6163, Type III Grade G

1. Tensile Strength (ASTM D5147)
   a. 2 in/min. @ 73.4 ± 3.6°F MD 210 lbf/in CMD 210 lbf/in
2. Tear Strength (ASTM D5147)
   a. 2 in/min. @ 73.4 ± 3.6°F MD 250 lbf CMD 250 lbf
3. Elongation at Maximum Tensile (ASTM D5147)
   a. 2 in/min. @ 73.4 ± 3.6°F MD 6.0% CMD 6.0%
4. Low Temperature Flexibility (ASTM D5147): Passes -20°F (-29°C)

C. Garla Prime Asphalt Primer: V.O.C. compliant, ASTM D-41.

D. Garla Flex Rubberized Asphalt Roofing Mastic: V.O.C. compliant, ASTM D-2822, Type II.

E. Drain Flashings and plumbing stacks: 4lb lead jacks. Spun lead jacks are not acceptable.

F. Title 24 coating: Bright white acrylic roof coating, must meet Title 24 requirements.

G. Glass Fiber Cant: Continuous triangular cross Section made of inorganic fibrous glass used as a cant strip as recommended by the membrane manufacturer.

H. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel. Fasteners shall be self-clinching type of penetrating type as recommended by the manufacturer of the deck material. Nails and fasteners shall be flush-driven through flat metal discs of not less than one (1) inch diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than one (1) inch diameter are used.

I. DensDeck Prime: ¼” recovery board

J. Urethane Caulking: Tuff Stuff urethane caulking

PART 3 - EXECUTION

3.1 PRECAUTIONS

A. General:

1. Provide protection to eliminate building damage from accidental spilling of asphalt or debris. Exercise good judgment and good workmanship when engaged in the preparation of roofing asphalt. Plug penetrations to prevent seepage of asphalt to building interior.

2. Damages to building, grounds or equipment done as a result of negligence shall be repaired by Contractor at no additional cost to the Owner.

3.2 APPLICATION

A. New Curbs or roof patches: Where noted, patch existing built-up capsheet roofing, at a minimum as follows. Match existing roofing manufacturer's products and perform all manufacturer's recommended procedures to maintain any effective warranties.

1. Cut back roofing 1' in all directions from all penetrations and curbs that are to be removed, replaced, or installed per drawings.
2. Sixteen inches (16") past where the roofing was cut back in all directions, the surface area of the existing roof coating needs to be removed from the top ply to provide a solid and clean attachment point for the new roofing to be applied. Areas with white coating or gravel must be heated up carefully with a torch until materials are loosened and then scraped off and disposed of.
3. Install ¼" Densdeck Prime directly to the deck to areas where roof was removed and secure with galvanized 3" plates and #14 screws.
4. Prime existing roofing where top surface was scraped off with 1 gallon per square of Garla Prime roofing primer, allow to dry.
5. Torch one ply of HPR Torchbase over entire area. Run up and over all curbs. Extend 8' onto existing roofing.
6. Install one ply of Stressply IV Mineral over entire area. Run up and over all curbs. Extend 16" onto existing roofing, 8" past the HPR Torchbase smooth layer.
7. All new pipe penetrations and/or pipe penetrations that are within the repair area shall receive new 4lb lead flashings with primed flanges, set in ¼" bed of mastic, and clamped and caulked at the top per manufacturer's guidelines. Caulking to be Tuff Stuff urethane sealant.
8. Coat all new roofing with 3 gallons per square of Title 24 roof coating. Extend new coating 1' onto existing roof coating that was left in place beyond the new roof patch.
9. Install new metal pans over curbs per SMACNA and NRCA guidelines. Solder all joints, hem all edges. Refer to Section 07600.

10. Water test area with a hose, repeat steps 1 through 8 if any leaks are found. Test to owner's satisfaction. No ponding in excess of 1/8" deep will be accepted in the area of the roof patch.

B. New pipe penetrations: Where noted, patch existing built-up capsheet roofing, at a minimum as follows. Match existing roofing manufacturer's products and perform all manufacturer's recommended procedures to maintain any effective warranties.

1. Remove Title 24 coating one foot (1') in all directions from all penetrations and curbs that are to be replaced or installed per drawings. The surface area of the existing roof coating needs to be removed from the top ply to provide a solid and clean attachment point for the new roofing to be applied. Areas with white coating or gravel must be heated up carefully with a torch until materials are loosened and then scraped off and disposed of.
2. All new pipe penetrations and/or pipe penetrations that are within the repair area shall receive new 4lb lead flashings with primed flanges that are clamped and caulked at the top.
3. Prime existing roofing where top surface was scraped off and entire top and bottom of roof jack flashing flange with 1 gallon per square of Garla Prime roofing primer, allow to dry.
4. Set roof flashing in ¼" bed of mastic
5. Torch one ply of HPR Torchbase over entire area. Extend four inches (4") past roof jack flange in all directions onto existing roofing.
6. Install one ply of Stressply IV Mineral over entire area. Extend 4" past smooth torch layer in all directions onto existing roofing.
7. Seal base of pipe penetration transition with roofing mastic.
8. Coat all new roofing with 3 gallons per square of Title 24 roof coating. Extend new coating 1' onto existing roof coating that was left in place beyond the new roof patch.
9. Water test area with a hose, repeat steps 1 through 8 if any leaks are found. Test to owner's satisfaction. No ponding in excess of 1/8" deep will be accepted in the area of the roof patch.

C. INSTALLATION AND WARRANTY

1. Install roofing systems in accordance with the manufacturer's written instructions. Provide letter from original roofing manufacturer to verify that all existing warranties in effect will be maintained. Contractor to provide 2 year warranty program to repair any leaks on all new repairs at no additional cost.

D. SHEET METAL FLASHINGS

1. Sheet metal flashings shall be as detailed on the drawings. Where not specifically noted, follow SMACNA and NRCA guidelines. Solder all joints, hem all edges. Refer to Section 07600.

3.3 CLEANING UP

A. All Debris resulting from this work shall be removed and premises left in good condition. Remove materials and roofing equipment as well as debris from site within two days after completion of the roofing work.

END OF SECTION 075552

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sealants and joint treatment necessary to provide a positive barrier against passage of moisture and air.
2. Sealants at all penetrations of sound rated walls and floors.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

D. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Provide adequate numbers of skilled staff, thoroughly trained and experienced in the necessary craft and installation methods associated with the specified products.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

1.5 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

C. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. 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.

1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

E. 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.

F. 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.

G. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

H. In concealed installations, and in partially or fully exposed installations where approved by the Architect, use standard gray sealant.

2.2 SEALANTS

A. General:

1. All sealants for any one Type shall be the product of a single manufacturer, suitable for the intended use, and per the following product characteristics.
2. Unless noted otherwise, use sealants in application as defined below.
3. For other applications provide products especially formulated for the proposed use and approved in advance by the Architect.

B. Product Characteristics:

1. Type 1: Unless noted otherwise, at exterior openings, joints, material transitions, bedding, and other conditions where anticipated joint movement will be plus/minus 25% or less.

    a. Products: Dow Corning 795, Pecora 895, Tremco Tremsil 600, or equal.

2. Type 2: At all exposed metal to metal wall and roof flashing conditions, all exposed prefinished metal roofing and flashing conditions; storefront perimeter conditions, and all other conditions where anticipated joint movement will be plus/minus 25 - 50%.

    a. Products: Dow Corning 795, GE Silicones Silglaze II, or equal.

3. Type 3: At horizontal concrete paving joints exposed to pedestrian and vehicular traffic, and all joints subject to immersion:

    a. Products: Pecora DynaTred, Mameco Vulkem 227, Sonneborn NP2, or equal.

4. Type 4: Exterior application in conjunction with wood products:

    a. Tremco Dymonic, Sika Sikaflex-1a, Sonneborn NP1, or equal.

5. Type 5: Pipes and conduits penetrating underground walls:

    a. Sealant compatible with waterproofing system.

6. Type 6: Interior applications in conjunction with sanitary conditions (nonfooduse):

    a. Products: General Electric Silicone Sanitary Sealant 1702, Dow Corning 786, Pecora 898 Sanitary Silicone Sealant, or equal.

7. Type 7: Interior sound control applications.

    a. Products: USG Sheetrock Acoustical Sealant, Pecora AC20FTR, Tremco Acoustical Sealant, or equal.

8. Type 8: Unless noted otherwise, at interior openings, joints, material transitions and bedding, at locations shown on drawings, and other conditions where anticipated joint movement will be 25% or less.

    a. Products: Pecora 864, Dow Corning 795, Sonneborn Omniseal, or equal.

9. Type 9: At all concealed prefinished metal roofing and flashing conditions, provide butyl sealant as recommended by metal roofing manufacturer.
10. Type 10: At all metal flashing and gutter joints subject to periodic or continuous water immersion:

    a. Products: Dow Corning 799, Pecora 863, or equal.

11. Type 11: At joints in acoustical laminated glass:

    a. Products: Dow Corning 795, Pecora 895, Tremco Tremsil 600, or equal.

12. For other applications provide products especially formulated for the proposed use and approved in advance by the Architect.

2.3 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Unglazed surfaces of ceramic tile.
    c. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

    1. Do not leave gaps between ends of sealant backings.
    2. Do not stretch, twist, puncture, or tear sealant backings.
    3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

    1. Place sealants so they directly contact and fully wet joint substrates.
    2. Completely fill recesses in each joint configuration.
    3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

F. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 230010 - MECHANICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Conditions and Supplementary Conditions shall apply to and form part of this Division.

1.2 SUMMARY

A. Work includes, but is not limited to, the following:

1. Labor, material, equipment and transportation to complete the Work as shown on the drawings, specified herein and/or implied thereby.
2. A requirement of the plumbing sections shall be to provide make-up water and drain final connections to systems and equipment.
3. It is the intent of the project that the installation be coordinated to provide a complete and usable facility.

B. Work not included in this division:

1. Painting, except as hereinafter specified. See Division 9 for painting.
2. Electrical, except for controls hereinafter specified. See Division 26 for electrical.

C. Related Sections include the following:

1. Division 1 Section 01 91 00 “General Commissioning Requirements.”
2. Division 23 Section 23 09 80 “Mechanical Commissioning.”
3. Division 23 Section 23 00 50 “Basic Mechanical Materials and Methods.”

1.3 DEFINITIONS

A. Unless otherwise specified, "all clarification from," "field direction by," "submittals to," "approved by," "processed by," "permission from," and like mentioned herein shall mean from/by/to Architect.

B. "Provide" means furnish and install referenced item with all appurtenances.

C. "Shall" indicates a mandatory requirement.

D. "Air conditioning" is defined as the treatment and/or handling of any air to any degree by the systems shown on the drawings and herein specified and is not restricted to refrigerated cooling.

1.4 DELIVERY AND STORAGE OF MATERIALS

A. Provide for the safety and good condition of all materials and equipment until final acceptance by the Owner. Protect all materials and equipment from damage from any cause whatever, and provide adequate and proper storage facilities during the progress of the work. Replace all damaged and defective work, material or equipment prior to filing application for final acceptance. Properly protect all openings to equipment, piping, ductwork, accessories, etc. from dirt, dust, and debris prior to and during installation of the work. Ductwork stored at the jobsite shall be covered to protect from dirt, dust, debris, fire proofing, etc.

1.5 CODES AND STANDARDS

A. Work and materials shall be in full accordance with the latest rules and regulations of the Local Fire Marshal; the National Electric Code (NEC); the Uniform Plumbing Code; the California Plumbing Code; California Administrative Code, Title 24, (CAL/OSHA); Local Building Codes; the Uniform Mechanical Code; the California Mechanical Code; Vol. II of the Uniform Building Code; Volume I and II of the California Building Code; SMACNA "Guidelines for Seismic Restraints of Mechanical Systems"; and other applicable codes, laws or regulations of bodies lawfully empowered and having jurisdiction over this project. Nothing in the plans or specifications shall be construed to permit work not conforming to these codes. When codes conflict with one another, provide larger, higher or more restrictive standards without additional costs.

1.6 PERMITS

A. Obtain all permits, patent rights, and licenses that are required for the performing of this work by all laws, ordinances, rules and regulations, or orders of any officer and/or body. Provide all notices necessary in connection therewith, and pay all fees relating thereto and all costs and expenses incurred on account thereof. No work shall be covered before inspection by the jurisdictional authorities and observation by the Architect or the owner's designated representatives.

1.7 EXPLANATION AND PRECEDENCE OF DRAWINGS

A. Drawings and specifications are intended to be read together so that any work mentioned in one and not the other shall be executed the same as if mentioned in both.

B. For purposes of clearness and legibility, drawings are essentially diagrammatic. The size and location of equipment is drawn to scale wherever possible. Contractor shall make use of data in the contract documents and shall verify this information at the building site.

C. Where the contract specifications and/or drawings are in conflict, obtain clarification of such during bidding. Where addenda for clarification of such is not timely, base the bid on the higher standards or more restrictive requirements; prior to fabrication, obtain written clarification.

D. The drawings indicate required size and points of termination of pipes, and suggest proper routes to conform to structure, avoid obstructions and preserve clearances. It is not intended that drawings indicate necessary offsets. The Contractor shall make the installation in such a

manner as to conform to the structure, avoid obstructions, preserve headroom and keep openings and passageways clear, without further instructions or costs to the Owner.

E. It is intended that apparatus be located symmetrical with architectural elements. Refer to architectural details in completing the correlating work.

F. The Contractor shall study drawings and specifications including, and not limited to, architectural, structural, mechanical, plumbing, fire protection, and electrical to determine conflict with ordinances and statutes. Errors or omissions shall be reported in writing, and changes shall be included in the as-built drawings and the additional work performed at no cost to the Owner.

G. Submittal of bid shall indicate the Contractor has examined the site and drawings and has included required allowances in his bid. No allowance shall be made for any error resulting from Contractor's failure to visit job site and to review drawings and specifications. Bid shall include costs for required drawings and changes as outline above, all at no cost to owner.

1.8 RECORD DRAWINGS

A. In addition for requirements for shop drawings specified elsewhere, provide and maintain on the job one complete set of blue line prints of the record drawings for all the mechanical and plumbing work. Carefully record on this set of prints, work including piping, valves, etc., which is installed differently from that indicated in the specifications and on the drawings; locate dimensionally from fixed points. The depth shall be indicated for all plugged wyes, tees and capped lines.

B. These record drawings shall be continuously kept up-to-date, and shall be available for inspection at all times. Existing lines discovered shall be indicated on these drawings.

C. At completion of work, provide a neat and legible reproducible set of these up-to-date record drawings which shall be individually signed and dated by the Contractor and the job inspector as to their accuracy.

D. Record drawings shall be submitted for acceptance and approval to the Architect and Mechanical Engineer before final certificate of acceptance will be issued.

E. Record drawings shall show the exact location of all control sensor devices.

1.9 CUTTING AND PATCHING

A. Perform all cutting and fitting required for work of this section in rough construction of the building. Obtain permission of the Structural Engineer prior to cutting any structural building elements.

B. All patching of finished construction of building shall be performed under the sections of specifications covering these materials by the trades at no additional cost to the Owner.

C. All cutting of concrete work by Contractor shall be by core drilling or concrete saw. No cutting or coring shall be done without first obtaining the permission of the Architect and Owner.

D. All patching of existing surfaces shall match existing material and finish.

1.10 DAMAGE BY LEAKS

A. Contractor shall be responsible for damage to the grounds, walks, roads, buildings, finishes, surfaces, materials, equipment, piping systems, electrical systems and their equipment and contents, caused by leaks in the piping systems being installed or having been installed herein. He shall repair at his expense all damage so caused. All repair work shall be done as directed by the Architect and Owner.

1.11 EMERGENCY REPAIRS

A. The Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding the Contractor's guarantee bond nor relieving the Contractor of his responsibilities.

1.12 LOCATIONS

A. Coordinate in advance of the work, requirements for openings, equipment maintenance clearances, recesses and chases in the walls, partitions, equipment housekeeping pads, framing or openings. Should furnishing this information be neglected, delayed or incorrect and additional cutting is found to be required, the cost of same shall be borne by the Contractor. Nothing in this paragraph shall be construed to relieve the Contractor of the responsibility for providing and paying for the required core drilling and openings in existing work.

B. Diagrammatic Indications on Drawings are:

1. Approximate only.
2. At various locations shown distorted for clarity.

C. Exact Locations Shall:

1. Be as required for proper installation in available space.
2. Avoid interference with architectural, electrical and structural features.
3. Be coordinated with the work of other trades toward the general purpose of having the work progress rapidly and smoothly with a minimum interference between one trade and another.
4. Preserve headroom and keep openings and passageways clear.
5. Have a neat arrangement symmetrical to the building lines, light and tile pattern.
6. Be reasonably accessible for hung ceiling areas for maintenance from the floor below. Equipment, valves, and other items requiring maintenance, adjustment and/or observation shall be accessible.

1.13 SUPPORTS, EQUIPMENT PADS, STAGING, ETC.

A. Construction supports required for the proper installation of equipment shall be in accordance with the drawings, manufacturer’s requirements, seismic requirements, and applicable codes.

Check architectural and structural drawings for equipment pads by others. Provide staging, scaffolds, platforms, ladders or similar facilities required to properly install the work.

1.14 INTERRUPTION OF UTILITIES

A. The Contractor shall schedule and coordinate all interruptions of utilities with the Architect and Owner within 30 days after award of contract. The Contractor shall submit to the Owner a schedule of proposed interruptions. At least 72 hours prior to the interruption, the contractor shall submit a request indicating the proposed date and duration of interruption, the work to be accomplished, the areas which will be affected and a proposed contingency plan to be followed in the event that normal service or facilities cannot be restored on schedule. Do not commence work until the time, date, and contingency have been approved in writing by the Architect and Owner.

B. Provide any labor and materials necessary to restore services on a contingency basis should normal service or facilities not be restored on schedule.

C. Preparatory work associated with each interruption shall be performed during normal work hours. The actual interruption required for tie-in shall be performed between 8 P.M. and 5 A.M. Maximum shutdown during this period of any system shall be 4 hours.

1.15 SUBSTITUTIONS

A. If substitutions of controls or equipment requires any changes in the architectural, structural, mechanical, plumbing or electrical work from that shown on the drawings(including all environmental characteristics), the extra cost of the equipment or architectural, structural, mechanical, plumbing or electrical work shall be responsibility of the Contractor requesting the substitution. All substitutions shall be approved by the Architect before purchase by the contractor.

B. If the Contractor proposes substitutions of any equipment specified herein or on the drawings, it shall be the Contractor's responsibility to obtain approval from the Architect for such equipment as well as approval for anchorage of such equipment from the Architect, Structural Engineer, and governing approval agencies (Department of the State Architects - DSA),. All costs required for such approval shall be the responsibility of the Contractor requesting the substitution.

1.16 PREPARATION OF SUBMITTALS

A. Refer to Division 1. In addition to the requirements of Division 1, provide the requirements specified herein.

B. Prior to commencement of work and in accordance with the General Requirements, submit for review six copies of proposed equipment and material submittals. The Contractor shall verify the delivery dates are compatible with the specified construction schedule; and verify the equipment is sized to accommodate the conditions specified. Submittals shall include manufacturer’s names and model numbers and shall comply with specifications and drawings.

The Contractor shall bear the cost of changes necessary to accommodate substitutions if substitution is approved.

C. Provide formal submittal to Architect. Review of the formal submittal is only for general conformance with design concept of project and general compliance with the information given in the contract documents. The Contractor is responsible for confirmation and correlation of the dimensions, quantities and sizes, for information that pertains to fabrication methods or construction techniques, and for coordination of work of all trades. Deviations from Drawings and Specifications shall be clearly and completely indicated (by a separate letter) in the formal submittals. Reviewed Submittals shall not relieve the Contractor of responsibility for errors or deviations.

1. Where specific model numbers and/or manufacturers are specified or shown, it is the intent of the contract documents to procure the specified item(s). Alternate equipment may not be used unless data is submitted for consideration as a substitution in accordance with General Requirements and this section.
2. Model numbers used may not indicate all features or options required for this specific installation. Modify the specified models to comply with the requirements, as specified or shown.
3. Product Data for Proposed Substitutions:

   a. Submit copies of complete data, with drawings and samples as appropriate, including:

      1) Comparison of the qualities of the proposed substitution with that specified.
      2) Changes required in other elements of the work because of the substitution.
      3) Affect on construction schedule.
      4) Cost data comparing the proposed substitution with the product specified.
      5) Availability of maintenance service and source of replacement materials.
      6) Reference to three (3) projects similar to this where such equipment is installed and operating to two (2) or more years.

   b. Acceptance of substitutions is entirely at the discretion of the Architect.

D. Formal submittals shall be complete with catalog data and information properly marked to indicate equality of material (where substitution is allowed and desired), adequacy in capacity and performance to meet minimum capacities or performance as specified or indicated. Arrange the submittals in the same sequence as these Specifications and indicate the Section and Paragraph number (in the upper right-hand side with tabs) for which each submittal is intended. Incomplete submittals shall be rejected.

E. Do not fabricate order or deliver materials or equipment until formal submittals have been approved. Where material or equipment is used without such permission, it is deemed that the material or equipment shall be in complete compliance with drawings and specifications, without additional cost where such compliance is lacking and may be required to be altered in the field.

F. Submittals shall be bound and shall include, at a minimum, the following:

1. Complete bill of materials listing equipment furnished.

2. Catalog cut sheets of every component being provided (highlighted).
3. Provide completed blue-line shop drawings of the packaged equipment detailing all field connection points.
4. Dimensions, clearance requirements, weights, and capacities.
5. Wiring diagrams showing control interface as applicable.
6. Warranty sheets.
7. Pressure drops as applicable.

G. Contractor shall incur all costs for time spent by Engineer for review of more than two submittals on each item. Costs shall be based on Engineer's hourly billing rate schedule at the time of review. Rate schedule available upon request. Engineer shall invoice the contractor upon completion of review and shall be paid by the contractor within 30 days of date of invoice. Failure to remit will withdraw approval (if any) of submittals in question.

1.17 SHOP DRAWINGS:

A. Proceed with preparation of shop drawings immediately upon receiving an authorization to proceed for the project. Shop drawings shall be originally prepared by the contractor. Provide minimum 1/4" scale shop drawings in electronic format. Submit a complete set in one package prior to material fabrication, order and installation.

B. Include:

1. Duct and pipe elevations and sizes.
2. Double line ductwork and piping (4” and larger).
3. Actual size of purchased equipment from certified shop drawings.
4. Access panels including ceiling panels.
5. Access clearances for equipment.
6. Actual locations of ceiling diffusers/ supply registers ad return registers.
7. Actual locations of manual volume dampers.
8. Locations of structural penetrations such as beams.
9. Actual location of control panels and power connections to equipment.
10. Color coded duct and piping based on material used.
11. Label and tag schedule for equipment.
12. Duct transitions to clear beams or tight areas.
13. Room temperature sensor locations.
14. Point of connection to utilities outside the building.
15. Sections or 3-dimensional drawings of congested areas.
16. Gridlines.
17. Duct and piping supports on roof.

C. Coordinate with other trades in preparation of shop drawings.

D. Submit a copy of coordinated shop drawings to General Contractor for distribution to other trades, including electrical and fire sprinkler contractor.

E. Submit to commissioning agent for approval to assure design intent is met.

F. Prior to fabrication and upon receiving approval from commissioning agent, submit a complete set of shop drawings at one time to the mechanical engineer.

1.18 ELECTRICAL REQUIREMENTS

A. Coordinate the following items with Division 26:

1. Power wiring
2. Power Supply Voltage Requirements
3. Safety switches
4. Combination controllers
5. Disconnect switches
6. Motor starters
7. Circuit breakers
8. Motor-control equipment forming part of motor control centers or switchgear assemblies
9. Electrical connections of the mechanical equipment to the electrical power source shall be coordinated with and provided under Division 26.

1.19 MOTORS

A. Before order is placed for electrical devices, the Contractor shall check with the Electrical contractor and verify requirements as to type, mounting and current characteristics as well as to any special delivery instructions. Motors provided under Division 23 shall be minimum of 10% normal rating above brake horsepower (BHP) rating of equipment driven.

1.20 TESTS

A. Contractor shall make tests required by legally constituted authorities and as listed below.

1. Tests shall be made in the presence of the Owner or his representative and a duly authorized inspector. The Owner or his representative shall be notified 5 days before tests are made.
2. Concealed work and insulated work shall remain uncovered until required testing has been performed and approved by the Owner. If work to be tested is covered before the approval of the Owner or his authorized representative has been obtained, it shall be uncovered for testing at the Contractor's expense.
3. Obtain required documents of certification indicating approval, acceptance and compliance with the requirements of all administrative authorities having jurisdiction over the work. No final payment shall be made until all such certificates are delivered to the Owner.
4. Furnish labor, materials, instruments and bear other costs in connection with all tests.
5. Piping systems, except as hereinafter noted, shall be given hydrostatic (with water) test of a least 150% of the maximum operating pressure but no less than 150 psig.
6. Before making test, remove or valve off from the system, gauges, traps, and other apparatus or equipment which may be damaged by test pressure.
7. Install a calibrated test pressure gauge in the system to observe any loss in pressure. Maintain the required test pressure for a sufficient length of time to enable an inspection

to be made of all joints and connections. Perform tests after installation and prior to acceptance.

8. Final pressures at the end of the test period shall be no more or less than that caused by expansion or contraction of the test medium due to temperature changes.
9. After tests have been made and leaks repaired, clean and flush systems as hereinafter specified. Water piping shall be left under supply main pressure for the balance of the construction period.
10. Tests for mechanical, plumbing, and fire protection systems are specified within their own section. Equipment and ductwork system tests are specified in the test and balance section.
11. Provide necessary provisions and tests for maintaining the operational condition and cleanliness of existing systems.

1.21 LABOR AND MATERIALS

A. Labor shall be carefully skilled for this kind of work, and under the direction of a competent foreman.

B. Materials shall be new, in perfect condition and of domestic manufacturer. Materials for similar uses to be of same type and manufacturer.

C. Equipment shall bear the manufacturer's label showing performance characteristics. Identifying size number shall be given only when it is not practicable or customary to show performance characteristics.

D. Valves, pipe, fittings, etc., shall bear the manufacturer's name or trademark.

E. Unless otherwise specified herein, equipment and fixtures shall be installed in accordance with the manufacturer's recommendations, including recommended service and removal clearances.

1.22 PROTECTION AND CLEAN-UP

A. Protection: Provide for the safety and good condition of materials and equipment until final acceptance of the Architect. Protect materials and equipment from dirt, dust, debris, and damage from any cause whatever, and provide adequate and proper storage facilities during the progress of the work and replace all damaged and defective material, equipment or work precedent to filing application for final acceptance.

B. Cleaning:

1. Unless a more stringent requirement is specified, thoroughly clean all parts of the piping, ductwork, fixtures, apparatus and equipment. All parts shall be thoroughly cleaned of dirt, dust, debris, cement, plaster and other materials, and all grease and oil spots removed. Such surfaces shall be carefully wiped and all cracks and corners scraped out. Clean all systems, including piping and ductwork prior to test.
2. Exposed rough metal work shall be carefully brushed down with steel brushes to remove rust and other spots and left in clean condition to receive painter's finish. Where factory

prime coat has been damaged, this Contractor shall be responsible for restoration of same.

1.23 ACCESS PANELS

A. Access Doors and Panels:

1. Wherever volume dampers, fire dampers, smoke fire dampers, controls, valves or other items or parts of the installation which require periodic inspection or adjustments are concealed by permanent non-removable construction, an access door shall be provided. Rating of access panel shall be determined by rating of wall or ceiling in which panel is installed. Types to be as approved and as appropriate for the surface and construction in which it is installed. Verify all locations with Architect and other trades.
2. Access doors and panels shall be of sufficient size and shall be located properly to assure service to the intended item.

1.24 MAINTENANCE, OPERATION INSTRUCTION

A. General: Thoroughly instruct the Owner's operators in every detail of operation of the system. Provide the Owner with a list of all equipment, giving the manufacturer's name, model number, serial number, parts list and complete internal wiring diagrams. All directions for operation furnished by the manufacturer shall be carefully saved and turned over to the Owner, together with written sequence of operation, operating and maintenance instructions for each system and its equipment. Instruction shall consist of a minimum of four 8-hour periods over consecutive days and shall be 30% classroom and 70% at site location. Coordinate scheduling of instruction times with Owner's operators.

B. Specific Data: Submit four complete sets of the following data to the Owner for approval and commissioning agent for review prior to acceptance of the installation, complete and at one time; (partial or separate data will not be accepted) data shall consist of the following:

1. Valve Directory: Indicating valve number, location, function and normal operating position for each.
2. Color code schedule.
3. Equipment: List of name plates, including name plate data.
4. Manufacturer's Literature: Copies of manufacturer's instructions for operation and maintenance of all mechanical equipment, including replacement parts lists and drawings. Mark or highlight brochure literature indicating the models, sizes, capacities, curve operating points, etc., in a manner to clearly indicate the equipment installed. Remove all pages or sheets from the bulletin and catalogs that do not pertain to equipment installed on the project.
5. Written Instructions: Typewritten instructions for operation and maintenance of the system composed of OPERATING INSTRUCTIONS, MAINTENANCE INSTRUCTIONS and a MAINTENANCE SCHEDULE.

    a. OPERATING INSTRUCTIONS shall contain a brief description of the system. Adjustments requiring the technical knowledge of the service agency personnel

shall not be included in the operating instructions. The fact such adjustments are required, however, shall be noted.

b. MAINTENANCE INSTRUCTIONS shall list each item of equipment requiring inspection, lubrication or service and describe the performance of such maintenance.

c. MAINTENANCE SCHEDULE shall list each item of equipment requiring maintenance, shall show the exact type of maintenance on every component of each item of equipment, and shall show when each item of equipment should be inspected or services.

6. Instructions: Operating personnel shall be instructed in the operation of the system in accordance with typewritten, approved instructions.

C. Binders: Provide complete sets of the above data in loose-leaf ring-type binders with permanent covers, with identification on front and on spine.

1.25 SPECIAL REQUIREMENTS

A. During the guarantee period and as directed by the Owner, make any additional tests, adjustment, etc., that may be required and correct any defects or deficiencies arising from operation of the systems. Operational tests shall be made during both heating and cooling seasons and on all systems.

B. Completion:

1. The entire mechanical system shall be commissioned in accordance with ASHRAE Guideline 1-1996 and the requirements of this specification. A final commissioning report shall be approved by the Owner, Architect, and Mechanical Engineer prior to final acceptance of the work.
2. When the installation is complete and adjustments specified herein have been made, the system, shall be operated for a period of one week, during which time it shall be demonstrated to the Owner or his representative as being completed and operating in conformance with these specifications. The Contractor shall schedule all work so that this time period, which is to confirm a "bug-free" system, will occur before the total project is accepted for substantial completion by Owner.
3. The work hereunder shall not be reviewed for final acceptance until operating and maintenance data, manufacturer's literature, valve directories, piping identification code directory, and nameplates specified herein have been approved and properly posted in the building.

1.26 WARRANTY/GUARANTEE

A. The contractor shall warranty/guarantee that materials, apparatus, and equipment furnished and installed under the mechanical division of these specifications shall be new and free from all defects. Should any defects develop, within one year (unless a longer period is listed in other sections of the specifications) from the date of final acceptance by the owner or from the date of certificate of substantial completion, whichever is earlier, due to inferior or faulty materials and/or workmanship, the trouble shall be corrected by this Contractor without expense to the

Owner. Any defective materials or inferior workmanship noticed at the time of installation or during the guarantee period shall be corrected immediately to the entire satisfaction of the Owner.

B. The work shall be installed of such materials and in such a manner that:

1. The operation of all parts of the system shall be noiseless to the extent that no objectionable sound of operation will be heard outside of the rooms enclosing the apparatus or equipment.
2. Apparatus or equipment shall operate in accordance with detailed specifications covering each item.
3. Contractor shall, at his own expense, make any adjustments or changes required to produce a condition of quietness satisfactory to the Engineer or his representative. Such adjustments or changes shall not reduce the performance or quantities called for on the drawings.
4. Contractor shall guarantee that his installation of all materials and equipment will meet the performance requirements of these specifications and that all equipment will deliver the specified or required capacities.
5. The Owner reserves the right to make temporary or emergency repairs as necessary to keep equipment in operating condition without voiding the guarantee contained herein nor relieving the Contractor of his responsibilities during the guarantee period.
6. Contractor shall be responsible for all damage to any part of the premises caused by leaks or break in pipe lines, fixtures or equipment furnished and installed under his contract for a period of one year after date of acceptance of the project by Owner. He shall replace in kind, at his own expense, any and all items so damaged to the complete satisfaction of the Owner.

END OF SECTION 230010

SECTION 230050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following basic mechanical materials and methods to complement other Division 23 Sections.

1. Piping materials and installation instructions common to most piping systems.
2. Concrete base construction requirements.
3. Escutcheons.
4. Dielectric fittings.
5. Flexible connectors.
6. Mechanical sleeve seals.
7. Equipment nameplate data requirements.
8. Labeling and identifying mechanical systems and equipment is specified in Division 23 Section "Identification for HVAC Piping and Equipment."
9. Nonshrink grout for equipment installations.
10. Field-fabricated metal and wood equipment supports.
11. Installation requirements common to equipment specification sections.
12. Cutting and patching.
13. Touchup painting and finishing.

B. Pipe and pipe fitting materials are specified in Division 23 piping system Sections.

C. Related Sections include the following:

1. Division 1 Section "LEED Requirements".

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for rubber materials:

1. CR: Chlorosulfonated polyethylene synthetic rubber.
2. EPDM: Ethylene propylene diene terpolymer rubber.

1.4 SUBMITTALS

A. Product Data: For dielectric fittings, flexible connectors, mechanical sleeve seals, and identification materials and devices.

B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.

C. Shop Drawings: Detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.

D. Coordination Drawings: For access panel and door locations.

E. Coordination Drawings: Detail major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:

1. Planned piping layout, including valve and specialty locations and valve-stem movement.
2. Clearances for installing and maintaining insulation.
3. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
4. Equipment and accessory service connections and support details.
5. Exterior wall and foundation penetrations.
6. Fire-rated wall and floor penetrations.
7. Sizes and location of required concrete pads and bases.
8. Scheduling, sequencing, movement, and positioning of large equipment into building during construction.
9. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
10. Reflected ceiling plans to coordinate and integrate installation of air outlets and inlets, light fixtures, communication system components, sprinklers, and other ceiling-mounted items.

F. Samples: Of color, lettering style, and other graphic representation required for each identification material and device.

1.5 QUALITY ASSURANCE

A. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate mechanical equipment installation with other building components.

B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.

C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.

E. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

F. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section.

G. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dielectric Unions:

a. Epco Sales Inc.
b. Watts Industries, Inc.; Water Products Div.
c. Zurn Industries, Inc.; Wilkins Div.

2. Dielectric Flanges:

a. Epco Sales Inc.
b. Watts Industries, Inc.; Water Products Div.

3. Dielectric-Flange Insulating Kits:

a. Calpico, Inc.
b. Central Plastics Co.

4. Dielectric Couplings:

a. Calpico, Inc.
b. Lochinvar Corp.

5. Dielectric Nipples:

a. Grinnell Corp.; Grinnell Supply Sales Co.
b. Victaulic Co. of America.

6. Mechanical Sleeve Seals:

a. Calpico, Inc.
b. Metraflex Co.
c. Thunderline/Link-Seal.

2.2 PIPE AND PIPE FITTINGS

A. Refer to individual Division 23 piping Sections for pipe and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 23 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32.

1. Alloy E: Approximately 95 percent tin and 5 percent antimony, lead free.

F. Brazing Filler Metals: AWS A5.8.

1. BCuP Series: Copper-phosphorus alloys.
2. BAg1: Silver alloy.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.

I. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.

1. Sleeve: ASTM A 126, Class B, gray iron.
2. Followers: ASTM A 47 malleable iron or ASTM A 536 ductile iron.
3. Gaskets: Rubber.
4. Bolts and Nuts: AWWA C111.
5. Finish: Enamel paint.

2.4 DIELECTRIC FITTINGS

A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.

B. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.

C. Insulating Material: Suitable for system fluid, pressure, and temperature.

D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

E. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

F. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure as required to suit system pressures.

G. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

H. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.5 MECHANICAL SLEEVE SEALS

A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

2.6 PIPING SPECIALTIES

A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:

1. Steel Sheet Metal: 0.0239-inch minimum thickness, galvanized, round tube closed with welded longitudinal joint.
2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

   a. Underdeck Clamp: Clamping ring with setscrews.

5. PE: Manufactured, reusable, tapered, cup shaped, smooth outer surface, with nailing flange for attaching to wooden forms.

B. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.

1. ID: Closely fit around pipe, tube, and insulation of insulated piping.
2. OD: Completely cover opening.
3. Cast Brass: Split casting, with concealed hinge and set screw.

    a. Finish: Rough brass.
    b. Finish: Polished chrome-plate.

4. Stamped Steel: One piece, with spring clips and chrome-plated finish.
5. Stamped Steel: Split plate, with concealed hinge, spring clips, and chrome-plated finish.
6. Cast-Iron Floor Plate: One-piece casting.

2.7 GROUT

A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.

1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psig, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. General: Install piping as described below, unless piping Sections specify otherwise. Individual Division 23 piping Sections specify unique piping installation requirements.

B. General Locations and Arrangements: 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 Coordination Drawings.

C. Install piping at indicated slope.

D. Install components with pressure rating equal to or greater than system operating pressure.

E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

F. Install piping free of sags and bends.

G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

I. Install piping to allow application of insulation plus 1-inch clearance around insulation.

J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

K. Install fittings for changes in direction and branch connections.

L. Install couplings according to manufacturer's written instructions.

M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:

1. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish.
2. Uninsulated Piping Wall Escutcheons: Cast brass or stamped steel, with set screw.
3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
4. Insulated Piping: Cast brass or stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
5. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.

N. Sleeves are not required for core drilled holes.

O. Permanent sleeves are not required for holes formed by PE removable sleeves.

P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

   a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Build sleeves into walls and slabs as work progresses.
3. Install sleeves large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

   a. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS.
   b. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS and larger, penetrating gypsum-board partitions.
   c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 7 Sections for flashing.

      1) Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants. Refer to Division 7 Sections for materials.
5. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.

Q. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches in diameter and larger.
3. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

R. Underground, Exterior-Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

S. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials. Refer to Division 7 Sections for materials.

T. Verify final equipment locations for roughing-in.

U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

V. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
4. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

    a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
    b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
    c. Align threads at point of assembly.
    d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
    e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

6. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

W. Piping Connections: Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping 2-inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS or smaller threaded pipe connection.
2. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.

B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

E. Install equipment giving right of way to piping installed at required slope.

F. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

3.3 PAINTING AND FINISHING

A. Refer to Division 9 Section "Painting" for paint materials, surface preparation, and application of paint.

B. Apply paint to exposed piping according to the following, unless otherwise indicated:

1. Interior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
2. Interior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
3. Interior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
4. Exterior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
5. Exterior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
6. Exterior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.

C. Paint visible sheet metal behind ceiling inlets and outlets flat black.

D. Do not paint piping specialties with factory-applied finish.

E. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psig, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.6 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.7 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair cut surfaces to match adjacent surfaces.

3.8 GROUTING

A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placing of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases to provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout according to manufacturer's written instructions.

END OF SECTION 230050

SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with NEMA MG 1 unless otherwise indicated.

B. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Energy efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.

1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Multispeed Motors: Separate winding for each speed.

F. Rotor: Random-wound, squirrel cage.

G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

H. Temperature Rise: Match insulation rating.

I. Insulation: Class F.

J. Code Letter Designation:

1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.

K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

B. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 230513

SECTION 230517 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Stack-sleeve fittings.
3. Sleeve-seal systems.
4. Sleeve-seal fittings.
5. Grout.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

G. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

2.2 STACK-SLEEVE FITTINGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Smith, Jay R. Mfg. Co.
2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.

B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. Metraflex Company (The).
4. Pipeline Seal and Insulator, Inc.
5. Proco Products, Inc.

C. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Presealed Systems.

B. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch (25-mm) annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.

3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 07 92 00 "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 07 84 13 "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 07 62 00 "Sheet Metal Flashing and Trim."
3. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using grout, seal the space around outside of stack-sleeve fittings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 07 84 13 "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

   a. Piping Smaller Than NPS 6 (DN 150): Cast-iron wall sleeves Galvanized-steel wall sleeves Galvanized-steel-pipe sleeves Sleeve-seal fittings.
   b. Piping NPS 6 (DN 150) and Larger: Galvanized-steel-pipe sleeves.

2. Interior Partitions:

   a. Piping Smaller Than NPS 6 (DN 150): Galvanized-steel-pipe sleeves.
   b. Piping NPS 6 (DN 150) and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 230517

SECTION 230518 - ESCUTCHEONS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. Split-Casting Brass Type: With polished, chrome-plated and rough-brass finish and with concealed hinge and setscrew.

B. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed and exposed-rivet hinge, and spring-clip fasteners.

2.2 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
c. Insulated Piping: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge or split-plate, stamped-steel type with exposed-rivet hinge.
d. Bare Piping at Ceiling Penetrations in Finished Spaces: Two-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge or split-plate, stamped-steel type with exposed-rivet hinge.
e. Bare Piping in Equipment Rooms: Caulk annular space.

C. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: Two-piece, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 230518

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following hangers and supports for mechanical system piping and equipment:

1. Steel pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Pipe positioning systems.
8. Equipment supports.

B. Related Sections include the following:

1. Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment" for vibration isolation devices.
3. Division 23 Section "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7 & 1615A.1.21 of CBC.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Steel pipe hangers and supports.
2. Thermal-hanger shield inserts.
3. Powder-actuated fastener systems.
4. Pipe positioning systems.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:

1. Trapeze pipe hangers. Include Product Data for components.
2. Metal framing systems. Include Product Data for components.
3. Pipe stands. Include Product Data for components.
4. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Design Calculations: Calculate requirements for designing trapeze hangers.

D. Welding Certificates.

1.6 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel.".

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 STEEL PIPE HANGERS AND SUPPORTS

A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

B. Manufacturers:

1. B-Line Systems, Inc.; a division of Cooper Industries.
2. Grinnell Corp.
3. Tolco, Inc.

C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.

B. Manufacturers:

1. B-Line Systems, Inc.; a division of Cooper Industries.
2. Power-Strut Div.; Tyco International, Ltd.
3. Unistrut Corp.; Tyco International, Ltd.
4. Tolco, Inc.

C. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.5 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Manufacturers:

1. ERICO/Michigan Hanger Co.
2. Pipe Shields, Inc.
3. Rilco Manufacturing Company, Inc.

C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.

D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:

a. Hilti, Inc.
b. ITW Ramset/Red Head.
c. Masterset Fastening Systems, Inc.

B. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated or stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:

a. B-Line Systems, Inc.; a division of Cooper Industries.
b. Hilti, Inc.
c. ITW Ramset/Red Head.

2.7 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use padded hangers for piping that is subject to scratching.

F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
2. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.
3. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
4. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
5. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
6. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
7. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.

G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
4. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
5. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

6. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.

3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
6. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
7. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

N. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

O. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

3.2 HANGER AND SUPPORT INSTALLATION

A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

H. 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.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 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.

K. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

M. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.

5. Pipes NPS 8 and Larger: Include wood inserts.
6. Insert Material: Length at least as long as protective shield.
7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 230529

SECTION 230548 - VIBRATION AND SEISMIC CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Elastomeric isolation mounts.
2. Housed-restrained-spring isolators.
3. Spring hangers.
4. Snubbers.
5. Restraint cables.
6. Seismic-restraint accessories.
7. Mechanical anchor bolts.
8. Adhesive anchor bolts.

B. Related Requirements:

1. Section 220548 "Vibration and Seismic Controls for Plumbing" for devices for plumbing equipment and systems.

1.3 DEFINITIONS

A. IBC: International Building Code.

B. ICC-ES: ICC-Evaluation Service.

C. OSHPD: Office of Statewide Health Planning & Development (for the State of California).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device and seismic-restraint component required.

a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
b. Annotate to indicate application of each product submitted and compliance with requirements.

3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

B. Shop Drawings:

1. Detail fabrication and assembly of equipment bases. Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Delegated-Design Submittal: For each vibration isolation and seismic-restraint device.

1. Include design calculations and details for selecting vibration isolators, seismic restraints, and vibration isolation bases complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Design Calculations: Calculate static and dynamic loading due to equipment weight, operation, and seismic forces required to select vibration isolators and seismic and wind restraints and for designing vibration isolation bases.

a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.

3. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, and seismic loads. Include certification that riser system was examined for excessive stress and that none exists.
4. Seismic Restraint Details:

a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
c. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
d. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show coordination of vibration isolation device installation and seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and restraints, if any.

B. Qualification Data: For professional engineer.

C. Welding certificates.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authorities having jurisdiction.

B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number 0349 & 0198 from OSHPD, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are unavailable, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC: A.
2. Assigned Seismic Use Group or Building Category as Defined in the IBC: [I] [II] [III].

    a. Component Importance Factor: 1.0.
    b. Component Response Modification Factor: 1.5.
    c. Component Amplification Factor: 1.0.

3. Design Spectral Response Acceleration at Short Periods (0.2 Second).
4. Design Spectral Response Acceleration at 1.0-Second Period.

5. Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.

    a. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they are subjected.

2.2 ELASTOMERIC ISOLATION MOUNTS

A. Double-Deflection, Elastomeric Isolation Mounts:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Kinetics Noise Control, Inc.
    b. Mason Industries, Inc.
    c. Vibration Isolation.

2. Mounting Plates:

    a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
    b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.

3. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.3 HOUSED-RESTRAINED-SPRING ISOLATORS

A. Freestanding, Steel, Open-Spring Isolators with Vertical-Limit Stop Restraint in Two-Part Telescoping Housing:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Kinetics Noise Control, Inc.
    b. Mason Industries, Inc.
    c. Vibration Eliminator Co., Inc.

2. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators. Housings are equipped with adjustable snubbers to limit vertical movement.

    a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
    b. Threaded top housing with adjustment bolt and cap screw to fasten and level equipment.

3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.4 SPRING HANGERS

A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Mason Industries, Inc.
   b. Vibration Eliminator Co., Inc.
   c. Vibration Isolation.

2. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
7. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
8. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
9. Self-centering hanger-rod cap to ensure concentricity between hanger rod and support spring coil.

2.5 SNUBBERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Insert manufacturer's name; product name or designation or comparable product by one of the following:

1. Kinetics Noise Control, Inc.
2. Mason Industries, Inc.
3. Vibration Mountings & Controls, Inc.

B. Description: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.

1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
3. Maximum 1/4-inch air gap, and minimum 1/4-inch- thick resilient cushion.

2.6 RESTRAINT CHANNEL BRACINGS

A.

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Cooper B-Line, Inc.
2. Hilti, Inc.
3. Mason Industries, Inc.
4. Unistrut.

C. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.7 RESTRAINT CABLES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Kinetics Noise Control, Inc.
2. Loos & Co., Inc.
3. Vibration Mountings & Controls, Inc.

B. Restraint Cables: ASTM A 492 stainless-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

2.8 SEISMIC-RESTRAINT ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Cooper B-Line, Inc.
2. Mason Industries, Inc.
3. TOLCO.

B. Hanger-Rod Stiffener: Reinforcing steel angle clamped to hanger rod.

C. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings and restraint cables.

D. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

E. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.

F. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.9 MECHANICAL ANCHOR BOLTS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Cooper B-Line, Inc.
2. Hilti, Inc.
3. Kinetics Noise Control, Inc.
4. Mason Industries, Inc.

B. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.10 ADHESIVE ANCHOR BOLTS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Hilti, Inc.
2. Kinetics Noise Control, Inc.
3. Mason Industries, Inc.

B. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing PVC or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Hanger-Rod Stiffeners: Install hanger-rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

B. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength is adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete." or Section 033053 "Miscellaneous Cast-in-Place Concrete."

B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

C. Comply with requirements in Section 077200 "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.

D. Equipment Restraints:

1. Install seismic snubbers on HVAC equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction that provides required submittals for component.

E. Install cables so they do not bend across edges of adjacent equipment or building structure.

F. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction that provides required submittals for component.

G. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

H. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or

drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.

2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Section 232113 "Hydronic Piping" for piping flexible connections.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.
6. Measure isolator restraint clearance.
7. Measure isolator deflection.
8. Verify snubber minimum clearances.
9. Test and adjust restrained-air-spring isolator controls and safeties.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.6 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained-spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

END OF SECTION 230548

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Duct labels.
5. Stencils.
6. Valve tags.
7. Warning tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

A. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: White
3. Background Color: Black
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black

C. Background Color: Yellow

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

    a. Constant-volume air systems.
    b. Variable-air-volume systems.

2. Balancing Hydronic Piping Systems:

    a. Constant-flow hydronic systems.
    b. Variable-flow hydronic systems.
    c. Primary-secondary hydronic systems.

3. Balancing steam systems.
4. Testing, Adjusting, and Balancing Equipment:

    a. Heat exchangers.
    b. Motors.
    c. Chillers.
    d. Cooling towers.
    e. Condensing units.
    f. Boilers.
    g. Heat-transfer coils.

5. Testing, adjusting, and balancing existing systems and equipment.
6. Sound tests.
7. Vibration tests.
8. Duct leakage tests.
9. Control system verification.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. BAS: Building automation systems.

C. NEBB: National Environmental Balancing Bureau.

D. TAB: Testing, adjusting, and balancing.

E. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

F. TDH: Total dynamic head.

1.4 PREINSTALLATION MEETINGS

A. TAB Conference: If requested by the Owner, conduct a TAB conference at Project site after approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Provide a minimum of 14 days' advance notice of scheduled meeting time and location.

1. Minimum Agenda Items:

a. The Contract Documents examination report.
b. The TAB plan.
c. Needs for coordination and cooperation of trades and subcontractors.
d. Proposed procedures for documentation and communication flow.

1.5 ACTION SUBMITTALS

A. LEED Submittals:

1. Air-Balance Report for Prerequisite IEQ 1: Documentation indicating that work complies with ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
2. TAB Report for Prerequisite EA 2: Documentation indicating that work complies with ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.

C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

D. System Readiness Checklists: Within 30 days of Contractor's Notice to Proceed, submit system readiness checklists as specified in "Preparation" Article.

E. Examination Report: Submit a summary report of the examination review required in "Examination" Article.

F. Certified TAB reports.

G. Sample report forms.

H. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.7 QUALITY ASSURANCE

A. TAB Specialists Qualifications: Certified by AABC or NEBB

1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABCor NEBB
2. TAB Technician: Employee of the TAB specialist and certified by AABC, NEBB or as a TAB technician.

B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.8 FIELD CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.

L. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.

M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

N. Examine system pumps to ensure absence of entrained air in the suction piping.

O. Examine operating safety interlocks and controls on HVAC equipment.

P. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes the following:

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. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:

a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
b. Duct systems are complete with terminals installed.
c. Volume, smoke, and fire dampers are open and functional.
d. Clean filters are installed.
e. Fans are operating, free of vibration, and rotating in correct direction.
f. Variable-frequency controllers' startup is complete and safeties are verified.
g. Automatic temperature-control systems are operational.
h. Ceilings are installed.
i. Windows and doors are installed.
j. Suitable access to balancing devices and equipment is provided.

2. Hydronics:

a. Verify leakage and pressure tests on water distribution systems have been satisfactorily completed.
b. Piping is complete with terminals installed.
c. Water treatment is complete.
d. Systems are flushed, filled, and air purged.
e. Strainers are pulled and cleaned.
f. Control valves are functioning per the sequence of operation.
g. Shutoff and balance valves have been verified to be 100 percent open.
h. Pumps are started and proper rotation is verified.

i. Pump gage connections are installed directly at pump inlet and outlet flanges or in discharge and suction pipe prior to valves or strainers.
j. Variable-frequency controllers' startup is complete and safeties are verified.
k. Suitable access to balancing devices and equipment is provided.

3.3 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", ASHRAE 111, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."

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.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

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. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.5 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 artificial loading of filters at the time static pressures are measured.

3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
4. Obtain approval from commissioning authority for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
5. 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 occurs. 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 submain and branch duct volume dampers for specified airflow.
3. Re-measure each submain 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 inlets and outlets airflow.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after they have been adjusted.

D. Verify final system conditions.

1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
2. Re-measure and confirm that total airflow is within design.
3. Re-measure all final fan operating data, rpms, volts, amps, and 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.
7. Record final fan-performance data.

3.6 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 two-thirds 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 set point 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. 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 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 that 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 set point to the most energy-efficient set point to maintain the optimum system static pressure. Record set point and give to controls contractor.
9. Verify final system conditions as follows:

   a. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
   b. Re-measure and confirm that total airflow is within design.
   c. Re-measure final fan operating data, rpms, volts, amps, and static profile.
   d. Mark 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.

3.7 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports for pumps, coils, and heat exchangers. Obtain approved submittals and manufacturer-recommended testing procedures. Crosscheck the summation of required coil and heat exchanger flow rates with pump design flow rate.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. In addition to requirements in "Preparation" Article, prepare hydronic systems for testing and balancing as follows:

1. Check liquid level in expansion tank.
2. Check highest vent for adequate pressure.
3. Check flow-control valves for proper position.
4. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
5. Verify that motor starters are equipped with properly sized thermal protection.
6. Check that air has been purged from the system.

3.8 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

A. Adjust pumps to deliver total design gpm.

1. Measure total water flow.

   a. Position valves for full flow through coils.
   b. Measure flow by main flow meter, if installed.
   c. If main flow meter is not installed, determine flow by pump TDH or exchanger pressure drop.

2. Measure pump TDH as follows:

   a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
   b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
   c. Convert pressure to head and correct for differences in gage heights.
   d. Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow, and verify that the pump has the intended impeller size.
   e. With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.

3. Monitor motor performance during procedures and do not operate motor in an overloaded condition.

B. Adjust flow-measuring devices installed in mains and branches to design water flows.

1. Measure flow in main and branch pipes.
2. Adjust main and branch balance valves for design flow.
3. Re-measure each main and branch after all have been adjusted.

C. Adjust flow-measuring devices installed at terminals for each space to design water flows.

1. Measure flow at terminals.
2. Adjust each terminal to design flow.
3. Re-measure each terminal after it is adjusted.
4. Position control valves to bypass the coil, and adjust the bypass valve to maintain design flow.
5. Perform temperature tests after flows have been balanced.

D. For systems with pressure-independent valves at terminals:

1. Measure differential pressure and verify that it is within manufacturer's specified range.
2. Perform temperature tests after flows have been verified.

E. For systems without pressure-independent valves or flow-measuring devices at terminals:

1. Measure and balance coils by either coil pressure drop or temperature method.
2. If balanced by coil pressure drop, perform temperature tests after flows have been verified.

F. Verify final system conditions as follows:

1. Re-measure and confirm that total water flow is within design.
2. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
3. Mark final settings.

G. Verify that memory stops have been set.

3.9 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

A. Balance systems with automatic two- and three-way control valves by setting systems at maximum flow through heat-exchange terminals, and proceed as specified above for hydronic systems.

B. Adjust the variable-flow hydronic system as follows:

1. Verify that the differential-pressure sensor is located as indicated.
2. Determine whether there is diversity in the system.

C. For systems with no diversity:

1. Adjust pumps to deliver total design gpm.

a. Measure total water flow.

1) Position valves for full flow through coils.
2) Measure flow by main flow meter, if installed.
3) If main flow meter is not installed, determine flow by pump TDH or exchanger pressure drop.

b. Measure pump TDH as follows:

1) Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
2) Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
3) Convert pressure to head and correct for differences in gage heights.
4) Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
5) With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.

c. Monitor motor performance during procedures and do not operate motor in an overloaded condition.

2. Adjust flow-measuring devices installed in mains and branches to design water flows.

a. Measure flow in main and branch pipes.
b. Adjust main and branch balance valves for design flow.
c. Re-measure each main and branch after all have been adjusted.

3. Adjust flow-measuring devices installed at terminals for each space to design water flows.

a. Measure flow at terminals.
b. Adjust each terminal to design flow.
c. Re-measure each terminal after it is adjusted.
d. Position control valves to bypass the coil and adjust the bypass valve to maintain design flow.
e. Perform temperature tests after flows have been balanced.

4. For systems with pressure-independent valves at terminals:

a. Measure differential pressure and verify that it is within manufacturer's specified range.
b. Perform temperature tests after flows have been verified.

5. For systems without pressure-independent valves or flow-measuring devices at terminals:

a. Measure and balance coils by either coil pressure drop or temperature method.
b. If balanced by coil pressure drop, perform temperature tests after flows have been verified.

6. Prior to verifying final system conditions, determine the system differential-pressure set point.
7. If the pump discharge valve was used to set total system flow with variable-frequency controller at 60 Hz, at completion open discharge valve 100 percent and allow variable-frequency controller to control system differential-pressure set point. Record pump data under both conditions.
8. Mark final settings and verify that all memory stops have been set.

9. Verify final system conditions as follows:

    a. Re-measure and confirm that total water flow is within design.
    b. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
    c. Mark final settings.

10. Verify that memory stops have been set.

D. For systems with diversity:

1. Determine diversity factor.
2. Simulate system diversity by closing required number of control valves, as approved by the design engineer.
3. Adjust pumps to deliver total design gpm.

    a. Measure total water flow.

        1) Position valves for full flow through coils.
        2) Measure flow by main flow meter, if installed.
        3) If main flow meter is not installed, determine flow by pump TDH or exchanger pressure drop.

    b. Measure pump TDH as follows:

        1) Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
        2) Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
        3) Convert pressure to head and correct for differences in gage heights.
        4) Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
        5) With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.

    c. Monitor motor performance during procedures and do not operate motor in an overloaded condition.

4. Adjust flow-measuring devices installed in mains and branches to design water flows.

    a. Measure flow in main and branch pipes.
    b. Adjust main and branch balance valves for design flow.
    c. Re-measure each main and branch after all have been adjusted.

5. Adjust flow-measuring devices installed at terminals for each space to design water flows.

    a. Measure flow at terminals.
    b. Adjust each terminal to design flow.
    c. Re-measure each terminal after it is adjusted.

d. Position control valves to bypass the coil, and adjust the bypass valve to maintain design flow.
e. Perform temperature tests after flows have been balanced.

6. For systems with pressure-independent valves at terminals:

a. Measure differential pressure, and verify that it is within manufacturer's specified range.
b. Perform temperature tests after flows have been verified.

7. For systems without pressure-independent valves or flow-measuring devices at terminals:

a. Measure and balance coils by either coil pressure drop or temperature method.
b. If balanced by coil pressure drop, perform temperature tests after flows have been verified.

8. Open control valves that were shut. Close a sufficient number of control valves that were previously open to maintain diversity, and balance terminals that were just opened.
9. Prior to verifying final system conditions, determine system differential-pressure set point.
10. If the pump discharge valve was used to set total system flow with variable-frequency controller at 60 Hz, at completion open discharge valve 100 percent and allow variable-frequency controller to control system differential-pressure set point. Record pump data under both conditions.
11. Mark final settings and verify that memory stops have been set.
12. Verify final system conditions as follows:

a. Re-measure and confirm that total water flow is within design.
b. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
c. Mark final settings.

13. Verify that memory stops have been set.

3.10 PROCEDURES FOR PRIMARY-SECONDARY HYDRONIC SYSTEMS

A. Balance the primary circuit flow first.

B. Balance the secondary circuits after the primary circuits are complete.

C. Adjust pumps to deliver total design gpm.

1. Measure total water flow.

a. Position valves for full flow through coils.
b. Measure flow by main flow meter, if installed.
c. If main flow meter is not installed, determine flow by pump TDH or exchanger pressure drop.

2. Measure pump TDH as follows:

a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
c. Convert pressure to head and correct for differences in gage heights.
d. Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
e. With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.

3. Monitor motor performance during procedures and do not operate motor in an overloaded condition.

D. Adjust flow-measuring devices installed in mains and branches to design water flows.

1. Measure flow in main and branch pipes.
2. Adjust main and branch balance valves for design flow.
3. Re-measure each main and branch after all have been adjusted.

E. Adjust flow-measuring devices installed at terminals for each space to design water flows.

1. Measure flow at terminals.
2. Adjust each terminal to design flow.
3. Re-measure each terminal after it is adjusted.
4. Position control valves to bypass the coil and adjust the bypass valve to maintain design flow.
5. Perform temperature tests after flows have been balanced.

F. For systems with pressure-independent valves at terminals:

1. Measure differential pressure and verify that it is within manufacturer's specified range.
2. Perform temperature tests after flows have been verified.

G. For systems without pressure-independent valves or flow-measuring devices at terminals:

1. Measure and balance coils by either coil pressure drop or temperature method.
2. If balanced by coil pressure drop, perform temperature tests after flows have been verified.

H. Verify final system conditions as follows:

1. Re-measure and confirm that total water flow is within design.
2. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
3. Mark final settings.

I. Verify that memory stops have been set.

3.11 PROCEDURES FOR STEAM SYSTEMS

A. Measure and record upstream and downstream pressure of each piece of equipment.

B. Measure and record upstream and downstream steam pressure of pressure-reducing valves.

C. Check settings and operation of automatic temperature-control valves, self-contained control valves, and pressure-reducing valves. Record final settings.

D. Check settings and operation of each safety valve. Record settings.

E. Verify the operation of each steam trap.

3.12 PROCEDURES FOR MOTORS

A. Motors 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Phase and hertz.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter size and thermal-protection-element rating.
8. Service factor and frame size.

B. Motors Driven by Variable-Frequency Controllers: Test manual bypass of controller to prove proper operation.

3.13 PROCEDURES FOR CONDENSING UNITS

A. Verify proper rotation of fans.

B. Measure entering- and leaving-air temperatures.

C. Record fan and motor operating data.

3.14 PROCEDURES FOR BOILERS

A. Hydronic Boilers:

1. Measure and record entering- and leaving-water temperatures.
2. Measure and record water flow.
3. Record relief valve pressure setting.

3.15 PROCEDURES FOR HEAT-TRANSFER COILS

A. Measure, adjust, and record the following data for each water coil:

1. Entering- and leaving-water temperature.
2. Water flow rate.
3. Water pressure drop for major (more than 20 gpm) equipment coils, excluding unitary equipment such as reheat coils, unit heaters, and fan-coil units.
4. Dry-bulb temperature of entering and leaving air.
5. Wet-bulb temperature of entering and leaving air for cooling coils.
6. Airflow.

B. Measure, adjust, and record the following data for each electric heating coil:

1. Nameplate data.
2. Airflow.
3. Entering- and leaving-air temperature at full load.
4. Voltage and amperage input of each phase at full load.
5. Calculated kilowatt at full load.
6. Fuse or circuit-breaker rating for overload protection.

C. Measure, adjust, and record the following data for each steam coil:

1. Dry-bulb temperature of entering and leaving air.
2. Airflow.
3. Inlet steam pressure.

D. Measure, adjust, and record the following data for each refrigerant coil:

1. Dry-bulb temperature of entering and leaving air.
2. Wet-bulb temperature of entering and leaving air.
3. Airflow.

3.16 SOUND TESTS

A. After the systems are balanced and construction is Substantially Complete, measure and record sound levels at 15 locations as designated by the Architect.

B. Instrumentation:

1. The sound-testing meter shall be a portable, general-purpose testing meter consisting of a microphone, processing unit, and readout.
2. The sound-testing meter shall be capable of showing fluctuations at minimum and maximum levels, and measuring the equivalent continuous sound pressure level (LEQ).
3. The sound-testing meter must be capable of using 1/3 octave band filters to measure mid-frequencies from 31.5 Hz to 8000 Hz.
4. The accuracy of the sound-testing meter shall be plus or minus one decibel.

C. Test Procedures:

1. Perform test at quietest background noise period. Note cause of unpreventable sound that affects test outcome.
2. Equipment should be operating at design values.
3. Calibrate the sound-testing meter prior to taking measurements.
4. Use a microphone suitable for the type of noise levels measured that is compatible with meter. Provide a windshield for outside or in-duct measurements.
5. Record a set of background measurements in dBA and sound pressure levels in the eight un-weighted octave bands 63 Hz to 8000 Hz (NC) with the equipment off.
6. Take sound readings in dBA and sound pressure levels in the eight un-weighted octave bands 63 Hz to 8000 Hz (NC) with the equipment operating.
7. Take readings no closer than 36 inches (900 mm) from a wall or from the operating equipment and approximately 60 inches (1500 mm) from the floor, with the meter held or mounted on a tripod.
8. For outdoor measurements, move sound-testing meter slowly and scan area that has the most exposure to noise source being tested. Use A-weighted scale for this type of reading.

D. Reporting:

1. Report shall record the following:

   a. Location.
   b. System tested.
   c. dBA reading.
   d. Sound pressure level in each octave band with equipment on and off.

2. Plot sound pressure levels on NC worksheet with equipment on and off.

3.17 VIBRATION TESTS

A. After systems are balanced and construction is Substantially Complete, measure and record vibration levels on equipment having motor horsepower equal to or greater than 10.

B. Instrumentation:

1. Use portable, battery-operated, and microprocessor-controlled vibration meter with or without a built-in printer.
2. The meter shall automatically identify engineering units, filter bandwidth, amplitude, and frequency scale values.
3. The meter shall be able to measure machine vibration displacement in mils of deflection, velocity in inches per second, and acceleration in inches per second squared.
4. Verify calibration date is current for vibration meter before taking readings.

C. Test Procedures:

1. To ensure accurate readings, verify that accelerometer has a clean, flat surface and is mounted properly.
2. With the unit running, set up vibration meter in a safe, secure location. Connect transducer to meter with proper cables. Hold magnetic tip of transducer on top of the bearing, and measure unit in mils of deflection. Record measurement, then move

transducer to the side of the bearing and record in mils of deflection. Record an axial reading in mils of deflection by holding nonmagnetic, pointed transducer tip on end of shaft.

3. Change vibration meter to velocity (inches per second) measurements. Repeat and record above measurements.
4. Record CPM or rpm.
5. Read each bearing on motor, fan, and pump as required. Track and record vibration levels from rotating component through casing to base.

D. Reporting:

1. Report shall record location and the system tested.
2. Include horizontal-vertical-axial measurements for tests.
3. Verify that vibration limits follow Specifications, or, if not specified, follow the General Machinery Vibration Severity Chart or Vibration Acceleration General Severity Chart from the AABC National Standards. Acceptable levels of vibration are normally "smooth" to "good."
4. Include in report General Machinery Vibration Severity Chart, with conditions plotted.

3.18 DUCT LEAKAGE TESTS

A. Witness the duct pressure testing performed by Installer.

B. Verify that proper test methods are used and that leakage rates are within specified tolerances.

C. Report deficiencies observed.

3.19 CONTROLS VERIFICATION

A. In conjunction with system balancing, perform the following:

1. Verify temperature control system is operating within the design limitations.
2. Confirm that the sequences of operation are in compliance with Contract Documents.
3. Verify that controllers are calibrated and function as intended.
4. Verify that controller set points are as indicated.
5. Verify the operation of lockout or interlock systems.
6. Verify the operation of valve and damper actuators.
7. Verify that controlled devices are properly installed and connected to correct controller.
8. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
9. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.

B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

3.20 TOLERANCES

A. Set HVAC system's airflow rates and water 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. Heating-Water Flow Rate: Plus or minus 10 percent
4. Cooling-Water Flow Rate: Plus or minus 10 percent

B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.21 PROGRESS REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems balancing devices. Recommend changes and additions to systems balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

B. Status Reports: Prepare biweekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.22 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.

3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Face and bypass damper settings at coils.
    e. Fan drive settings including settings and percentage of maximum pitch diameter.
    f. Inlet vane settings for variable-air-volume systems.
    g. Settings for supply-air, static-pressure controller.
    h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

    a. Unit identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.

f. Unit arrangement and class.
g. Discharge arrangement.
h. Sheave make, size in inches (mm), and bore.
i. Center-to-center dimensions of sheave and amount of adjustments in inches (mm).
j. Number, make, and size of belts.
k. Number, type, and size of filters.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches (mm), and bore.
f. Center-to-center dimensions of sheave and amount of adjustments in inches (mm).

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm (L/s).
b. Total system static pressure in inches wg (Pa).
c. Fan rpm.
d. Discharge static pressure in inches wg (Pa).
e. Filter static-pressure differential in inches wg (Pa).
f. Preheat-coil static-pressure differential in inches wg (Pa).
g. Cooling-coil static-pressure differential in inches wg (Pa).
h. Heating-coil static-pressure differential in inches wg (Pa).
i. Outdoor airflow in cfm (L/s).
j. Return airflow in cfm (L/s).
k. Outdoor-air damper position.
l. Return-air damper position.
m. Vortex damper position.

F. Apparatus-Coil Test Reports:

1. Coil Data:

a. System identification.
b. Location.
c. Coil type.
d. Number of rows.
e. Fin spacing in fins per inch (mm) o.c.
f. Make and model number.
g. Face area in sq. ft. (sq. m).
h. Tube size in NPS (DN).
i. Tube and fin materials.
j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm (L/s).

b. Average face velocity in fpm (m/s).
c. Air pressure drop in inches wg (Pa).
d. Outdoor-air, wet- and dry-bulb temperatures in deg F (deg C).
e. Return-air, wet- and dry-bulb temperatures in deg F (deg C).
f. Entering-air, wet- and dry-bulb temperatures in deg F (deg C).
g. Leaving-air, wet- and dry-bulb temperatures in deg F (deg C).
h. Water flow rate in gpm (L/s).
i. Water pressure differential in feet of head or psig (kPa).
j. Entering-water temperature in deg F (deg C).
k. Leaving-water temperature in deg F (deg C).
l. Refrigerant expansion valve and refrigerant types.
m. Refrigerant suction pressure in psig (kPa).
n. Refrigerant suction temperature in deg F (deg C).
o. Inlet steam pressure in psig (kPa).

G. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Fuel type in input data.
g. Output capacity in Btu/h (kW).
h. Ignition type.
i. Burner-control types.
j. Motor horsepower and rpm.
k. Motor volts, phase, and hertz.
l. Motor full-load amperage and service factor.
m. Sheave make, size in inches (mm), and bore.
n. Center-to-center dimensions of sheave and amount of adjustments in inches (mm).

2. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm (L/s).
b. Entering-air temperature in deg F (deg C).
c. Leaving-air temperature in deg F (deg C).
d. Air temperature differential in deg F (deg C).
e. Entering-air static pressure in inches wg (Pa).
f. Leaving-air static pressure in inches wg (Pa).
g. Air static-pressure differential in inches wg (Pa).
h. Low-fire fuel input in Btu/h (kW).
i. High-fire fuel input in Btu/h (kW).
j. Manifold pressure in psig (kPa).
k. High-temperature-limit setting in deg F (deg C).
l. Operating set point in Btu/h (kW).
m. Motor voltage at each connection.

n. Motor amperage for each phase.
o. Heating value of fuel in Btu/h (kW).

H. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Coil identification.
d. Capacity in Btu/h (kW).
e. Number of stages.
f. Connected volts, phase, and hertz.
g. Rated amperage.
h. Airflow rate in cfm (L/s).
i. Face area in sq. ft. (sq. m).
j. Minimum face velocity in fpm (m/s).

2. Test Data (Indicated and Actual Values):

a. Heat output in Btu/h (kW).
b. Airflow rate in cfm (L/s).
c. Air velocity in fpm (m/s).
d. Entering-air temperature in deg F (deg C).
e. Leaving-air temperature in deg F (deg C).
f. Voltage at each connection.
g. Amperage for each phase.

I. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches (mm), and bore.
h. Center-to-center dimensions of sheave and amount of adjustments in inches (mm).

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches (mm), and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).

g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm (L/s).
b. Total system static pressure in inches wg (Pa).
c. Fan rpm.
d. Discharge static pressure in inches wg (Pa).
e. Suction static pressure in inches wg (Pa).

J. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F (deg C).
d. Duct static pressure in inches wg (Pa).
e. Duct size in inches (mm).
f. Duct area in sq. ft. (sq. m).
g. Indicated airflow rate in cfm (L/s).
h. Indicated velocity in fpm (m/s).
i. Actual airflow rate in cfm (L/s).
j. Actual average velocity in fpm (m/s).
k. Barometric pressure in psig (Pa).

K. Air-Terminal-Device Reports:

1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft. (sq. m).

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm (L/s).
b. Air velocity in fpm (m/s).
c. Preliminary airflow rate as needed in cfm (L/s).
d. Preliminary velocity as needed in fpm (m/s).
e. Final airflow rate in cfm (L/s).
f. Final velocity in fpm (m/s).
g. Space temperature in deg F (deg C).

L. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:

   a. System and air-handling-unit identification.
   b. Location and zone.
   c. Room or riser served.
   d. Coil make and size.
   e. Flowmeter type.

2. Test Data (Indicated and Actual Values):

   a. Airflow rate in cfm (L/s).
   b. Entering-water temperature in deg F (deg C).
   c. Leaving-water temperature in deg F (deg C).
   d. Water pressure drop in feet of head or psig (kPa).
   e. Entering-air temperature in deg F (deg C).
   f. Leaving-air temperature in deg F (deg C).

M. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:

1. Unit Data:

   a. Unit identification.
   b. Location.
   c. Service.
   d. Make and size.
   e. Model number and serial number.
   f. Water flow rate in gpm (L/s).
   g. Water pressure differential in feet of head or psig (kPa).
   h. Required net positive suction head in feet of head or psig (kPa).
   i. Pump rpm.
   j. Impeller diameter in inches (mm).
   k. Motor make and frame size.
   l. Motor horsepower and rpm.
   m. Voltage at each connection.
   n. Amperage for each phase.
   o. Full-load amperage and service factor.
   p. Seal type.

2. Test Data (Indicated and Actual Values):

   a. Static head in feet of head or psig (kPa).
   b. Pump shutoff pressure in feet of head or psig (kPa).
   c. Actual impeller size in inches (mm).
   d. Full-open flow rate in gpm (L/s).
   e. Full-open pressure in feet of head or psig (kPa).
   f. Final discharge pressure in feet of head or psig (kPa).
   g. Final suction pressure in feet of head or psig (kPa).

h. Final total pressure in feet of head or psig (kPa).
i. Final water flow rate in gpm (L/s).
j. Voltage at each connection.
k. Amperage for each phase.

N. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.23 VERIFICATION OF TAB REPORT

A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of commissioning authority.

B. Commissioning authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.

C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."

D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

E. If TAB work fails, proceed as follows:

1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.
3. If the second verification also fails, Architect may contact AABC Headquarters regarding the AABC National Performance Guaranty.

F. Prepare test and inspection reports.

3.24 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following HVAC piping systems:

1. Condensate drain piping, indoors and outdoors.
2. Heating hot-water piping, indoors and outdoors.
3. Refrigerant suction and hot-gas piping, indoors and outdoors.

B. Related Sections:

1. Section 23 07 13 "Duct Insulation."
2. Section 23 07 16 "HVAC Equipment Insulation."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation

materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 23 05 29 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Calcium Silicate:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Industrial Insulation Group (IIG); Thermo-12 Gold.

2. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
3. Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
4. Prefabricated Fitting Covers: Comply with ASTM C 450 and ASTM C 585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

G. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Pittsburgh Corning Corporation; Foamglas.

2. Block Insulation: ASTM C 552, Type I.
3. Special-Shaped Insulation: ASTM C 552, Type III.
4. Board Insulation: ASTM C 552, Type IV.
5. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
6. Preformed Pipe Insulation with Factory-Applied ASJ ASJ-SSL: Comply with ASTM C 552, Type II, Class 2.

7. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

H. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Aeroflex USA, Inc.; Aerocel.
b. Armacell LLC; AP Armaflex.
c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.

I. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I, or II with factory-applied vinyl jacket, III with factory-applied FSK jacket or III with factory-applied FSP jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; SoftTouch Duct Wrap.
b. Johns Manville; Microlite.
c. Knauf Insulation; Friendly Feel Duct Wrap.
d. Manson Insulation Inc.; Alley Wrap.
e. Owens Corning; SOFTR All-Service Duct Wrap.

J. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Johns Manville; Micro-Lok.
b. Knauf Insulation; 1000-Degree Pipe Insulation.
c. Manson Insulation Inc.; Alley-K.
d. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 deg F (454 deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, without factory-applied jacket, with factory-applied ASJ or with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
3. Type II, 1200 deg F (649 deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type II, Grade A, without factory-applied jacket, with factory-applied ASJ or with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

K. Mineral-Fiber, Pipe Insulation Wicking System: Preformed pipe insulation complying with ASTM C 547, Type I, Grade A, with absorbent cloth factory-applied to the entire inside surface of preformed pipe insulation and extended through the longitudinal joint to outside surface of insulation under insulation jacket. Factory apply a white, polymer, vapor-retarder jacket with self-sealing adhesive tape seam and evaporation holes running continuously along the longitudinal seam, exposing the absorbent cloth.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Knauf Insulation; Permawick Pipe Insulation.
b. Owens Corning; VaporWick Pipe Insulation.

L. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied ASJ or FSK jacket complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. (40 kg/cu. m) or more. Thermal conductivity (k-value) at 100 deg F (55 deg C) is 0.29 Btu x in./h x sq. ft. x deg F (0.042 W/m x K) or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; CrimpWrap.
b. Johns Manville; MicroFlex.
c. Knauf Insulation; Pipe and Tank Insulation.
d. Manson Insulation Inc.; AK Flex.
e. Owens Corning; Fiberglas Pipe and Tank Insulation.

M. Phenolic:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Kingspan Tarec Industrial Insulation NV; Koolphen K.
b. Resolco International BV; Insul-phen.

2. Preformed pipe insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type III, Grade 1.
3. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type II, Grade 1.
4. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
5. Factory-Applied Jacket: Requirements are specified in "Factory-Applied Jackets" Article.

a. Preformed Pipe Insulation: ASJ.

N. Polyisocyanurate: Unfaced, preformed, rigid cellular polyisocyanurate material intended for use as thermal insulation.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Chemical Company (The); Trymer 2000 XP.
b. Duna USA Inc.; Corafoam.
c. Dyplast Products; ISO-25.
d. Elliott Company of Indianapolis; Elfoam.

2. Comply with ASTM C 591, Type I or Type IV, except thermal conductivity (k-value) shall not exceed 0.19 Btu x in./h x sq. ft. x deg F (0.027 W/m x K) at 75 deg F (24 deg C) after 180 days of aging.
3. Flame-spread index shall be 25 or less, and smoke-developed index shall be 50 or less for thickness up to 1 inch (25 mm) as tested by ASTM E 84.
4. Fabricate shapes according to ASTM C 450 and ASTM C 585.

5. Factory-Applied Jacket: Requirements are specified in "Factory-Applied Jackets" Article.

a. Pipe Applications: ASJ, ASJ-SSL, PVDC or PVDC-SSL.

O. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Armacell LLC; Tubolit.
b. Nomaco Insulation; IMCOLOCK, IMCOSHEET, NOMALOCK, and NOMAPLY.

P. Polystyrene: Rigid, extruded cellular polystyrene intended for use as thermal insulation. Comply with ASTM C 578, Type IV or Type XIII, except thermal conductivity (k-value) shall not exceed 0.26 Btu x in./h x sq. ft. x deg F (0.038 W/m x K) after 180 days of aging. Fabricate shapes according to ASTM C 450 and ASTM C 585.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Chemical Company (The); Styrofoam.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Ramco Insulation, Inc.; Super-Stik.

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Ramco Insulation, Inc.; Thermokote V.

C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Ramco Insulation, Inc.; Ramcote 1200 and Quik-Cote.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 deg F (10 to 427 deg C).

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-97.
   b. Eagle Bridges - Marathon Industries; 290.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-27.
   d. Mon-Eco Industries, Inc.; 22-30.
   e. Vimasco Corporation; 760.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F (minus 73 to plus 93 deg C).

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-84.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Phenolic and Polyisocyanurate Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F (minus 59 to plus 149 deg C).

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-96.
   b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-33.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Aeroflex USA, Inc.; Aeroseal.
   b. Armacell LLC; Armaflex 520 Adhesive.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
   d. K-Flex USA; R-373 Contact Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
   b. Eagle Bridges - Marathon Industries; 225.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
   d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

G. Polystyrene Adhesive: Solvent- or water-based, synthetic resin adhesive with a service temperature range of minus 20 to plus 140 deg F (29 to plus 60 deg C).

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-96.
   b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60.

H. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
    b. Eagle Bridges - Marathon Industries; 225.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.
    d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

I. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Dow Corning Corporation; 739, Dow Silicone.
    b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
    c. P.I.C. Plastics, Inc.; Welding Adhesive.
    d. Speedline Corporation; Polyco VP Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
    b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.

5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-30.
b. Eagle Bridges - Marathon Industries; 501.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-35.
d. Mon-Eco Industries, Inc.; 55-10.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm (0.03 metric perm) at 35-mil (0.9-mm) dry film thickness.
3. Service Temperature Range: 0 to 180 deg F (Minus 18 to plus 82 deg C).
4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
5. Color: White.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
b. Eagle Bridges - Marathon Industries; 570.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm (0.033 metric perm) at 30-mil (0.8-mm) dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F (Minus 46 to plus 104 deg C).
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
b. Eagle Bridges - Marathon Industries; 550.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
d. Mon-Eco Industries, Inc.; 55-50.
e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms (1.2 metric perms) at 0.0625-inch (1.6-mm) dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
4. Solids Content: 60 percent by volume and 66 percent by weight.

5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.
    b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
    c. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
4. Service Temperature Range: 0 to plus 180 deg F (Minus 18 to plus 82 deg C).
5. Color: White.

2.6 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass, Phenolic, and Polyisocyanurate Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
    b. Eagle Bridges - Marathon Industries; 405.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45.
    d. Mon-Eco Industries, Inc.; 44-05.
    e. Pittsburgh Corning Corporation; Pittseal 444.

2. Joint Sealants for Polystyrene Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-70.
    b. Eagle Bridges - Marathon Industries; 405.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45.
    d. Mon-Eco Industries, Inc.; 44-05.

3. Materials shall be compatible with insulation materials, jackets, and substrates.
4. Permanently flexible, elastomeric sealant.

5. Service Temperature Range: Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).
6. Color: White or gray.
7. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
8. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
   b. Eagle Bridges - Marathon Industries; 405.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
   d. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
5. Color: Aluminum.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
5. Color: White.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.
5. PVDC Jacket for Indoor Applications: 4-mil- (0.10-mm-) thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perm (0.013 metric perm) when tested according to ASTM E 96/E 96M and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.

    a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

        1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.

6. PVDC Jacket for Outdoor Applications: 6-mil- (0.15-mm-) thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perm (0.007 metric perm) when tested according to ASTM E 96/E 96M and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E 84.

    a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

        1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.

7. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.

    a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

        1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.

8. Vinyl Jacket: White vinyl with a permeance of 1.3 perms (0.86 metric perms) when tested according to ASTM E 96/E 96M, Procedure A, and complying with NFPA 90A and NFPA 90B.

2.8 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Glass-Fiber Fabric: Approximately 2 oz./sq. yd. (68 g/sq. m) with a thread count of 10 strands by 10 strands/sq. in. (4 strands by 4 strands/sq. mm) for covering pipe and pipe fittings.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Chil-Glas Number 10.

B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. (34 g/sq. m) with a thread count of 10 strands by 10 strands/sq. in. (4 strands by 4 strands/sq. mm), in a Leno weave, for pipe.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Mast-A-Fab.
   b. Vimasco Corporation; Elastafab 894.

2.9 FIELD-APPLIED CLOTHS

A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd. (271 g/sq. m).

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Alpha Associates, Inc.; Alpha-Maritex 84215 and 84217/9485RW, Luben 59.

2.10 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Johns Manville; Zeston.
   b. P.I.C. Plastics, Inc.; FG Series.
   c. Proto Corporation; LoSmoke.
   d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: Color-code jackets based on system. Color as selected by Architect.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

D. Metal Jacket:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.
   b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
   c. RPR Products, Inc.; Insul-Mate.

2. Aluminum Jacket: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005, Temper H-14.

   a. Sheet and roll stock ready for shop or field sizing or factory cut and rolled to size.
   b. Finish and thickness are indicated in field-applied jacket schedules.
   c. Moisture Barrier for Indoor Applications: 2.5-mil- (0.063-mm-) thick polysurlyn.
   d. Moisture Barrier for Outdoor Applications: 3-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper.
   e. Factory-Fabricated Fitting Covers:

      1) Same material, finish, and thickness as jacket.
      2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
      3) Tee covers.
      4) Flange and union covers.
      5) End caps.
      6) Beveled collars.
      7) Valve covers.
      8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

3. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.

   a. Sheet and roll stock ready for shop or field sizing or factory cut and rolled to size.
   b. Material, finish, and thickness are indicated in field-applied jacket schedules.
   c. Moisture Barrier for Indoor Applications: 2.5-mil- (0.063-mm-) thick polysurlyn.
   d. Moisture Barrier for Outdoor Applications: 3-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper.
   e. Factory-Fabricated Fitting Covers:

      1) Same material, finish, and thickness as jacket.
      2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
      3) Tee covers.
      4) Flange and union covers.
      5) End caps.
      6) Beveled collars.

7) Valve covers.
8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

E. Underground Direct-Buried Jacket: 125-mil- (3.2-mm-) thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Pittsburgh Corning Corporation; Pittwrap.
b. Polyguard Products, Inc.; Insulrap No Torch 125.

F. Self-Adhesive Outdoor Jacket: 60-mil- (1.5-mm-) thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a crosslaminated polyethylene film covered with white or stucco-embossed aluminum-foil facing.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Polyguard Products, Inc.; Alumaguard 60.

G. PVDC Jacket for Indoor Applications: 4-mil- (0.10-mm-) thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perms (0.013 metric perms) when tested according to ASTM E 96/E 96M and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Chemical Company (The); Saran 540 Vapor Retarder Film.

H. PVDC Jacket for Outdoor Applications: 6-mil- (0.15-mm-) thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perms (0.007 metric perms) when tested according to ASTM E 96/E 96M and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E 84.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Chemical Company (The); Saran 560 Vapor Retarder Film.

I. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.

2.11 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 428 AWF ASJ.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
   c. Compac Corporation; 104 and 105.
   d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches (75 mm).
3. Thickness: 11.5 mils (0.29 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 491 AWF FSK.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
   c. Compac Corporation; 110 and 111.
   d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches (75 mm).
3. Thickness: 6.5 mils (0.16 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 370 White PVC tape.
   b. Compac Corporation; 130.
   c. Venture Tape; 1506 CW NS.

2. Width: 2 inches (50 mm).
3. Thickness: 6 mils (0.15 mm).
4. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 488 AWF.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
   c. Compac Corporation; 120.
   d. Venture Tape; 3520 CW.

2. Width: 2 inches (50 mm).
3. Thickness: 3.7 mils (0.093 mm).
4. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

E. PVDC Tape for Indoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Dow Chemical Company (The); Saran 540 Vapor Retarder Tape.

2. Width: 3 inches (75 mm).
3. Film Thickness: 4 mils (0.10 mm).
4. Adhesive Thickness: 1.5 mils (0.04 mm).
5. Elongation at Break: 145 percent.
6. Tensile Strength: 55 lbf/inch (10.1 N/mm) in width.

F. PVDC Tape for Outdoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Dow Chemical Company (The); Saran 560 Vapor Retarder Tape.

2. Width: 3 inches (75 mm).
3. Film Thickness: 6 mils (0.15 mm).
4. Adhesive Thickness: 1.5 mils (0.04 mm).
5. Elongation at Break: 145 percent.
6. Tensile Strength: 55 lbf/inch (10.1 N/mm) in width.

2.12 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ITW Insulation Systems; Gerrard Strapping and Seals.
   b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.

2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch (0.38 mm) thick, 3/4 inch (19 mm) wide with wing seal or closed seal.
3. Aluminum: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 3/4 inch (19 mm) wide with wing seal or closed seal.
4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.

C. Wire: 0.080-inch (2.0-mm) nickel-copper alloy, 0.062-inch (1.6-mm) soft-annealed, stainless steel or 0.062-inch (1.6-mm) soft-annealed, galvanized steel.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. C & F Wire.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils (0.127 mm) thick and an epoxy finish 5 mils (0.127 mm) thick if operating in a temperature range between 140 and 300 deg F (60 and 149 deg C). Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F (0 and 149 deg C) with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.

2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches (100 mm) o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 07 84 13 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 07 84 13 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets,

valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF CALCIUM SILICATE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure single-layer insulation with stainless-steel bands at 12-inch (300-mm) intervals and tighten bands without deforming insulation materials.
2. Install two-layer insulation with joints tightly butted and staggered at least 3 inches (75 mm). Secure inner layer with wire spaced at 12-inch (300-mm) intervals. Secure outer layer with stainless-steel bands at 12-inch (300-mm) intervals.
3. Apply a skim coat of mineral-fiber, hydraulic-setting cement to insulation surface. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth or tape. Overlap edges at least 1 inch (25 mm). Apply finish coat of lagging adhesive over glass cloth or tape. Thin finish coat to achieve smooth, uniform finish.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.
4. Finish flange insulation same as pipe insulation.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed insulation sections of insulation are not available, install mitered sections of calcium silicate insulation. Secure insulation materials with wire or bands.
3. Finish fittings insulation same as pipe insulation.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install mitered segments of calcium silicate insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
2. Install insulation to flanges as specified for flange insulation application.
3. Finish valve and specialty insulation same as pipe insulation.

3.7 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.

4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.8 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.9 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.

3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.10 INSTALLATION OF PHENOLIC INSULATION

A. General Installation Requirements:

1. Secure single-layer insulation with stainless-steel bands at 12-inch (300-mm) intervals and tighten bands without deforming insulation materials.
2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches (75 mm). Secure inner layer with 0.062-inch (1.6-mm) wire spaced at 12-inch (300-mm) intervals. Secure outer layer with stainless-steel bands at 12-inch (300-mm) intervals.

B. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets with vapor retarders on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

C. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.

D. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

E. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.11 INSTALLATION OF POLYISOCYANURATE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with tape or bands and tighten without deforming insulation materials. Orient longitudinal joints between half sections in 3- and 9-o'clock positions on the pipe.
2. For insulation with factory-applied jackets with vapor barriers, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive or tape as recommended by insulation material manufacturer and seal with vapor-barrier mastic.
3. All insulation shall be tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, same thickness of adjacent pipe insulation, not to exceed 1-1/2-inch (38-mm) thickness.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyisocyanurate block insulation of same thickness as pipe insulation.

C. Insulation Installation on Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of polyisocyanurate insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.12 INSTALLATION OF POLYOLEFIN INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of polyolefin pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install cut sections of polyolefin pipe and sheet insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.13 INSTALLATION OF POLYSTYRENE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation with tape or bands and tighten bands without deforming insulation materials. Orient longitudinal joints between half sections in 3- and 9-o'clock positions on the pipe.
2. For insulation with factory-applied jackets with vapor barriers, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive or tape as recommended by insulation material manufacturer and seal with vapor-barrier mastic.
3. All insulation shall be tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, and make thickness same as adjacent pipe insulation, not to exceed 1-1/2-inch (38-mm).
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polystyrene block insulation of same thickness as pipe insulation.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed section of polystyrene insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.14 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch (50-mm) overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.

E. Where PVDC jackets are indicated, install as follows:

1. Apply three separate wraps of filament tape per insulation section to secure pipe insulation to pipe prior to installation of PVDC jacket.
2. Wrap factory-presized jackets around individual pipe insulation sections with one end overlapping the previously installed sheet. Install presized jacket with an approximate overlap at butt joint of 2 inches (50 mm) over the previous section. Adhere lap seal using adhesive or SSL, and then apply 1-1/4 circumferences of appropriate PVDC tape around overlapped butt joint.
3. Continuous jacket can be spiral-wrapped around a length of pipe insulation. Apply adhesive or PVDC tape at overlapped spiral edge. When electing to use adhesives, refer to manufacturer's written instructions for application of adhesives along this spiral edge to maintain a permanent bond.

4. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of 33-1/2 inches (850 mm) or less. The 33-1/2-inch- (850-mm-) circumference limit allows for 2-inch- (50-mm-) overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and use PVDC tape along lap seal to secure joint.
5. Repair holes or tears in PVDC jacket by placing PVDC tape over the hole or tear and wrapping a minimum of 1-1/4 circumferences to avoid damage to tape edges.

3.15 FINISHES

A. Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.16 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.17 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

3.18 INDOOR PIPING INSULATION SCHEDULE

A. Condensate and Equipment Drain Water below 60 Deg F (16 Deg C):

1. All Pipe Sizes: Insulation shall be one of the following:

   a. Cellular Glass: 1-1/2 inches (38 mm) thick.
   b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.
   c. Phenolic: 1 inch (25 mm) thick.
   d. Polyisocyanurate: 1 inch (25 mm) thick.
   e. Polyolefin: 1 inch (25 mm) thick.

B. Heating-Hot-Water Supply and Return, 200 Deg F (93 Deg C) and Below:

1. NPS 8 (DN 200) and Smaller: Insulation shall be one of the following:

   a. Cellular Glass: 2 inches (50 mm) thick.
   b. Mineral-Fiber, Preformed Pipe, Type I: 2 inches (50 mm) thick.
   c. Phenolic: 2 inches (50 mm) thick.
   d. Polyisocyanurate: 1 inch (25 mm) thick.

C. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation shall be one of the following:

   a. Cellular Glass: 1-1/2 inches (38 mm) thick.
   b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.
   c. Phenolic: 1 inch (25 mm) thick.
   d. Polyisocyanurate: 1 inch (25 mm) thick.
   e. Polyolefin: 1 inch (25 mm) thick.

D. Refrigerant Suction and Hot-Gas Flexible Tubing:

1. All Pipe Sizes: Insulation shall be one of the following:

   a. Flexible Elastomeric: 1 inch (25 mm) thick.
   b. Polyolefin: 1 inch (25 mm) thick.

3.19 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Heating-Hot-Water Supply and Return, 200 Deg F (93 Deg C) and Below:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Cellular Glass: 3 inches (75 mm) thick.

B. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Cellular Glass: 2 inches (50 mm) thick.
b. Flexible Elastomeric: 2 inches (50 mm) thick.
c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches (50 mm) thick.
d. Phenolic: 2 inches (50 mm) thick.
e. Polyisocyanurate: 2 inches (50 mm) thick.
f. Polyolefin: 2 inches (50 mm) thick.
g. Polystyrene: 2 inches (50 mm) thick.

C. Refrigerant Suction and Hot-Gas Flexible Tubing:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Flexible Elastomeric: 2 inches (50 mm) thick.
b. Polyolefin: 2 inches (50 mm) thick.

3.20 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:
1. PVC, Color-Coded by System: 30 mils (0.8 mm) thick.
2. Aluminum, Smooth, Corrugated or Stucco Embossed: 0.040 inch (1.0 mm) thick.
3. Painted Aluminum, Smooth, Corrugated or Stucco Embossed: 0.032 inch (0.81 mm) thick.
4. Stainless Steel, Type 304 or Type 316, Smooth 2B Finish, Corrugated or Stucco Embossed: 0.024 inch (0.61 mm) thick.

3.21 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.
2. PVC PVC, Color-Coded by System: 30 mils (0.8 mm) thick.
3. Aluminum, Smooth, Corrugated or Stucco Embossed: 0.040 inch (1.0 mm) thick.
4. Painted Aluminum, Smooth, Corrugated or Stucco Embossed: 0.032 inch (0.81 mm) thick.
5. Stainless Steel, Type 304, 316, 304 or 316, Smooth 2B Finish, Corrugated or Stucco Embossed: 0.024 inch (0.61 mm) thick.

D. Piping, Exposed:

1. PVC: 40 mils (1.0 mm) thick.
2. Painted Aluminum, Smooth, Corrugated, Stucco Embossed or with Z-Shaped Locking Seam: 0.040 inch (1.0 mm) thick.
3. Stainless Steel, Type 304, 316, 304 or 316, Smooth 2B Finish, Corrugated, Stucco Embossed or with Z-Shaped Locking Seam: 0.024 inch (0.61 mm) thick.

END OF SECTION 230719

SECTION 230800 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.

B. Related Sections:

1. Section 019113 "General Commissioning Requirements" for general commissioning process requirements.

1.3 DEFINITIONS

A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

B. CxA: Commissioning Authority.

C. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.

D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates of readiness.

B. Certificates of completion of installation, prestart, and startup activities.

1.5 ALLOWANCES

A. Labor, instrumentation, tools, and equipment costs for technicians for the performance of commissioning testing are covered by the "Schedule of Allowances" Article in Section 012100 "Allowances."

1.6 UNIT PRICES

A. Commissioning testing allowance may be adjusted up or down by the "List of Unit Prices" Article in Section 012200 "Unit Prices" when actual man-hours are computed at the end of commissioning testing.

1.7 CONTRACTOR'S RESPONSIBILITIES

A. Perform commissioning tests at the direction of the CxA.

B. Attend construction phase controls coordination meeting.

C. Attend testing, adjusting, and balancing review and coordination meeting.

D. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

E. Provide information requested by the CxA for final commissioning documentation.

F. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

1.8 CxA'S RESPONSIBILITIES

A. Provide Project-specific construction checklists and commissioning process test procedures for actual HVAC&R systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.

B. Direct commissioning testing.

C. Verify testing, adjusting, and balancing of Work are complete.

D. Provide test data, inspection reports, and certificates in Systems Manual.

1.9 COMMISSIONING DOCUMENTATION

A. Provide the following information to the CxA for inclusion in the commissioning plan:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for HVAC&R systems, assemblies, equipment, and components to be verified and tested.
4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
5. Certificate of readiness certifying that HVAC&R systems, subsystems, equipment, and associated controls are ready for testing.
6. Test and inspection reports and certificates.
7. Corrective action documents.
8. Verification of testing, adjusting, and balancing reports.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TESTING PREPARATION

A. Certify that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

B. Certify that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.

D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

E. Inspect and verify the position of each device and interlock identified on checklists.

F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.

G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.2 Testing AND BALANCING VERIFICATION

A. Prior to performance of testing and balancing Work, provide copies of reports, sample forms, checklists, and certificates to the CxA.

B. Notify the CxA at least 10 days in advance of testing and balancing Work, and provide access for the CxA to witness testing and balancing Work.

C. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC&R systems at the direction of the CxA.

1. The CxA will notify testing and balancing Contractor 10 days in advance of the date of field verification. Notice will not include data points to be verified.
2. The testing and balancing Contractor shall use the same instruments (by model and serial number) that were used when original data were collected.
3. Failure of an item includes, other than sound, a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final testing, adjusting, and balancing report. For sound pressure readings, a deviation of 3 dB shall result in rejection of final testing. Variations in background noise must be considered.
4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.3 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. The CxA along with the HVAC&R Contractor, testing and balancing Contractor, and HVAC&R Instrumentation and Control Contractor shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

G. The CxA may direct that set points be altered when simulating conditions is not practical.

H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

I. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.

J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.4 hvac&R systems, subsystems, and equipment Testing Procedures

A. Boiler Testing and Acceptance Procedures: Testing requirements are specified in HVAC boiler Sections. Provide submittals, test data, inspector record, and boiler certification to the CxA.

B. HVAC&R Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Section 230900 "Instrumentation and Control for HVAC" and Section 230993 "Sequence and Operations for HVAC Controls." Assist the CxA with preparation of testing plans.

C. Pipe system cleaning, flushing, hydrostatic tests, and chemical treatment requirements are specified in HVAC piping Sections. HVAC&R Contractor shall prepare a pipe system

cleaning, flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final reports to the CxA. Plan shall include the following:

1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.
2. Description of equipment for flushing operations.
3. Minimum flushing water velocity.
4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.

D. Energy Supply System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of chilled and hot-water systems and equipment at the direction of the CxA. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.

E. Refrigeration System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of chillers, cooling towers, refrigerant compressors and condensers, heat pumps, and other refrigeration systems. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.

F. HVAC&R Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air, steam, and hydronic distribution systems; special exhaust; and other distribution systems, including HVAC&R terminal equipment and unitary equipment.

G. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls.

END OF SECTION 230800

SECTION 230900 - INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

B. Related Sections include the following:

1. Section 230519 "Meters and Gages for HVAC Piping" for measuring equipment that relates to this Section.
2. Section 230993 "Sequence of Operations for HVAC Controls" for requirements that relate to this Section.

1.3 DEFINITIONS

A. DDC: Direct digital control.

B. I/O: Input/output.

C. LonWorks: A control network technology platform for designing and implementing interoperable control devices and networks.

D. MS/TP: Master slave/token passing.

E. PC: Personal computer.

F. PID: Proportional plus integral plus derivative.

G. RTD: Resistance temperature detector.

1.4 SYSTEM PERFORMANCE

A. Comply with the following performance requirements:

1. Graphic Display: Display graphic with minimum 20 dynamic points with current data within 10 seconds.

2. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 8 seconds.
3. Object Command: Reaction time of less than two seconds between operator command of a binary object and device reaction.
4. Object Scan: Transmit change of state and change of analog values to control units or workstation within six seconds.
5. Alarm Response Time: Annunciate alarm at workstation within 45 seconds. Multiple workstations must receive alarms within five seconds of each other.
6. Program Execution Frequency: Run capability of applications as often as five seconds, but selected consistent with mechanical process under control.
7. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.
8. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:

    a. Water Temperature: Plus or minus 1 deg F (0.5 deg C).
    b. Water Flow: Plus or minus 5 percent of full scale.
    c. Water Pressure: Plus or minus 2 percent of full scale.
    d. Space Temperature: Plus or minus 1 deg F (0.5 deg C).
    e. Ducted Air Temperature: Plus or minus 1 deg F (0.5 deg C).
    f. Outside Air Temperature: Plus or minus 2 deg F (1.0 deg C).
    g. Dew Point Temperature: Plus or minus 3 deg F (1.5 deg C).
    h. Temperature Differential: Plus or minus 0.25 deg F (0.15 deg C).
    i. Relative Humidity: Plus or minus 5 percent.
    j. Airflow (Pressurized Spaces): Plus or minus 3 percent of full scale.
    k. Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
    l. Airflow (Terminal): Plus or minus 10 percent of full scale.
    m. Air Pressure (Space): Plus or minus 0.01-inch wg (2.5 Pa).
    n. Air Pressure (Ducts): Plus or minus 0.1-inch wg (25 Pa).
    o. Carbon Monoxide: Plus or minus 5 percent of reading.
    p. Carbon Dioxide: Plus or minus 50 ppm.
    q. Electrical: Plus or minus 5 percent of reading.

1.5 SEQUENCE OF OPERATION

1.6 ACTION SUBMITTALS

A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.

1. DDC System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.
2. Control System Software: Include technical data for operating system software, operator interface, color graphics, and other third-party applications.

3. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Bill of materials of equipment indicating quantity, manufacturer, and model number.
2. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
3. Wiring Diagrams: Power, signal, and control wiring.
4. Details of control panel faces, including controls, instruments, and labeling.
5. Written description of sequence of operation.
6. Schedule of dampers including size, leakage, and flow characteristics.
7. Schedule of valves including flow characteristics.
8. DDC System Hardware:

   a. Wiring diagrams for control units with termination numbers.
   b. Schematic diagrams and floor plans for field sensors and control hardware.
   c. Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control unit locations.

9. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.
10. Controlled Systems:

    a. Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
    b. Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
    c. Written description of sequence of operation including schematic diagram.
    d. Points list.

C. Samples for Initial Selection: For each color required, of each type of thermostat cover with factory-applied color finishes.

D. Samples for Verification: For each color required, of each type of thermostat cover.

1.7 INFORMATIONAL SUBMITTALS

A. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with ASHRAE 135.

B. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with LonWorks.

C. Qualification Data: For Installer.

D. Software Upgrade Kit: For Owner to use in modifying software to suit future systems revisions or monitoring and control revisions.

E. Field quality-control test reports.

1.8 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Maintenance instructions and lists of spare parts for each type of control device and compressed-air station.
2. Interconnection wiring diagrams with identified and numbered system components and devices.
3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
5. Calibration records and list of set points.

B. Software and Firmware Operational Documentation: Include the following:

1. Software operating and upgrade manuals.
2. Program Software Backup: On a magnetic media or compact disc, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.
5. Software license required by and installed for DDC workstations and control systems.

1.9 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Replacement Materials: One replacement diaphragm or relay mechanism for each unique valve motor, controller, thermostat and positioning relay.
2. Maintenance Materials: One thermostat adjusting key(s).
3. Maintenance Materials: One pneumatic thermostat test kit.

1.10 QUALITY ASSURANCE

A. Installer Qualifications: Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with ASHRAE 135 for DDC system components.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.

B. System Software: Update to latest version of software at Project completion.

1.12 COORDINATION

A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.

B. Coordinate equipment with Section 281600 "Intrusion Detection" to achieve compatibility with equipment that interfaces with that system and with building master clock.

C. Coordinate equipment with Section 281300 "Access Control" to achieve compatibility with equipment that interfaces with that system.

D. Coordinate equipment with Section 275313 "Clock Systems" to achieve compatibility with equipment that interfaces with that system.

E. Coordinate equipment with Section 284619 "PLC Electronic Detention Monitoring and Control Systems" to achieve compatibility with equipment that interfaces with that system.

F. Coordinate equipment with Section 260943.13 "Addressable-Fixture Lighting Controls" and Section 260943.23 "Relay-Based Lighting Controls" to achieve compatibility with equipment that interfaces with that system.

G. Coordinate equipment with Section 283111 "Digital, Addressable Fire-Alarm System" and Section 283112 "Zoned (DC Loop) Fire-Alarm System" to achieve compatibility with equipment that interfaces with that system.

H. Coordinate supply of conditioned electrical branch circuits for control units and operator workstation.

I. Coordinate equipment with Section 260913 "Electrical Power Monitoring and Control" to achieve compatibility of communication interfaces.

J. Coordinate equipment with Section 262416 "Panelboards" to achieve compatibility with starter coils and annunciation devices.

K. Coordinate equipment with Section 262419 "Motor-Control Centers" to achieve compatibility with motor starters and annunciation devices.

L. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 CONTROL SYSTEM

A. Available Manufacturers:

1. Alerton Inc.
2. Carrier.
3. Trane; Worldwide Applied Systems Group

B. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, and accessories to control mechanical systems.

C. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on token-passing network and programmed to control mechanical systems. An operator workstation permits interface with the network via dynamic color graphics with each mechanical system, building floor plan, and control device depicted by point-and-click graphics.

D. Control system shall include the following:

1. Building intrusion detection system specified in Section 281600 "Intrusion Detection."
2. Building clock control system specified in Section 275313 "Clock Systems."
3. Building lighting control system specified in Section 260943.13 "Addressable-Fixture Lighting Controls" and Section 260943.23 "Relay-Based Lighting Controls."
4. Fire alarm system specified in Section 283111 "Digital, Addressable Fire-Alarm System" and Section 283112 "Zoned (DC Loop) Fire-Alarm System."

2.3 DDC EQUIPMENT

A. Operator Workstation: One PC-based microcomputer(s) with minimum configuration as follows:

1. Motherboard: With 8 integrated USB 2.0 ports, integrated Intel Pro 10/100 (Ethernet), integrated audio, bios, and hardware monitoring.
2. Processor: Intel Pentium 4 .
3. Random-Access Memory: 512 MB.
4. Graphics: Video adapter, minimum 1280 x 1024 pixels, 64 -MB video memory, with TV out.
5. Monitor: 19 inches (480 mm) , LCD color.
6. Keyboard: QWERTY, 105 keys in ergonomic shape.
7. Floppy-Disk Drive: 1.44 MB.
8. Hard-Disk Drive: 80 GB .
9. CD-ROM Read/Write Drive: 48x24x48 .
10. Mouse: Three button, optical.
11. Uninterruptible Power Supply: 2 kVa.

    a. ASHRAE 135 Compliance: Workstation shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.
    b. .

12. Application Software:

    a. I/O capability from operator station.
    b. System security for each operator via software password and access levels.
    c. Automatic system diagnostics; monitor system and report failures.
    d. Database creation and support.
    e. Automatic and manual database save and restore.
    f. Dynamic color graphic displays with up to 10 screen displays at once.
    g. Custom graphics generation and graphics library of HVAC equipment and symbols.
    h. Alarm processing, messages, and reactions.
    i. Trend logs retrievable in spreadsheets and database programs.
    j. Alarm and event processing.
    k. Object and property status and control.
    l. Automatic restart of field equipment on restoration of power.
    m. Data collection, reports, and logs. Include standard reports for the following:

        1) Current values of all objects.
        2) Current alarm summary.
        3) Disabled objects.
        4) Alarm lockout objects.
        5) Logs.

    n. Custom report development.
    o. Utility and weather reports.
    p. Workstation application editors for controllers and schedules.
    q. Maintenance management.

13. Custom Application Software:

    a. English language oriented.
    b. Full-screen character editor/programming environment.
    c. Allow development of independently executing program modules with debugging/simulation capability.
    d. Support conditional statements.
    e. Support floating-point arithmetic with mathematic functions.
    f. Contains predefined time variables.

B. Control Units: Modular, comprising processor board with programmable, nonvolatile, random-access memory; local operator access and display panel; integral interface equipment; and backup power source.

1. Units monitor or control each I/O point; process information; execute commands from other control units, devices, and operator stations; and download from or upload to operator workstation or diagnostic terminal unit.
2. Stand-alone mode control functions operate regardless of network status. Functions include the following:

    a. Global communications.
    b. Discrete/digital, analog, and pulse I/O.
    c. Monitoring, controlling, or addressing data points.
    d. Software applications, scheduling, and alarm processing.
    e. Testing and developing control algorithms without disrupting field hardware and controlled environment.

3. Standard Application Programs:

    a. Electric Control Programs: Demand limiting, duty cycling, automatic time scheduling, start/stop time optimization, night setback/setup, on-off control with differential sequencing, staggered start, antishort cycling, PID control, DDC with fine tuning, and trend logging.
    b. HVAC Control Programs: Optimal run time, supply-air reset, and enthalpy switchover.
    c. Chiller Control Programs: Control function of condenser-water reset, chilled-water reset, and equipment sequencing.
    d. Programming Application Features: Include trend point; alarm processing and messaging; weekly, monthly, and annual scheduling; energy calculations; run-time totalization; and security access.
    e. Remote communications.
    f. Maintenance management.
    g. Units of Measure: Inch-pound and SI (metric).

4. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
5. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.
6. LonWorks Compliance: Control units shall use LonTalk protocol and communicate using EIA/CEA 709.1 datalink/physical layer protocol.

C. Local Control Units: Modular, comprising processor board with electronically programmable, nonvolatile, read-only memory; and backup power source.

1. Units monitor or control each I/O point, process information, and download from or upload to operator workstation or diagnostic terminal unit.
2. Stand-alone mode control functions operate regardless of network status. Functions include the following:

   a. Global communications.
   b. Discrete/digital, analog, and pulse I/O.
   c. Monitoring, controlling, or addressing data points.

3. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
4. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.
5. LonWorks Compliance: Control units shall use LonTalk protocol and communicate using EIA/CEA 709.1 datalink/physical layer protocol.

D. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers.

1. Binary Inputs: Allow monitoring of on-off signals without external power.
2. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
3. Analog Inputs: Allow monitoring of low-voltage (0- to 10-V dc), current (4 to 20 mA), or resistance signals.
4. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation with three-position (on-off-auto) override switches and status lights.
5. Analog Outputs: Provide modulating signal, either low voltage (0- to 10-V dc) or current (4 to 20 mA) with status lights, two-position (auto-manual) switch, and manually adjustable potentiometer.
6. Tri-State Outputs: Provide two coordinated binary outputs for control of three-point, floating-type electronic actuators.
7. Universal I/Os: Provide software selectable binary or analog outputs.

E. Power Supplies: Transformers with Class 2 current-limiting type or overcurrent protection; limit connected loads to 80 percent of rated capacity. DC power supply shall match output current and voltage requirements and be full-wave rectifier type with the following:

1. Output ripple of 5.0 mV maximum peak to peak.
2. Combined 1 percent line and load regulation with 100-mic.sec. response time for 50 percent load changes.
3. Built-in overvoltage and overcurrent protection and be able to withstand 150 percent overload for at least 3 seconds without failure.

F. Power Line Filtering: Internal or external transient voltage and surge suppression for workstations or controllers with the following:

1. Minimum dielectric strength of 1000 V.

2. Maximum response time of 10 nanoseconds.
3. Minimum transverse-mode noise attenuation of 65 dB.
4. Minimum common-mode noise attenuation of 150 dB at 40 to 100 Hz.

2.4 UNITARY CONTROLLERS

A. Unitized, capable of stand-alone operation with sufficient memory to support its operating system, database, and programming requirements, and with sufficient I/O capacity for the application.

1. Configuration: Local keypad and display; diagnostic LEDs for power, communication, and processor; wiring termination to terminal strip or card connected with ribbon cable; memory with bios; and 72 -hour battery backup.
2. Operating System: Manage I/O communication to allow distributed controllers to share real and virtual object information and allow central monitoring and alarms. Perform scheduling with real-time clock. Perform automatic system diagnostics; monitor system and report failures.
3. ASHRAE 135 Compliance: Communicate using read (execute and initiate) and write (execute and initiate) property services defined in ASHRAE 135. Reside on network using MS/TP datalink/physical layer protocol and have service communication port for connection to diagnostic terminal unit.
4. Enclosure: Dustproof rated for operation at 32 to 120 deg F (0 to 50 deg C).
5. Enclosure: Waterproof rated for operation at 40 to 150 deg F (5 to 65 deg C).

2.5 ALARM PANELS

A. Unitized cabinet with suitable brackets for wall or floor mounting. Fabricate of 0.06-inch- (1.5-mm-) thick, furniture-quality steel or extruded-aluminum alloy, totally enclosed, with hinged doors and keyed lock and with manufacturer's standard shop-painted finish. Provide common keying for all panels.

B. Indicating light for each alarm point, single horn, acknowledge switch, and test switch, mounted on hinged cover.

1. Alarm Condition: Indicating light flashes and horn sounds.
2. Acknowledge Switch: Horn is silent and indicating light is steady.
3. Second Alarm: Horn sounds and indicating light is steady.
4. Alarm Condition Cleared: System is reset and indicating light is extinguished.
5. Contacts in alarm panel allow remote monitoring by independent alarm company.

2.6 ANALOG CONTROLLERS

A. Step Controllers: 6- or 10-stage type, with heavy-duty switching rated to handle loads and operated by electric motor.

B. Electric, Outdoor-Reset Controllers: Remote-bulb or bimetal rod-and-tube type, proportioning action with adjustable throttling range, adjustable set point, scale range minus 10 to plus 70 deg F (minus 23 to plus 21 deg C), and single- or double-pole contacts.

C. Electronic Controllers: Wheatstone-bridge-amplifier type, in steel enclosure with provision for remote-resistance readjustment. Identify adjustments on controllers, including proportional band and authority.

1. Single controllers can be integral with control motor if provided with accessible control readjustment potentiometer.

D. Fan-Speed Controllers: Solid-state model providing field-adjustable proportional control of motor speed from maximum to minimum of 55 percent and on-off action below minimum fan speed. Controller shall briefly apply full voltage, when motor is started, to rapidly bring motor up to minimum speed. Equip with filtered circuit to eliminate radio interference.

E. Receiver Controllers: Single- or multiple-input models with control-point adjustment, direct or reverse acting with mechanical set-point adjustment with locking device, proportional band adjustment, authority adjustment, and proportional control mode.

1. Remote-control-point adjustment shall be plus or minus 20 percent of sensor span, input signal of 3 to 13 psig (21 to 90 kPa).
2. Proportional band shall extend from 2 to 20 percent for 5 psig (35 kPa).
3. Authority shall be 20 to 200 percent.
4. Air-supply pressure of 18 psig (124 kPa), input signal of 3 to 15 psig (21 to 103 kPa), and output signal of zero to supply pressure.
5. Gages: 2-1/2 inches (64 mm) in diameter, 2.5 percent wide-scale accuracy, and range to match transmitter input or output pressure.

2.7 ELECTRONIC SENSORS

A. Description: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.

B. Thermistor Temperature Sensors and Transmitters:

1. Available Manufacturers:

a. Ebtron, Inc.
b. Heat-Timer Corporation.
c. AutomatedLogic

2. Accuracy: Plus or minus 0.5 deg F (0.3 deg C) at calibration point.
3. Wire: Twisted, shielded-pair cable.
4. Insertion Elements in Ducts: Single point, 8 inches (200 mm) long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft. (0.84 sq. m).
5. Averaging Elements in Ducts: 36 inches (915 mm) long, flexible ; use where prone to temperature stratification or where ducts are larger than 10 sq. ft. (1 sq. m).
6. Insertion Elements for Liquids: Brass or stainless-steel socket with minimum insertion length of 2-1/2 inches (64 mm).
7. Room Sensor Cover Construction: Manufacturer's standard locking covers.

a. Set-Point Adjustment: Exposed.

b. Set-Point Indication: Exposed.
c. Thermometer: Exposed
d. Orientation: Vertical .

8. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
9. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.

C. RTDs and Transmitters:

1. Available Manufacturers:

a. BEC Controls Corporation.
b. MAMAC Systems, Inc.
c. RDF Corporation.
d.

2. Accuracy: Plus or minus 0.2 percent at calibration point.
3. Wire: Twisted, shielded-pair cable.
4. Insertion Elements in Ducts: Single point, 8 inches (200 mm) long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft. (0.84 sq. m).
5. Averaging Elements in Ducts: 18 inches (460 mm) long, rigid; use where prone to temperature stratification or where ducts are larger than 9 sq. ft. (0.84 sq. m); length as required.
6. Insertion Elements for Liquids: Brass socket with minimum insertion length of 2-1/2 inches (64 mm).
7. Room Sensor Cover Construction: Manufacturer's standard locking covers.

a. Set-Point Adjustment: Exposed.
b. Set-Point Indication: Exposed.
c. Thermometer: Exposed
d. Orientation: Vertical .

8. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
9. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.

D. Pressure Transmitters/Transducers:

1. Available Manufacturers:

a. BEC Controls Corporation.
b. General Eastern Instruments.
c. MAMAC Systems, Inc.
d. ROTRONIC Instrument Corp.
e. TCS/Basys Controls.

2. Static-Pressure Transmitter: Nondirectional sensor with suitable range for expected input, and temperature compensated.

a. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
b. Output: 4 to 20 mA.
c. Building Static-Pressure Range: 0- to 0.25-inch wg (0 to 62 Pa).
d. Duct Static-Pressure Range: 0- to 5-inch wg (0 to 1240 Pa).

3. Water Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig (1034-kPa) operating pressure; linear output 4 to 20 mA.
4. Water Differential-Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig (1034-kPa) operating pressure and tested to 300-psig (2070-kPa); linear output 4 to 20 mA.
5. Differential-Pressure Switch (Air or Water): Snap acting, with pilot-duty rating and with suitable scale range and differential.
6. Pressure Transmitters: Direct acting for gas, liquid, or steam service; range suitable for system; linear output 4 to 20 mA.

E. Room Sensor Cover Construction: Manufacturer's standard locking covers.

1. Set-Point Adjustment: Exposed.
2. Set-Point Indication: Keyed Exposed.
3. Thermometer: Exposed
4. Orientation: Vertical

F. Room sensor accessories include the following:

1. Insulating Bases: For sensors located on exterior walls.
2. Guards: Locking; heavy-duty, transparent plastic; mounted on separate base Adjusting Key: As required for calibration and cover screws.

2.8 STATUS SENSORS

A. Status Inputs for Fans: Differential-pressure switch with pilot-duty rating and with adjustable range of 0- to 5-inch wg (0 to 1240 Pa).

B. Status Inputs for Pumps: Differential-pressure switch with pilot-duty rating and with adjustable pressure-differential range of 8 to 60 psig (55 to 414 kPa), piped across pump.

C. Status Inputs for Electric Motors: Comply with ISA 50.00.01, current-sensing fixed- or split-core transformers with self-powered transmitter, adjustable and suitable for 175 percent of rated motor current.

D. Voltage Transmitter (100- to 600-V ac): Comply with ISA 50.00.01, single-loop, self-powered transmitter, adjustable, with suitable range and 1 percent full-scale accuracy.

E. Power Monitor: 3-phase type with disconnect/shorting switch assembly, listed voltage and current transformers, with pulse kilowatt hour output and 4- to 20-mA kW output, with maximum 2 percent error at 1.0 power factor and 2.5 percent error at 0.5 power factor.

F. Current Switches: Self-powered, solid-state with adjustable trip current, selected to match current and system output requirements.

G. Electronic Valve/Damper Position Indicator: Visual scale indicating percent of travel and 2- to 10-V dc, feedback signal.

H. Water-Flow Switches: Bellows-actuated mercury or snap-acting type with pilot-duty rating, stainless-steel or bronze paddle, with appropriate range and differential adjustment, in NEMA 250, Type 1 enclosure.

1. Available Manufacturers:

a. BEC Controls Corporation.
b. I.T.M. Instruments Inc.

2.9 THERMOSTATS

A. Available Manufacturers:

1. Erie Controls.
2. Danfoss Inc.; Air-Conditioning and Refrigeration Div.
3. AutomatedLogic

B. Combination Thermostat and Fan Switches: Line-voltage thermostat with push-button or lever-operated fan switch.
1. Mount on single electric switch box.

C. Electric, solid-state, microcomputer-based room thermostat with remote sensor.

1. Automatic switching from heating to cooling.
2. Preferential rate control to minimize overshoot and deviation from set point.
3. Set up for four separate temperatures per day.
4. Instant override of set point for continuous or timed period from 1 hour to 31 days.
5. Short-cycle protection.
6. Programming based on every day of week.
7. Selection features include degree F or degree C display, 12- or 24-hour clock, keyboard disable, remote sensor, and fan on-auto.
8. Battery replacement without program loss.
9. Thermostat display features include the following:

a. Time of day.
b. Actual room temperature.
c. Programmed temperature.
d. Programmed time.
e. Duration of timed override.
f. Day of week.
g. System mode indications include "heating," "off," "fan auto," and "fan on."

D. Low-Voltage, On-Off Thermostats: NEMA DC 3, 24-V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater, concealed set-point adjustment, 55 to 85 deg F (13 to 30 deg C) set-point range, and 2 deg F (1 deg C) maximum differential.

E. Line-Voltage, On-Off Thermostats: Bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch or equivalent solid-state type, with heat anticipator; listed for electrical rating; with concealed set-point adjustment, 55 to 85 deg F (13 to 30 deg C) set-point range, and 2 deg F (1 deg C) maximum differential.

1. Electric Heating Thermostats: Equip with off position on dial wired to break ungrounded conductors.
2. Selector Switch: Integral, manual on-off-auto.

F. Remote-Bulb Thermostats: On-off or modulating type, liquid filled to compensate for changes in ambient temperature; with copper capillary and bulb, unless otherwise indicated.

1. Bulbs in water lines with separate wells of same material as bulb.
2. Bulbs in air ducts with flanges and shields.
3. Averaging Elements: Copper tubing with either single- or multiple-unit elements, extended to cover full width of duct or unit; adequately supported.
4. Scale settings and differential settings are clearly visible and adjustable from front of instrument.
5. On-Off Thermostat: With precision snap switches and with electrical ratings required by application.
6. Modulating Thermostats: Construct so complete potentiometer coil and wiper assembly is removable for inspection or replacement without disturbing calibration of instrument.

G. Fire-Protection Thermostats: Listed and labeled by an NRTL acceptable to authorities having jurisdiction; with fixed or adjustable settings to operate at not less than 75 deg F (24 deg C) above normal maximum operating temperature, and the following:

1. Reset: Manual.
2. Reset: Automatic, with control circuit arranged to require manual reset at central control panel; with pilot light and reset switch on panel labeled to indicate operation.

H. Electric, Low-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual- or automatic- reset switch that trips if temperature sensed across any 12 inches (300 mm) of bulb length is equal to or below set point.

1. Bulb Length: Minimum 20 feet (6 m).
2. Quantity: One thermostat for every 20 sq. ft. (2 sq. m) of coil surface.

I. Electric, High-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual- or automatic- reset switch that trips if temperature sensed across any 12 inches (300 mm) of bulb length is equal to or above set point.

1. Bulb Length: Minimum 20 feet (6 m).
2. Quantity: One thermostat for every 20 sq. ft. (2 sq. m) of coil surface.

J. Heating/Cooling Valve-Top Thermostats: Proportional acting for proportional flow, with molded-rubber diaphragm, remote-bulb liquid-filled element, direct and reverse acting at minimum shutoff pressure of 25 psig (172 kPa), and cast housing with position indicator and adjusting knob.

2.10 ACTUATORS

A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.

1. Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
3. Nonspring-Return Motors for Valves Larger Than NPS 2-1/2 (DN 65): Size for running torque of 150 in. x lbf (16.9 N x m) and breakaway torque of 300 in. x lbf (33.9 N x m).
4. Spring-Return Motors for Valves Larger Than NPS 2-1/2 (DN 65): Size for running and breakaway torque of 150 in. x lbf (16.9 N x m).
5. Nonspring-Return Motors for Dampers Larger Than 25 Sq. Ft. (2.3 sq. m): Size for running torque of 150 in. x lbf (16.9 N x m) and breakaway torque of 300 in. x lbf (33.9 N x m).
6. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft. (2.3 sq. m): Size for running and breakaway torque of 150 in. x lbf (16.9 N x m).

B. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.

1. Available Manufacturers:

   a. Belimo Aircontrols (USA), Inc.
   b. Danfoss

2. Valves: Size for torque required for valve close off at maximum pump differential pressure.
3. Dampers: Size for running torque calculated as follows:

   a. Parallel-Blade Damper with Edge Seals: 7 inch-lb/sq. ft. (86.8 kg-cm/sq. m) of damper.
   b. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft. (62 kg-cm/sq. m) of damper.
   c. Parallel-Blade Damper without Edge Seals: 4 inch-lb/sq. ft (49.6 kg-cm/sq. m) of damper.
   d. Opposed-Blade Damper without Edge Seals: 3 inch-lb/sq. ft. (37.2 kg-cm/sq. m) of damper.
   e. Dampers with 2- to 3-Inch wg (500 to 750 Pa) of Pressure Drop or Face Velocities of 1000 to 2500 fpm (5 to 13 m/s): Increase running torque by 1.5.
   f. Dampers with 3- to 4-Inch wg (750 to 1000 Pa) of Pressure Drop or Face Velocities of 2500 to 3000 fpm (13 to 15 m/s): Increase running torque by 2.0.

4. Coupling: V-bolt and V-shaped, toothed cradle.
5. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
6. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.

7. Power Requirements (Two-Position Spring Return): 24-V ac.
8. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
9. Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
10. Temperature Rating: Minus 22 to plus 122 deg F (Minus 30 to plus 50 deg C)
11. Temperature Rating (Smoke Dampers): Minus 22 to plus 250 deg F (Minus 30 to plus 121 deg C).
12. Run Time: 12 seconds open, 5 seconds closed
13. Standard spring ranges are 2 to 5 psig (14 to 35 kPa), 3 to 10 psig (21 to 69 kPa), and 8 to 11 psig (55 to 76 kPa).

2.11 CONTROL VALVES

A. Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.

B. Hydronic system globe valves shall have the following characteristics:

1. NPS 2 (DN 50) and Smaller: Class 125 bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity repackable under pressure.
2. NPS 2-1/2 (DN 65) and Larger: Class 125 iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.
3. Internal Construction: Replaceable plugs and stainless-steel or brass seats.

    a. Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom.
    b. Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom.

4. Sizing: 3-psig (21-kPa) maximum pressure drop at design flow rate or the following:

    a. Two Position: Line size.
    b. Two-Way Modulating: Either the value specified above or twice the load pressure drop, whichever is more.
    c. Three-Way Modulating: Twice the load pressure drop, but not more than value specified above.

5. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.
6. Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of total system (pump) head for two-way valves and 100 percent of pressure differential across valve or 100 percent of total system (pump) head.

C. Steam system globe valves shall have the following characteristics:

1. NPS 2 (DN 50) and Smaller: Class 125 bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity repackable under pressure.

2. NPS 2-1/2 (DN 65) and Larger: Class 125 iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.
3. Internal Construction: Replaceable plugs and stainless-steel seats.

    a. Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom of guided plugs.
    b. Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom of guided plugs.

4. Sizing: For pressure drop based on the following services:

    a. Two Position: 20 percent of inlet pressure.

5. Flow Characteristics: Modified linear characteristics.
6. Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of operating (inlet) pressure.

D. Terminal Unit Control Valves: Bronze body, bronze trim, two or three ports as indicated, replaceable plugs and seats, and union and threaded ends.

1. Rating: Class 125 for service at 125 psig (860 kPa) and 250 deg F (121 deg C) operating conditions.
2. Sizing: 3-psig (21-kPa) maximum pressure drop at design flow rate, to close against pump shutoff head.
3. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.

2.12 DAMPERS

A. Available Manufacturers:

1. Ruskin
2. Potroff
3. United Enertech Corp.

B. Dampers: AMCA-rated, opposed-blade design; 0.108-inch- (2.8-mm-) minimum thick, galvanized-steel or 0.125-inch- (3.2-mm-) minimum thick, extruded-aluminum frames with holes for duct mounting; damper blades shall not be less than 0.064-inch- (1.6-mm-) thick galvanized steel with maximum blade width of 8 inches (200 mm) and length of 48 inches (1220 mm).

1. Secure blades to 1/2-inch- (13-mm-) diameter, zinc-plated axles using zinc-plated hardware, with oil-impregnated sintered bronze blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
2. Operating Temperature Range: From minus 40 to plus 200 deg F (minus 40 to plus 93 deg C).
3. Edge Seals, Standard Pressure Applications: Closed-cell neoprene.
4. Edge Seals, Low-Leakage Applications: Use inflatable blade edging or replaceable rubber blade seals and spring-loaded stainless-steel side seals, rated for leakage at less

than 10 cfm per sq. ft. (50 L/s per sq. m) of damper area, at differential pressure of 4-inch wg (1000 Pa) when damper is held by torque of 50 in. x lbf (5.6 N x m); when tested according to AMCA 500D.

2.13 CONTROL CABLE

A. Electronic and fiber-optic cables for control wiring are specified in Section 271500 "Communications Horizontal Cabling."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that conditioned power supply is available to control units and operator workstation.

B. Verify that pneumatic piping and duct-, pipe-, and equipment-mounted devices are installed before proceeding with installation.

3.2 INSTALLATION

A. Install software in control units and operator workstation(s). Implement all features of programs to specified requirements and as appropriate to sequence of operation.

B. Connect and configure equipment and software to achieve sequence of operation specified.

C. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices 48 inches (1220 mm) above the floor.

1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.

D. Install guards on thermostats in the following locations:

1. Entrances.
2. Public areas.
3. Where indicated.

E. Install automatic dampers according to Section 233300 "Air Duct Accessories."

F. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.

G. Install labels and nameplates to identify control components according to Section 230553 "Identification for HVAC Piping and Equipment."

H. Install hydronic instrument wells, valves, and other accessories according to Section 232116 Hydronic Piping Specialties."

I. Install steam and condensate instrument wells, valves, and other accessories according toSection 232216 Steam and Condensate Piping Specialties."

J. Install refrigerant instrument wells, valves, and other accessories according to Section 232300 "Refrigerant Piping."

K. Install duct volume-control dampers according to Section 233113 "Metal Ducts" and Section 233116 "Nonmetal Ducts."

L. Install electronic and fiber-optic cables according to Section 271500 "Communications Horizontal Cabling."

3.3 PNEUMATIC PIPING INSTALLATION

A. Install piping in mechanical equipment rooms inside mechanical equipment enclosures, in pipe chases, or suspended ceilings with easy access.

1. Install copper tubing with maximum unsupported length of 36 inches (915 mm), for tubing exposed to view.
2. Install polyethylene tubing in metallic raceways or electrical metallic tubing. Electrical metallic tubing materials and installation requirements are specified in Section 260533 "Raceways and Boxes for Electrical Systems."

B. Install terminal single-line connections, less than 18 inches (460 mm) in length, with copper or polyethylene tubing run inside flexible steel protection.

C. In concealed locations such as pipe chases and suspended ceilings with easy access, install copper tubing. Electrical metallic tubing materials and installation requirements are specified in Section 260533 "Raceways and Boxes for Electrical Systems."

D. In concrete slabs, furred walls, or ceilings with no access, install copper or polyethylene tubing in electrical metallic tubing or vinyl-jacketed polyethylene tubing.

1. Protect embedded-copper and vinyl-jacketed polyethylene tubing with electrical metallic tubing extending 6 inches (150 mm) above finished slab and 6 inches (150 mm) into slab. Pressure test tubing before and after pour for leak and pinch.
2. Install polyethylene tubing in electrical metallic tubing extending 6 inches (150 mm) above floor line; pull tubing into electrical metallic tubing after pour.

E. Install tubing with sufficient slack and flexible connections to allow for vibration of piping and equipment.

F. Purge tubing with dry, oil-free compressed air before connecting control instruments.

1. Bridge cabinets and doors with flexible connections fastened along hinge side; protect against abrasion. Tie and support tubing.

G. Number-code or color-code control air piping for future identification and service of control system, except local individual room control tubing.

H. Pressure Gages or Test Plugs: Install on branch lines at each receiver controller and on signal lines at each transmitter, except individual room controllers.

3.4 ELECTRICAL WIRING AND CONNECTION INSTALLATION

A. Install raceways, boxes, and cabinets according to Section 260533 "Raceways and Boxes for Electrical Systems."

B. Install building wire and cable according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Install signal and communication cable according to Section 271500 "Communications Horizontal Cabling."

1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
2. Install exposed cable in raceway.
3. Install concealed cable in raceway.
4. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
5. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
6. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
7. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment.

D. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.

E. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
2. Test and adjust controls and safeties.
3. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
4. Pressure test control air piping at 30 psig (207 kPa) or 1.5 times the operating pressure for 24 hours, with maximum 5-psig (35-kPa) loss.

5. Pressure test high-pressure control air piping at 150 psig (1034 kPa) and low-pressure control air piping at 30 psig (207 kPa) for 2 hours, with maximum 1-psig (7-kPa) loss.
6. Test calibration of electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.
7. Test each point through its full operating range to verify that safety and operating control set points are as required.
8. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
9. Test each system for compliance with sequence of operation.
10. Test software and hardware interlocks.

C. DDC Verification:

1. Verify that instruments are installed before calibration, testing, and loop or leak checks.
2. Check instruments for proper location and accessibility.
3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
4. Check instrument tubing for proper fittings, slope, material, and support.
5. Check installation of air supply for each instrument.
6. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
7. Check pressure instruments, piping slope, installation of valve manifold, and self-contained pressure regulators.
8. Check temperature instruments and material and length of sensing elements.
9. Check control valves. Verify that they are in correct direction.
10. Check air-operated dampers. Verify that pressure gages are provided and that proper blade alignment, either parallel or opposed, has been provided.
11. Check DDC system as follows:

    a. Verify that DDC controller power supply is from emergency power supply, if applicable.
    b. Verify that wires at control panels are tagged with their service designation and approved tagging system.
    c. Verify that spare I/O capacity has been provided.
    d. Verify that DDC controllers are protected from power supply surges.

D. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

3.6 ADJUSTING

A. Calibrating and Adjusting:

1. Calibrate instruments.
2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
4. Control System Inputs and Outputs:

a. Check analog inputs at 0, 50, and 100 percent of span.
b. Check analog outputs using milliampere meter at 0, 50, and 100 percent output.
c. Check digital inputs using jumper wire.
d. Check digital outputs using ohmmeter to test for contact making or breaking.
e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.

5. Flow:

a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
b. Manually operate flow switches to verify that they make or break contact.

6. Pressure:

a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.

7. Temperature:

a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
b. Calibrate temperature switches to make or break contacts.

8. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
9. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
10. Provide diagnostic and test instruments for calibration and adjustment of system.
11. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.

B. Adjust initial temperature and humidity set points.

C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three visits to Project during other than normal occupancy hours for this purpose.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain HVAC instrumentation and controls. Refer to Section 017900 "Demonstration and Training."

END OF SECTION 230900

SECTION 232113 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes pipe and fitting materials and joining methods for the following:

1. Hot-water heating piping.
2. Chilled-water piping.
3. Condenser-water piping.
4. Makeup-water piping.
5. Condensate-drain piping.
6. Blowdown-drain piping.
7. Air-vent piping.
8. Safety-valve-inlet and -outlet piping.

1.3 ACTION SUBMITTALS

A. Delegated-Design Submittal:

1. Design calculations and detailed fabrication and assembly of pipe anchors and alignment guides, hangers and supports for multiple pipes, expansion joints and loops, and attachments of the same to the building structure.
2. Locations of pipe anchors and alignment guides and expansion joints and loops.
3. Locations of and details for penetrations, including sleeves and sleeve seals for exterior walls, floors, basement, and foundation walls.
4. Locations of and details for penetration and firestopping for fire- and smoke-rated wall and floor and ceiling assemblies.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Piping layout, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Other building services.
3. Structural members.

B. Qualification Data: For Installer.

C. Welding certificates.

D. Field quality-control reports.

E. Water Analysis: Submit a copy of the water analysis to illustrate water quality available at Project site.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installers of Pressure-Sealed Joints: Installers shall be certified by pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings.
2. Fiberglass Pipe and Fitting Installers: Installers of RTRF and RTRP shall be certified by manufacturer of pipes and fittings as having been trained and qualified to join fiberglass piping with manufacturer-recommended adhesive.

B. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Pipe Welding: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

1. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:

1. Hot-Water Heating Piping: at 200 deg F (93 deg C).
2. Chilled-Water Piping: at 200 deg F (93 deg C).
3. Condenser-Water Piping: at 150 deg F (66 deg C).
4. Makeup-Water Piping: 80 psig (552 kPa) at 150 deg F (66 deg C).
5. Condensate-Drain Piping: 150 deg F (66 deg C).
6. Blowdown-Drain Piping: 200 deg F (93 deg C).
7. Air-Vent Piping: 200 deg F (93 deg C).
8. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

2.2 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tubing: ASTM B 88, Type L (ASTM B 88M, Type B).

B. Annealed-Temper Copper Tubing: ASTM B 88, Type K (ASTM B 88M, Type A).

C. Wrought-Copper Unions: ASME B16.22.

2.3 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; welded and seamless, Grade B, and wall thickness as indicated in "Piping Applications" Article.

B. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250 as indicated in "Piping Applications" Article.

C. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300 as indicated in "Piping Applications" Article.

D. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in "Piping Applications" Article.

E. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125, and 250; raised ground face, and bolt holes spot faced as indicated in "Piping Applications" Article.

F. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.

G. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

1. Material Group: 1.1.
2. End Connections: Butt welding.
3. Facings: Raised face.

H. Steel Pipe Nipples: ASTM A 733, made of same materials and wall thicknesses as pipe in which they are installed.

2.4 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch (3.2-mm) maximum thickness unless otherwise indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.

E. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

F. Gasket Material: Thickness, material, and type suitable for fluid to be handled and working temperatures and pressures.

2.5 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. A.Y. McDonald Mfg. Co.
   b. Capitol Manufacturing Company.
   c. Watts Regulator Co.
   d. Zurn Industries, LLC; AquaSpec Commercial Faucet Products.

2. Description:

   a. Standard: ASSE 1079.
   b. Pressure Rating: 250 psig (1725 kPa).
   c. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Matco-Norca.
   b. Watts Regulator Co.
   c. Zurn Industries, LLC; AquaSpec Commercial Faucet Products.

2. Description:

   a. Standard: ASSE 1079.
   b. Factory-fabricated, bolted, companion-flange assembly.
   c. Pressure Rating: 300 psig (2070 kPa).
   d. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Central Plastics Company.
   d. Pipeline Seal and Insulator, Inc.

2. Description:

   a. Nonconducting materials for field assembly of companion flanges.
   b. Pressure Rating: 150 psig (1035 kPa).
   c. Gasket: Neoprene or phenolic.
   d. Bolt Sleeves: Phenolic or polyethylene.
   e. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Elster Perfection.
   b. Grinnell Mechanical Products.
   c. Matco-Norca.
   d. Precision Plumbing Products, Inc.
   e. Victaulic Company.

2. Description:

   a. Standard: IAPMO PS 66.
   b. Electroplated steel nipple, complying with ASTM F 1545.
   c. Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C).
   d. End Connections: Male threaded or grooved.
   e. Lining: Inert and noncorrosive, propylene.

2.6 BYPASS CHEMICAL FEEDER

A. Description: Welded steel construction; 125-psig (860-kPa) working pressure; 5-gal. (19-L) capacity; with fill funnel and inlet, outlet, and drain valves.

1. Chemicals: Specially formulated, based on analysis of makeup water, to prevent accumulation of scale and corrosion in piping and connected equipment.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Hot-water heating piping, aboveground, NPS 2 (DN 50) and smaller, shall be any of the following:

1. Type L (Type B), drawn-temper copper tubing, wrought-copper fittings, and soldered or brazed joints.
2. Schedule 40, Grade B, Type 96 steel pipe; Class 300, malleable-iron fittings; cast-iron flanges and flange fittings; and threaded joints.

B. Hot-water heating piping, aboveground, NPS 2-1/2 (DN 65) and larger, shall be any of the following:

1. Type L (Type B), drawn-temper copper tubing, wrought-copper fittings, and soldered or brazed joints.
2. Schedule 40 steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.

C. Chilled-water piping, aboveground, NPS 2 (DN 50) and smaller, shall be any of the following:

1. Type L (Type B) or Type M (Type C), drawn-temper copper tubing, wrought-copper fittings, and soldered or brazed joints.
2. Schedule 40 steel pipe; Class 300, malleable-iron fittings; cast-iron flanges and flange fittings; and threaded joints.

D. Chilled-water piping, aboveground, NPS 2-1/2 (DN 65) and larger, shall be any of the following:

1. Type L (Type B), drawn-temper copper tubing, wrought-copper fittings, and soldered brazed joints.
2. Schedule 40 steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.

E. Condenser-water piping, aboveground, NPS 2-1/2 (DN 65) and larger, shall be any of the following:

1. Type L (Type B), drawn-temper copper tubing, wrought-copper fittings, and soldered or brazed joints.
2. Schedule 80 or Schedule 40 steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.

F. Condenser-water piping installed belowground and within slabs shall be either of the following:

1. Type K (Type A), annealed-temper copper tubing, wrought-copper fittings, and soldered or brazed joints. Use the fewest possible joints.

G. Makeup-water piping installed aboveground shall be the following:

1. Type L (Type B), drawn-temper copper tubing, wrought-copper fittings, and soldered brazed joints.

H. Makeup-Water Piping Installed Belowground and within Slabs: Type K (Type A), annealed-temper copper tubing, wrought-copper fittings, and soldered joints. Use the fewest possible joints.

I. Condensate-Drain Piping: Type M (Type C), drawn -temper copper tubing, wrought-copper fittings, and soldered joints or Schedule 40 PVC plastic pipe and fittings and solvent-welded joints.

J. Blowdown-Drain Piping: Same materials and joining methods as for piping specified for the service in which blowdown drain is installed.

K. Air-Vent Piping:

1. Inlet: Same as service where installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.
2. Outlet: Type K (Type A), annealed-temper copper tubing with soldered or flared joints.

L. Safety-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.

3.2 PIPING INSTALLATIONS

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

L. Install drains, consisting of a tee fitting, NPS 3/4 (DN 20) ball valve, and short NPS 3/4 (DN 20) threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

M. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

N. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

O. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

P. Install valves according to Section 23 05 23 "General-Duty Valves for HVAC Piping."

Q. Install unions in piping, NPS 2 (DN 50) and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

R. Install flanges in piping, NPS 2-1/2 (DN 65) and larger, at final connections of equipment and elsewhere as indicated.

S. Install shutoff valve immediately upstream of each dielectric fitting.

T. Comply with requirements in Section 23 05 16 "Expansion Fittings and Loops for HVAC Piping" for installation of expansion loops, expansion joints, anchors, and pipe alignment guides.

U. Comply with requirements in Section 23 05 53 "Identification for HVAC Piping and Equipment" for identifying piping.

V. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 23 05 17 "Sleeves and Sleeve Seals for HVAC Piping."

W. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 23 05 17 "Sleeves and Sleeve Seals for HVAC Piping."

X. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 23 05 18 "Escutcheons for HVAC Piping."

3.3 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric nipples or unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100) <Insert pipe size range>: Use dielectric flanges, flange kits or nipples.

D. Dielectric Fittings for NPS 5 (DN 125) and Larger: Use dielectric flange kits.

3.4 HANGERS AND SUPPORTS

A. Comply with requirements in Section 23 05 29 "Hangers and Supports for HVAC Piping and Equipment" for hanger, support, and anchor devices. Comply with the following requirements for maximum spacing of supports.

B. Comply with requirements in Section 23 05 48 "Vibration and Seismic Controls for HVAC" for seismic restraints.

C. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet (6 m) long.
2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet (6 m) or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
6. On plastic pipe, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe.

D. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 3/4 (DN 20): Maximum span, 7 feet (2.1 m).
2. NPS 1 (DN 25): Maximum span, 7 feet (2.1 m).
3. NPS 1-1/2 (DN 40): Maximum span, 9 feet (2.7 m).
4. NPS 2 (DN 50): Maximum span, 10 feet (3 m).
5. NPS 2-1/2 (DN 65): Maximum span, 11 feet (3.4 m).
6. NPS 3 (DN 80) and Larger: Maximum span, 12 feet (3.7 m).

E. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:

1. NPS 3/4 (DN 20): Maximum span, 5 feet (1.5 m); minimum rod size, 1/4 inch (6.4 mm).
2. NPS 1 (DN 25): Maximum span, 6 feet (1.8 m); minimum rod size, 1/4 inch (6.4 mm).
3. NPS 1-1/4 (DN 32:)Maximum span, 7 feet (2.1 m); minimum rod size, 3/8 inch (10 mm).
4. NPS 1-1/2 (DN 40): Maximum span, 8 feet (2.4 m); minimum rod size, 3/8 inch (10 mm).
5. NPS 2 (DN 50): Maximum span, 8 feet (2.4 m); minimum rod size, 3/8 inch (10 mm).
6. NPS 2-1/2 (DN 65): Maximum span, 9 feet (2.7 m); minimum rod size, 3/8 inch (10 mm).
7. NPS 3 (DN 80) and Larger: Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (10 mm).

F. Plastic Piping Hanger Spacing: Space hangers according to pipe manufacturer's written instructions for service conditions. Avoid point loading. Space and install hangers with the fewest practical rigid anchor points.

G. Support vertical runs at roof, at each floor, and at 10-foot (3-m) intervals between floors.

3.5 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8/A5.8M.

E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

H. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end-pipe couplings.

3.6 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

D. Install ports for pressure gages and thermometers at coil inlet and outlet connections. Comply with requirements in Section 23 05 19 "Meters and Gages for HVAC Piping."

3.7 CHEMICAL TREATMENT

A. Perform an analysis of makeup water to determine type and quantities of chemical treatment needed to keep system free of scale, corrosion, and fouling, and to sustain the following water characteristics:

1. pH: 9.0 to 10.5.
2. "P" Alkalinity: 100 to 500 ppm.
3. Boron: 100 to 200 ppm.
4. Chemical Oxygen Demand: Maximum of 100 ppm. Revise this value if closed system contains glycol.
5. Corrosion Inhibitor:

    a. Sodium Nitrate: 1000 to 1500 ppm.
    b. Molybdate: 200 to 300 ppm.
    c. Chromate: 200 to 300 ppm.
    d. Sodium Nitrate Plus Molybdate: 100 to 200 ppm each.
    e. Chromate Plus Molybdate: 50 to 100 ppm each.

6. Soluble Copper: Maximum of 0.20 ppm.
7. Tolyiriazole Copper and Yellow Metal Corrosion Inhibitor: Minimum of 10 ppm.
8. Total Suspended Solids: Maximum of 10 ppm.
9. Ammonia: Maximum of 20 ppm.
10. Free Caustic Alkalinity: Maximum of 20 ppm.
11. Microbiological Limits:

    a. Total Aerobic Plate Count: Maximum of 1000 organisms/mL.
    b. Total Anaerobic Plate Count: Maximum of 100 organisms/mL.
    c. Nitrate Reducers: 100 organisms/mL.
    d. Sulfate Reducers: Maximum of zero organisms/mL.
    e. Iron Bacteria: Maximum of zero organisms/mL.

B. Install bypass chemical feeders in each hydronic system where indicated.

1. Install in upright position with top of funnel not more than 48 inches (1200 mm) above the floor.
2. Install feeder in minimum NPS 3/4 (DN 20) bypass line, from main with full-size, full-port, ball valve in the main between bypass connections.
3. Install NPS 3/4 (DN 20) pipe from chemical feeder drain to nearest equipment drain and include a full-size, full-port, ball valve.

C. Fill system with fresh water and add liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products from piping. Circulate solution for a minimum of 24 hours, drain, clean strainer screens, and refill with fresh water.

D. Add initial chemical treatment and maintain water quality in ranges noted above for the first year of operation.

3.8 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
3. Isolate expansion tanks and determine that hydronic system is full of water.
4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
6. Prepare written report of testing.

C. Perform the following before operating the system:

1. Open manual valves fully.
2. Inspect pumps for proper rotation.
3. Set makeup pressure-reducing valves for required system pressure.
4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Set temperature controls so all coils are calling for full flow.
6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
7. Verify lubrication of motors and bearings.

END OF SECTION 23 21 13

SECTION 232116 - HYDRONIC PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes special-duty valves and specialties for the following:

1. Hot-water heating piping.
2. Makeup-water piping.
3. Condensate-drain piping.
4. Air-vent piping.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Valves: Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.
2. Air-control devices.
3. Hydronic specialties.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air-control devices, hydronic specialties, and special-duty valves to include in emergency, operation, and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Differential Pressure Meter: For each type of balancing valve and automatic flow control valve, include flowmeter, probes, hoses, flow charts, and carrying case.

1.6 QUALITY ASSURANCE

A. Pipe Welding: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

1. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

PART 2 - PRODUCTS

2.1 VALVES

A. Bronze, Calibrated-Orifice, Balancing Valves:
1. Body: Bronze, ball or plug type with calibrated orifice or venturi.
2. Ball: Brass or stainless steel.
3. Plug: Resin.
4. Seat: PTFE.
5. End Connections: Threaded or socket.
6. Pressure Gage Connections: Integral seals for portable differential pressure meter.
7. Handle Style: Lever, with memory stop to retain set position.
8. CWP Rating: Minimum 125 psig (860 kPa).
9. Maximum Operating Temperature: 250 deg F (121 deg C).

B. Cast-Iron or Steel, Calibrated-Orifice, Balancing Valves:
1. Body: Cast-iron or steel body, ball, plug, or globe pattern with calibrated orifice or venturi.
2. Ball: Brass or stainless steel.
3. Stem Seals: EPDM O-rings.
4. Disc: Glass and carbon-filled PTFE.
5. Seat: PTFE.
6. End Connections: Flanged or grooved.
7. Pressure Gage Connections: Integral seals for portable differential pressure meter.
8. Handle Style: Lever, with memory stop to retain set position.
9. CWP Rating: Minimum 125 psig (860 kPa).
10. Maximum Operating Temperature: 250 deg F (121 deg C).

C. Diaphragm-Operated, Pressure-Reducing Valves: ASME labeled.
1. Body: Bronze or brass.
2. Disc: Glass and carbon-filled PTFE.
3. Seat: Brass.
4. Stem Seals: EPDM O-rings.
5. Diaphragm: EPT.
6. Low inlet-pressure check valve.
7. Valve Seat and Stem: Noncorrosive.
8. Valve Size, Capacity, and Operating Pressure: Selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.

D. Diaphragm-Operated Safety Valves: ASME labeled.
1. Body: Bronze or brass.
2. Disc: Glass and carbon-filled PTFE.
3. Seat: Brass.
4. Stem Seals: EPDM O-rings.

5. Diaphragm: EPT.
6. Wetted, Internal Work Parts: Brass and rubber.
7. Valve Seat and Stem: Noncorrosive.
8. Valve Size, Capacity, and Operating Pressure: Comply with ASME Boiler and Pressure Vessel Code: Section IV, and selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.

E. Automatic Flow-Control Valves:
1. Body: Brass or ferrous metal.
2. Piston and Spring Assembly: Stainless steel , tamper proof, self-cleaning, and removable.
3. Combination Assemblies: Include bronze or brass-alloy ball valve.
4. Identification Tag: Marked with zone identification, valve number, and flow rate.
5. Size: Same as pipe in which installed.
6. Performance: Maintain constant flow, plus or minus 5 percent over system pressure fluctuations.
7. Minimum CWP Rating: 175 psig (1207 kPa
8. Maximum Operating Temperature: 200 deg F (93 deg C)

2.2 AIR-CONTROL DEVICES

A. Manual Air Vents:
1. Body: Bronze.
2. Internal Parts: Nonferrous.
3. Operator: Screwdriver or thumbscrew.
4. Inlet Connection: NPS 1/2 (DN 15).
5. Discharge Connection: NPS 1/8 (DN 6).
6. CWP Rating: 150 psig (1035 kPa).
7. Maximum Operating Temperature: 225 deg F (107 deg C).

B. Automatic Air Vents:
1. Body: Bronze or cast iron.
2. Internal Parts: Nonferrous.
3. Operator: Noncorrosive metal float.
4. Inlet Connection: NPS 1/2 (DN 15).
5. Discharge Connection: NPS 1/4 (DN 8).
6. CWP Rating: 150 psig (1035 kPa).
7. Maximum Operating Temperature: 240 deg F (116 deg C).

C. Expansion Tanks:
1. Tank: Welded steel, rated for 125-psig (860-kPa) working pressure and 375 deg F (191 deg C) maximum operating temperature, with taps in bottom of tank for tank fitting and taps in end of tank for gage glass. Tanks shall be factory tested after taps are fabricated and shall be labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
2. Air-Control Tank Fitting: Cast-iron body, copper-plated tube, brass vent tube plug, and stainless-steel ball check, 100-gal. (379-L) unit only; sized for compression-tank diameter. Provide tank fittings for 125-psig (860-kPa) working pressure and 250 deg F (121 deg C) maximum operating temperature.

3. Tank Drain Fitting: Brass body, nonferrous internal parts; 125-psig (860-kPa) working pressure and 240 deg F (116 deg C) maximum operating temperature; constructed to admit air to compression tank, drain water, and close off system.
4. Gage Glass: Full height with dual manual shutoff valves, 3/4-inch- (20-mm-) diameter gage glass, and slotted-metal glass guard.

D. Bladder-Type Expansion Tanks:
1. Tank: Welded steel, rated for 125-psig (860-kPa) working pressure and 375 deg F (191 deg C) maximum operating temperature. Factory test after taps are fabricated and supports installed and are labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
2. Bladder: Securely sealed into tank to separate air charge from system water to maintain required expansion capacity.
3. Air-Charge Fittings: Schrader valve, stainless steel with EPDM seats.

2.3 HYDRONIC PIPING SPECIALTIES

A. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
3. Strainer Screen: Stainless-steel, 40-mesh strainer, or perforated stainless-steel basket.
4. CWP Rating: 125 psig (860 kPa).

B. Basket Strainers:

1. Body: ASTM A 126, Class B, high-tensile cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig (860 kPa).

C. T-Pattern Strainers:

1. Body: Ductile or malleable iron with removable access coupling and end cap for strainer maintenance.
2. End Connections: Grooved ends.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 57 percent free area.
4. CWP Rating: 750 psig (5170 kPa).

D. Stainless-Steel Bellow, Flexible Connectors:

1. Body: Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.
2. End Connections: Threaded or flanged to match equipment connected.
3. Performance: Capable of 3/4-inch (20-mm) misalignment.

4. CWP Rating: 150 psig (1035 kPa).
5. Maximum Operating Temperature: 250 deg F (121 deg C).

E. Spherical, Rubber, Flexible Connectors:

1. Body: Fiber-reinforced rubber body.
2. End Connections: Steel flanges drilled to align with Classes 150 and 300 steel flanges.
3. Performance: Capable of misalignment.
4. CWP Rating: 150 psig (1035 kPa).
5. Maximum Operating Temperature: 250 deg F (121 deg C).

F. Expansion Fittings: Comply with requirements in Section 230516 "Expansion Fittings and Loops for HVAC Piping."Section 15124 "Expansion Fittings and Loops for HVAC Piping."

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS

A. Install shutoff-duty valves at each branch connection to supply mains and at supply connection to each piece of equipment.

B. Install calibrated-orifice, balancing valves at each branch connection to return main.

C. Install calibrated-orifice, balancing valves in the return pipe of each heating or cooling terminal.

D. Install check valves at each pump discharge and elsewhere as required to control flow direction.

E. Install safety valves at hot-water generators and elsewhere as required by ASME Boiler and Pressure Vessel Code. Install drip-pan elbow on safety-valve outlet and pipe without valves to the outdoors; pipe drain to nearest floor drain or as indicated on Drawings. Comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, for installation requirements.

F. Install pressure-reducing valves at makeup-water connection to regulate system fill pressure.

3.2 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.

B. Install automatic air vents at high points of system piping in mechanical equipment rooms only. Install manual vents at heat-transfer coils and elsewhere as required for air venting.

C. Install piping from boiler air outlet, air separator, or air purger to expansion tank with a 2 percent upward slope toward tank.

D. Install in-line air separators in pump suction. Install drain valve on air separators NPS 2 (DN 50) and larger.

E. Install tangential air separator in pump suction. Install blowdown piping with gate or full-port ball valve; extend full size to nearest floor drain.

F. Install expansion tanks above the air separator. Install tank fitting in tank bottom and charge tank. Use manual vent for initial fill to establish proper water level in tank.

1. Install tank fittings that are shipped loose.
2. Support tank from floor or structure above with sufficient strength to carry weight of tank, piping connections, fittings, plus tank full of water. Do not overload building components and structural members.

G. Install expansion tanks on the floor. Vent and purge air from hydronic system, and ensure that tank is properly charged with air to suit system Project requirements.

END OF SECTION 232116

SECTION 232300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

1.3 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-410A:

1. Suction Lines for Air-Conditioning Applications: 300 psig (2068 kPa).
2. Suction Lines for Heat-Pump Applications: 535 psig (3689 kPa).
3. Hot-Gas and Liquid Lines: 535 psig (3689 kPa).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for the following:

1. Thermostatic expansion valves.
2. Solenoid valves.
3. Hot-gas bypass valves.
4. Filter dryers.
5. Strainers.
6. Pressure-regulating valves.

B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.

1. Shop Drawing Scale: 1/4 inch equals 1 foot (1:50).
2. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.8 PRODUCT STORAGE AND HANDLING

A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

1.9 COORDINATION

A. Coordinate size and location of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 077200 "Roof Accessories."

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B 88, Type K or L (ASTM B 88M, Type A or B) or ASTM B 280, Type ACR.

B. Wrought-Copper Fittings: ASME B16.22.

C. Wrought-Copper Unions: ASME B16.22.

D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

E. Brazing Filler Metals: AWS A5.8.

F. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
4. Pressure Rating: Factory test at minimum 500 psig (3450 kPa).
5. Maximum Operating Temperature: 250 deg F (121 deg C).

2.2 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; Type, Grade, and wall thickness as selected in Part 3 piping applications articles.

B. Wrought-Steel Fittings: ASTM A 234/A 234M, for welded joints.

C. Steel Flanges and Flanged Fittings: ASME B16.5, steel, including bolts, nuts, and gaskets, bevel-welded end connection, and raised face.

D. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

E. Flanged Unions:

1. Body: Forged-steel flanges for NPS 1 to NPS 1-1/2 (DN 25 to DN 40) and ductile iron for NPS 2 to NPS 3 (DN 50 to DN 80). Apply rust-resistant finish at factory.
2. Gasket: Fiber asbestos free.
3. Fasteners: Four plated-steel bolts, with silicon bronze nuts. Apply rust-resistant finish at factory.
4. End Connections: Brass tailpiece adapters for solder-end connections to copper tubing.
5. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
6. Pressure Rating: Factory test at minimum 400 psig (2760 kPa).
7. Maximum Operating Temperature: 330 deg F (165 deg C).

F. Flexible Connectors:

1. Body: Stainless-steel bellows with woven, flexible, stainless-steel-wire-reinforced protective jacket
2. End Connections:
   a. NPS 2 (DN 50) and Smaller: With threaded-end connections.
   b. NPS 2-1/2 (DN 65) and Larger: With flanged-end connections.
3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
4. Pressure Rating: Factory test at minimum 500 psig (3450 kPa).
5. Maximum Operating Temperature: 250 deg F (121 deg C).

2.3 VALVES AND SPECIALTIES

A. Diaphragm Packless Valves:

1. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
2. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.
3. Operator: Rising stem and hand wheel.
4. Seat: Nylon.
5. End Connections: Socket, union, or flanged.
6. Working Pressure Rating: 500 psig (3450 kPa).
7. Maximum Operating Temperature: 275 deg F (135 deg C).

B. Packed-Angle Valves:

1. Body and Bonnet: Forged brass or cast bronze.
2. Packing: Molded stem, back seating, and replaceable under pressure.
3. Operator: Rising stem.
4. Seat: Nonrotating, self-aligning polytetrafluoroethylene.
5. Seal Cap: Forged-brass or valox hex cap.
6. End Connections: Socket, union, threaded, or flanged.
7. Working Pressure Rating: 500 psig (3450 kPa).
8. Maximum Operating Temperature: 275 deg F (135 deg C).

C. Check Valves:

1. Body: Ductile iron, forged brass, or cast bronze; globe pattern.
2. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
3. Piston: Removable polytetrafluoroethylene seat.
4. Closing Spring: Stainless steel.
5. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.
6. End Connections: Socket, union, threaded, or flanged.
7. Maximum Opening Pressure: 0.50 psig (3.4 kPa).
8. Working Pressure Rating: 500 psig (3450 kPa).
9. Maximum Operating Temperature: 275 deg F (135 deg C).

D. Service Valves:

1. Body: Forged brass with brass cap including key end to remove core.
2. Core: Removable ball-type check valve with stainless-steel spring.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Copper spring.
5. Working Pressure Rating: 500 psig (3450 kPa).

E. Solenoid Valves: Comply with ARI 760 and UL 429; listed and labeled by an NRTL.

1. Body and Bonnet: Plated steel.
2. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Threaded.
5. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch (16-GRC) conduit adapter, and 24, 115 or 208-V ac coil.
6. Working Pressure Rating: 400 psig (2760 kPa).
7. Maximum Operating Temperature: 240 deg F (116 deg C).
8. Manual operator.

F. Safety Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.

1. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
2. Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Seat Disc: Polytetrafluoroethylene.
4. End Connections: Threaded.
5. Working Pressure Rating: 400 psig (2760 kPa).
6. Maximum Operating Temperature: 240 deg F (116 deg C).

G. Thermostatic Expansion Valves: Comply with ARI 750.

1. Body, Bonnet, and Seal Cap: Forged brass or steel.
2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Packing and Gaskets: Non-asbestos.
4. Capillary and Bulb: Copper tubing filled with refrigerant charge.
5. Suction Temperature: 40 deg F (4.4 deg C).
6. Superheat: Adjustable.
7. Reverse-flow option (for heat-pump applications).
8. End Connections: Socket, flare, or threaded union.
9. Working Pressure Rating: 450 psig (3100 kPa).

H. Hot-Gas Bypass Valves: Comply with UL 429; listed and labeled by an NRTL.

1. Body, Bonnet, and Seal Cap: Ductile iron or steel.
2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Packing and Gaskets: Non-asbestos.
4. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
5. Seat: Polytetrafluoroethylene.
6. Equalizer: Internal or External.
7. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch (16-GRC) conduit adapter, and 24, 115 or 208-V ac coil.
8. End Connections: Socket.
9. Throttling Range: Maximum 5 psig (34 kPa).
10. Working Pressure Rating: 500 psig (3450 kPa).
11. Maximum Operating Temperature: 240 deg F (116 deg C).

I. Straight-Type Strainers:

1. Body: Welded steel with corrosion-resistant coating.
2. Screen: 100-mesh stainless steel.
3. End Connections: Socket or flare.
4. Working Pressure Rating: 500 psig (3450 kPa).
5. Maximum Operating Temperature: 275 deg F (135 deg C).

J. Angle-Type Strainers:

1. Body: Forged brass or cast bronze.
2. Drain Plug: Brass hex plug.
3. Screen: 100-mesh monel.
4. End Connections: Socket or flare.
5. Working Pressure Rating: 500 psig (3450 kPa).
6. Maximum Operating Temperature: 275 deg F (135 deg C).

K. Moisture/Liquid Indicators:

1. Body: Forged brass.
2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
3. Indicator: Color coded to show moisture content in ppm.
4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
5. End Connections: Socket or flare.
6. Working Pressure Rating: 500 psig (3450 kPa).

7. Maximum Operating Temperature: 240 deg F (116 deg C).

L. Replaceable-Core Filter Dryers: Comply with ARI 730.

1. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.
2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
3. Desiccant Media: Activated alumina or charcoal.
4. Designed for reverse flow (for heat-pump applications).
5. End Connections: Socket.
6. Access Ports: NPS 1/4 (DN 8) connections at entering and leaving sides for pressure differential measurement.
7. Maximum Pressure Loss: 2 psig (14 kPa).
8. Working Pressure Rating: 500 psig (3450 kPa).
9. Maximum Operating Temperature: 240 deg F (116 deg C).

M. Permanent Filter Dryers: Comply with ARI 730.

1. Body and Cover: Painted-steel shell.
2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
3. Desiccant Media: Activated alumina or charcoal.
4. Designed for reverse flow (for heat-pump applications).
5. End Connections: Socket.
6. Access Ports: NPS 1/4 (DN 8) connections at entering and leaving sides for pressure differential measurement.
7. Maximum Pressure Loss: 2 psig (14 kPa).
8. Working Pressure Rating: 500 psig (3450 kPa).
9. Maximum Operating Temperature: 240 deg F (116 deg C).

N. Mufflers:

1. Body: Welded steel with corrosion-resistant coating.
2. End Connections: Socket or flare.
3. Working Pressure Rating: 500 psig (3450 kPa).
4. Maximum Operating Temperature: 275 deg F (135 deg C).

O. Receivers: Comply with ARI 495.

1. Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
2. Comply with UL 207; listed and labeled by an NRTL.
3. Body: Welded steel with corrosion-resistant coating.
4. Tappings: Inlet, outlet, liquid level indicator, and safety relief valve.
5. End Connections: Socket or threaded.
6. Working Pressure Rating: 500 psig (3450 kPa).
7. Maximum Operating Temperature: 275 deg F (135 deg C).

P. Liquid Accumulators: Comply with ARI 495.

1. Body: Welded steel with corrosion-resistant coating.
2. End Connections: Socket or threaded.
3. Working Pressure Rating: 500 psig (3450 kPa).
4. Maximum Operating Temperature: 275 deg F (135 deg C).

2.4 REFRIGERANTS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Atofina Chemicals, Inc.
2. DuPont Company; Fluorochemicals Div.
3. Honeywell, Inc.; Genetron Refrigerants.
4. INEOS Fluor Americas LLC.

B. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-410A

A. Suction Lines NPS 1-1/2 (DN 40) and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.

B. Hot-Gas and Liquid Lines: Copper, Type ACR or L (B), annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

C. Hot-Gas and Liquid Lines: Copper, Type K (A), annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

D. Hot-Gas and Liquid Lines: Copper, Type ACR, K (A) or L (B), drawn-temper tubing and wrought-copper fittings with 95-5 tin-antimony soldered joints.

E. Hot-Gas and Liquid Lines: Copper, Type ACR, K (A) or L (B), drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.

F. Hot-Gas and Liquid Lines:

1. NPS 5/8 (DN 18) and Smaller: Copper, Type ACR or L (B), annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
2. NPS 3/4 to NPS 1 (DN 20 to DN 25) and Smaller: Copper, Type K (A), annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
3. NPS 1-1/4 (DN 32) and Smaller: Copper, Type ACR, K (A) or L (B), drawn-temper tubing and wrought-copper fittings with 95-5 tin-antimony soldered joints.
4. NPS 1-1/2 to NPS 2 (DN 40 to DN 50): Copper, Type ACR, K (A) or L (B), drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.

G. Hot-Gas and Liquid Lines NPS 2 to NPS 4 (DN 50 to DN 100): Schedule 40, black-steel and wrought-steel fittings with welded joints.

H. Safety-Relief-Valve Discharge Piping: Copper, Type ACR or L (B), annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

I. Safety-Relief-Valve Discharge Piping: Copper, Type K (A), annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

J. Safety-Relief-Valve Discharge Piping: Copper, Type ACR, K (A) or L (B), drawn-temper tubing and wrought-copper fittings with 95-5 tin-antimony soldered joints.

K. Safety-Relief-Valve Discharge Piping: Copper, Type ACR, K (A) or L (B), drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.

L. Safety-Relief-Valve Discharge Piping:

1. NPS 5/8 (DN 18) and Smaller: Copper, Type ACR or L (B), annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
2. NPS 3/4 to NPS 1 (DN 20 to DN 25) and Smaller: Copper, Type K (A), annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
3. NPS 1-1/4 (DN 32) and Smaller: Copper, Type ACR, K (A) or L (B), drawn-temper tubing and wrought-copper fittings with 95-5 tin-antimony soldered joints.
4. NPS 1-1/2 to NPS 2 (DN 40 to DN 50): Copper, Type ACR, K (A) or L (B), drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.

M. Safety-Relief-Valve Discharge Piping NPS 2 to NPS 4 (DN 50 to DN 100): Schedule 40, black-steel and wrought-steel fittings with welded joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

A. Install diaphragm packless or packed-angle valves in suction and discharge lines of compressor.

B. Install service valves for gage taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.

C. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.

D. Except as otherwise indicated, install diaphragm packless or packed-angle valves on inlet and outlet side of filter dryers.

E. Install a full-sized, three-valve bypass around filter dryers.

F. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at top.

G. Install thermostatic expansion valves as close as possible to distributors on evaporators.

1. Install valve so diaphragm case is warmer than bulb.
2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

H. Install safety relief valves where required by ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside according to ASHRAE 15.

I. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.

J. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for device being protected:

1. Solenoid valves.
2. Thermostatic expansion valves.
3. Hot-gas bypass valves.
4. Compressor.

K. Install filter dryers in liquid line between compressor and thermostatic expansion valve, and in the suction line at the compressor.

L. Install receivers sized to accommodate pump-down charge.

M. Install flexible connectors at compressors.

3.3 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. 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.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Refer to Section 230900 "Instrumentation and Control for HVAC" and Section 230993 "Sequence of Operations for HVAC Controls" for solenoid valve controllers, control wiring, and sequence of operation.

K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

L. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or

panels as specified in Section 083113 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

M. Install refrigerant piping in protective conduit where installed belowground.

N. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

O. 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. Install traps and double risers to entrain oil in vertical runs.
4. Liquid lines may be installed level.

P. 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.

Q. Before installation of steel refrigerant piping, clean pipe and fittings using the following procedures:

1. Shot blast the interior of piping.
2. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through tubing by means of a wire or electrician's tape.
3. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
4. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
5. Finally, draw a clean, dry, lintless cloth through the tube or pipe.
6. Safety-relief-valve discharge piping is not required to be cleaned but is required to be open to allow unrestricted flow.

R. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

S. Identify refrigerant piping and valves according to Section 230553 "Identification for HVAC Piping and Equipment."

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."

3.4 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.

D. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

F. Threaded Joints: Thread steel pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry-seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Steel pipe can be threaded, but threaded joints must be seal brazed or seal welded.

H. Welded Joints: Construct joints according to AWS D10.12/D10.12M.

I. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.5 HANGERS AND SUPPORTS

A. Hanger, support, and anchor products are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6 m) long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet (6 m) or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2 (DN 15): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
2. NPS 5/8 (DN 18): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
3. NPS 1 (DN 25): Maximum span, 72 inches (1800 mm); minimum rod size, 1/4 inch (6.4 mm).
4. NPS 1-1/4 (DN 32): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
5. NPS 1-1/2 (DN 40): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
6. NPS 2 (DN 50): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
7. NPS 2-1/2 (DN 65): Maximum span, 108 inches (2700 mm); minimum rod size, 3/8 inch (9.5 mm).
8. NPS 3 (DN 80): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (9.5 mm).
9. NPS 4 (DN 100): Maximum span, 12 feet (3.7 m); minimum rod size, 1/2 inch (13 mm).

D. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 2 (DN 50): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (9.5 mm).
2. NPS 2-1/2 (DN 65): Maximum span, 11 feet (3.4 m); minimum rod size, 3/8 inch (9.5 mm).
3. NPS 3 (DN 80): Maximum span, 12 feet (3.7 m); minimum rod size, 3/8 inch (9.5 mm).
4. NPS 4 (DN 100): Maximum span, 14 feet (4.3 m); minimum rod size, 1/2 inch (13 mm).

E. Support multifloor vertical runs at least at each floor.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.
    a. Fill system with nitrogen to the required test pressure.
    b. System shall maintain test pressure at the manifold gage throughout duration of test.
    c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
    d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.7 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers (67 Pa). If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig (14 kPa).
4. Charge system with a new filter-dryer core in charging line.

3.8 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Open shutoff valves in condenser water circuit.
2. Verify that compressor oil level is correct.
3. Open compressor suction and discharge valves.
4. Open refrigerant valves except bypass valves that are used for other purposes.
5. Check open compressor-motor alignment and verify lubrication for motors and bearings.

E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 232300

SECTION 233423 - HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Centrifugal Roof Ventilators
2. In-line Centrifugal Fans

1.3 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base fan-performance ratings on actual Project site elevations.

B. Operating Limits: Classify according to AMCA 99.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material thickness and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Delegated-Design Submittal: For unit hangars and supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.

D. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Roof framing and support members relative to duct penetrations.
2. Ceiling suspension assembly members.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

E. Field quality-control reports.

F. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.

C. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

1.6 COORDINATION

A. Coordinate size and location of structural-steel support members.

B. Coordinate sizes and locations of concrete bases with actual equipment provided.

C. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set(s) for each belt-driven unit.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL ROOF VENTILATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:

1. Loren Cook Company.
2. Twin City Fan.
3. Greenheck Fan Cooperation

2.2 CENTRIFUGAL ROOF VENTILATORS

A. Housing: Removable, spun-aluminum, dome top and outlet baffle, one-piece, aluminum base with venturi inlet cone.

1. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.

B. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

C. Belt Drives:

1. Resiliently mounted to housing.
2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
4. Pulleys: Cast-iron, adjustable-pitch motor pulley.
5. Fan and motor isolated from exhaust airstream.

D. Accessories:

1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
2. Bird Screens: Removable, 1/2-inch (13-mm) mesh, aluminum or brass wire.
3. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.

E. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch- (40-mm-) thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch (40-mm) wood nailer. Size as required to suit roof opening and fan base.

1. Configuration: Built-in cant and mounting flange.
2. Overall Height: 8 inches (200 mm).
3. Pitch Mounting: Manufacture curb for roof slope.
4. Metal Liner: Galvanized steel.

2.3 IN-LINE CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:

1. Loren Cook Company.
2. Twin City Fan.
3. Greenheck Fan Cooperation

C. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.

D. Direct-Drive Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing; with wheel, inlet cone, and motor on swing-out service door.

E. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.

F. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.

G. Accessories:

1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Volume-Control Damper: Manually operated with quadrant lock, located in fan outlet.
3. Companion Flanges: For inlet and outlet duct connections.
4. Fan Guards: 1/2- by 1-inch mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.
5. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.

2.4 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.

B. Enclosure Type: Totally enclosed, fan cooled.

2.5 SOURCE QUALITY CONTROL

A. Certify sound-power level ratings according to AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Certify fan performance ratings, including flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install power ventilators level and plumb.

B. Vibration- and seismic-control devices are specified in Division 23 Section “Vibration and Seismic Controls for HVAC Piping and Equipment.”

1. Secure vibration and seismic controls to concrete bases using anchor bolts cast in concrete base.

C. Install roof-mounted units to curbs with cadmium-plated hardware.

D. Install units with clearances for service and maintenance.

E. Label units according to requirements specified in Division 23 Section "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section "Air Duct Accessories."

B. Install ducts adjacent to power ventilators to allow service and maintenance.

C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
5. Adjust belt tension.
6. Adjust damper linkages for proper damper operation.
7. Verify lubrication for bearings and other moving parts.
8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
10. Shut unit down and reconnect automatic temperature-control operators.
11. Remove and replace malfunctioning units and retest as specified above.

C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.

D. Replace fan and motor pulleys as required to achieve design airflow.

E. Lubricate bearings.

END OF SECTION 233423

SECTION 238126 - SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set(s) for each air-handling unit.
2. Gaskets: One set(s) for each access door.
3. Fan Belts: One set(s) for each air-handling unit fan.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance:

1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - " Procedures," and Section 7 - "Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.8 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. For Compressor: Five year(s) from date of Substantial Completion.
b. For Parts: One year(s) from date of Substantial Completion.
c. For Labor: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Carrier Corporation; Home Comfort and HVAC Building & Industrial Systems.
2. Mitsubishi Electric & Electronics USA, Inc.; HVAC Advanced Products Division.
3. Daikin
4. Liebert

2.2 INDOOR UNITS (5 TONS OR LESS)

A. Concealed Evaporator-Fan Components:

1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
2. Insulation: Faced, glass-fiber duct liner.
3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
4. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
5. Fan Motors:

   a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
   b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
   c. Wiring Terminations: Connect motor to chassis wiring with plug connection.

6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
7. Filters: Permanent, cleanable.
8. Condensate Drain Pans:

   a. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.

      1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
      2) Depth: A minimum of 2 inches deep.

   b. Double-wall, stainless-steel sheet with space between walls filled with foam insulation and moisture-tight seal.
   c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on both ends of pan.

1) Minimum Connection Size: NPS 3/4.

d. Pan-Top Surface Coating: Asphaltic waterproofing compound.
e. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.

B. Wall-Mounted, Evaporator-Fan Components:

1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
3. Fan: Direct drive, centrifugal.
4. Fan Motors:

a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
c. Enclosure Type: Totally enclosed, fan cooled.
d. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.
e. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
f. Mount unit-mounted disconnect switches on exterior of unit.

5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
6. Condensate Drain Pans:

a. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.

1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
2) Depth: A minimum of 1 inch deep.

b. Double-wall, stainless-steel sheet with space between walls filled with foam insulation and moisture-tight seal.
c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on both ends of pan.

1) Minimum Connection Size: NPS 1

d. Pan-Top Surface Coating: Asphaltic waterproofing compound.

7. Air Filtration Section:

a. General Requirements for Air Filtration Section:

1) Comply with NFPA 90A.
2) Minimum Arrestance: According to ASHRAE 52.1 and MERV according to ASHRAE 52.2.
3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.

b. Disposable Panel Filters:

1) Factory-fabricated, viscous-coated, flat-panel type.
2) Thickness: 1 inch or 2 inches.
3) Arrestance according to ASHRAE 52.1: 80.
4) Merv according to ASHRAE 52.2: 5.
5) Media: Interlaced glass fibers sprayed with nonflammable adhesive[and antimicrobial agent].
6) Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, and hinged; with pull and retaining handles.

c. Extended-Surface, Disposable Panel Filters:

1) Factory-fabricated, dry, extended-surface type.
2) Thickness: 1 inch or 2 inches.
3) Arrestance according to ASHRAE 52.1: 90.
4) Merv according to ASHRAE 52.2: 7.
5) Media: Fibrous material formed into deep-V-shaped pleats[with antimicrobial agent] and held by self-supporting wire grid.
6) Media-Grid Frame: Nonflammable cardboard, Galvanized steel or Fire-retardant, 3/4-inch particleboard with gaskets.
7) Mounting Frames: Welded, galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.

2.3 OUTDOOR UNITS (5 TONS OR LESS)

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

a. Compressor Type: Scroll.
b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
c. Refrigerant Charge: R-410A.
d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.

3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.
4. Fan: Aluminum-propeller type, directly connected to motor.
5. Motor: Permanently lubricated, with integral thermal-overload protection.
6. Low Ambient Kit: Permits operation down to 35 deg F.
7. Mounting Base: Polyethylene.

2.4 ACCESSORIES

A. Control equipment and sequence of operation are specified in Section 230900 "Instrumentation and Control for HVAC."

B. Thermostat: Low voltage with subbase to control compressor and evaporator fan.

C. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:

1. Compressor time delay.
2. 24-hour time control of system stop and start.
3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
4. Fan-speed selection including auto setting.

D. Automatic-reset timer to prevent rapid cycling of compressor.

E. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

F. Drain Hose: For condensate.

G. Additional Monitoring:

1. Monitor constant and variable motor loads.
2. Monitor variable-frequency-drive operation.
3. Monitor economizer cycle.
4. Monitor cooling load.
5. Monitor air distribution static pressure and ventilation air volumes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install roof-mounted, compressor-condenser components on equipment supports specified in Section 077200 "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.

D. Equipment Mounting:

1. Install ground-mounted, compressor-condenser components on cast-in-place concrete equipment base(s).
2. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

C. Duct Connections: Duct installation requirements are specified in Section 233113 "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect outside air ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Section 233300 "Air Duct Accessories."

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 238126

SECTION 260100 - ELECTRICAL GENERAL PROVISIONS

ARTICLE 1 SUMMARY

1.1 This Division of the specification outlines the provisions of the contract work to be performed under this Division.

1.2 This Section applies to and forms a part of each section of specifications in Division 26 and all work performed under the electrical and communications contracts.

1.3 In addition, work in this Division is governed by the provisions of the bidding requirements, contract forms, general conditions and all sections under general requirements.

1.4 These specifications contain statements which may be more definitive or more restrictive than those contained in the General Conditions. Where these statements occur, they shall take precedence over the General Conditions.

1.5 Where the words 'provide' or 'provision' are used, it shall be definitely interpreted as 'furnishing and installing complete in operating condition'. Where the words 'as indicated' or 'as shown' are used, it shall mean as shown on contract drawings.

1.6 Where items are specified in the singular, this Division shall provide the quantity as shown on drawings plus any spares or extras mentioned on drawings or specifications. All specified and supplied equipment shall be new.

ARTICLE 2 CONTRACTOR QUALIFICATIONS

2.1 The Contractor shall have a current California C-10 Electrical Contractor's license and all individuals working on this project shall have passed the Department of Industrial Relations Division of apprenticeship Standards – "Electrician Certification Program."

ARTICLE 3 CODES, PERMITS AND FEES

3.1 Comply with all applicable laws, ordinances, rules, regulations, codes, or rulings of governmental units having jurisdiction as well as standards of NFPA, and serving utility requirements.

3.2 Obtain permits, fees, inspections, meter and the like, associated with work in each section of this Division.

3.3 Installation procedures, methods and conditions shall comply with the latest requirements of the Federal Occupational Safety and Health Act (OSHA).

ARTICLE 4 EXAMINATION OF PREMISES

4.1 Examine the construction drawings and premises prior to bidding. No allowances will be made for not being knowledgeable of existing conditions.

ARTICLE 5 STANDARDS

5.1 The following standard publications of the latest editions enforced and supplements thereto shall form a part of these specifications. All electrical work must, as a minimum, be in accordance with these standards.

5.1.1 2013 California Electrical Code (CEC), Part 3 Title 24 CCR.
5.1.2 National Fire Protection Association.
5.1.3 Underwriters' Laboratories, Inc. (UL).
5.1.4 Certified Ballast Manufacturers' Association (CBM).
5.1.5 National Electrical Manufacturers' Association (NEMA).
5.1.6 Institution of Electrical & Electronics Engineers (IEEE).
5.1.7 American Society for Testing & Materials (ASTM).
5.1.8 National Board of Fire Underwriters (NBFU).
5.1.9 National Board of Standards (NBS).
5.1.10 American National Standards Institute (ANSI).
5.1.11 Insulated Power Cable Engineers Association (IPECS).
5.1.12 Electrical Testing Laboratories (ETL).
5.1.13 National Electrical Safety Code (NESC).
5.1.14 2013 California Building Code (CBC), Part 2, Title 24 CCR.
5.1.15 2013 California Fire Code (CFC), Part 9, Title 24, CCR.
5.1.16 2013 NFPA 72 with California State Amendments
5.1.17 National Electrical Testing Association (NETA), 2010 or most current

ARTICLE 6 DEFINITIONS

6.1 Concealed: Hidden from sight, as in trenches, chases, hollow construction, or above furred spaces, hung ceilings - acoustical or plastic type, or exposed to view only in tunnels, attics, shafts, crawl spaces, unfinished spaces, or other areas solely for maintenance and repair.

6.2 Exposed, Non-Concealed, Unfinished Space: A room or space that is ordinarily accessible only to building maintenance personnel, a room noted on the 'finish schedule' with exposed and unpainted construction for walls, floors, or ceilings or specifically mentioned as 'unfinished'.

6.3 Finish Space: Any space ordinarily visible, including exterior areas.

ARTICLE 7 WORK AND MATERIALS

7.1 Unless otherwise specified, all materials must be new and of the best quality. Materials previously incorporated into other projects, salvaged, or refurbished are not considered new. Perform all labor in a thorough and workmanlike manner.

7.2 All materials provided under the contract must bear the UL label where normally available. Note that this requirement may be repeated under equipment specifications. In general, such devices as will void the label should be provided in separate enclosures and wired to the labeled unit in proper manner.

ARTICLE 8 SHOP DRAWINGS AND SUBMITTALS

8.1 Submit shop drawings and all data in accordance with Division 1 of these specifications and as noted below for all equipment provided under this Division.

8.2 Shop drawings submittals demonstrate to the Architect that the Contractor understands the design concept. The Contractor demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods of material and equipment he intends to use. If deviations, discrepancies, or conflicts between submittals and specifications are discovered either prior to or after submittals are processed, notify the Architect immediately.

8.3 Manufacturer's data and dimension sheets shall be submitted giving all pertinent physical and engineering data including weights, cross sections and maintenance instructions. Standard items of equipment such as receptacles, switches, plates, etc., which are cataloged items, shall be listed by manufacturer.

8.4 Index all submittals and reference them to these specifications. All submittal items shall be assembled and submitted, one for each specification section. (Multiple specification sections may be grouped together in one common submittal binder, as long as each individual section is clearly identified.) Partial or incomplete submittal sections will not be reviewed.

ARTICLE 9 EQUIPMENT PURCHASES

9.1 Arrange for purchase and delivery of all materials and equipment within 20 days after approval of submittals. All materials and equipment must be ordered in ample quantities for delivery at the proper time. If items are not on the project in time to expedite completion, the Owner may purchase said equipment and materials and deduct the cost from the contract sum.

9.2 Provide all materials of similar class or service by one manufacturer.

ARTICLE 10 COOPERATIVE WORK

10.1 Correct without charge any work requiring alteration due to lack of proper supervision or failure to make proper provision in time. Correct without charge any damage to adjacent work caused by the alteration.

10.2 Cooperative work includes: General supervision and responsibility for proper location and size of work related to this Division, but provided under the other sections of these specifications, and installation of sleeves, inserts, and anchor bolts for work under each section in this Division.

ARTICLE 11 VERIFICATION OF DIMENSIONS

11.1 Scaled and figured dimensions are approximate only. Before proceeding with work, carefully check and verify dimensions, etc., and be responsible for properly fitting equipment and materials together and to the structure in spaces provided.

11.2 Drawings are essentially diagrammatic, and many offsets, bends, pull boxes, special fittings, and exact locations are not indicated. Carefully study drawings and premises in order to determine best methods, exact location, routes, building obstructions, etc. and install apparatus and equipment in manner and locations to avoid obstructions, preserve headroom, keep openings and passageways clear, and maintain proper clearances.

ARTICLE 12 CUTTING AND PATCHING

12.1 All cutting and patching shall be in accordance with Division 1 of these specifications and as noted below.

12.2 Cut existing work and patch as necessary to properly install new work. As the work progresses, leave necessary openings, holes, chases, etc., in their correct location. If the required openings, holes, chases, etc., are not in their correct locations, make the necessary corrections at no cost to the Owner. Avoid excessive cutting and do not cut structural members including wall framing without the consent of the Architect.

ARTICLE 13 CLOSING-IN OF UNINSPECTED WORK

13.1 Cover no work until inspected, tested, and approved by the Architect. Where work is covered before inspection and test, uncover it and when inspected, tested, and approved, restore all work to original proper condition at no additional cost to Owner.

ARTICLE 14 ACCESSIBILITY

14.1 Install all control devices or other specialties requiring reading, adjustment, inspection, repairs, removal, or replacement conveniently and accessibly throughout the finished building.

14.2 All required access doors or panels in walls and ceilings are to be furnished and installed as part of the work under this Section. Refer to Division 1 of these specifications and as noted below.

14.3 Where located in fire rated assemblies, provide doors which match the rating of the assembly and are approved by the jurisdictional authority.

14.4 Refer to 'finish schedule' for types of walls and ceilings in each area and the architectural drawings for rated wall construction.

14.5 Coordinate work of the various sections to locate specialties requiring accessibility with others to avoid unnecessary duplication of access doors.

ARTICLE 15 FLASHING

15.1 Flash and counter flash all conduits penetrating roofing membrane as shown on Architectural drawings. All work shall be in accordance with Division 7 of these specifications.

ARTICLE 16 IDENTIFICATION OF EQUIPMENT

16.1 All electrical equipment shall be labeled, tagged, stamped, or otherwise identified in accordance with the following schedules:

16.1.1 General:

16.1.1.1 In general, the installed laminated nameplates as hereinafter called for shall also clearly indicate its use, areas served, circuit identification, voltage and any other useful data.

16.1.1.2 All auxiliary systems, including communications, shall be labeled to indicate function.

16.1.2 Lighting and Local Panelboards:

16.1.2.1 Panel identification shall be with white and black micarta nameplates. Letters shall be no less than 3/8" high.

16.1.2.2 Circuit directory shall be two column typewritten card set under glass or glass equivalent. Each circuit shall be identified by the room number and/or number of unit and other pertinent data as required.

16.1.3 Distribution Switchboards and Feeders Sections:

16.1.3.1 Identification shall be with 1" x 4" laminated white micarta nameplates with black lettering on each major component, each with name and/or number of unit and other pertinent data as required. Letters shall be no less than 3/8" high.

16.1.3.2 Circuit breakers and switches shall be identified by number and name with 3/8" x 1-1/2" laminated micarta nameplates with 3/16" high letters mounted adjacent to or on circuit breaker or switch.

16.1.4 Disconnect Switches, Motor Starters and Transformers:

16.1.4.1 Identification shall be with white micarta laminated labels and 3/8" high black lettering.

16.1.5 All communication system terminal boxes including T.V., telephone/intercom, security, fire alarm, clock, and computer networking shall be provided with white micarta laminated labels and 3/8" high black lettering.

ARTICLE 17 CONSTRUCTION FACILITIES

17.1 Furnish and maintain from the beginning to the completion all lawful and necessary guards, railings, fences, canopies, lights, warning signs, etc. Take all necessary precautions required by City, State Laws, and OSHA to avoid injury or damage to any persons and property.

17.2 Temporary power and lighting for construction purposes shall be provided under this Section. All work shall be in accordance with Division 1 of these specifications.

ARTICLE 18 GUARANTEE

18.1 Guarantee all material, equipment and workmanship for all sections under this Division in writing to be free from defect of material and workmanship for one year from date of final acceptance, as outlined in the general conditions. Replace without charge any material or equipment proven defective during this period. The guarantee shall include performance of equipment under all site conditions, conditions of load, installing any additional items of control and/or protective devices, as required.

ARTICLE 19 PATENTS

19.1 Refer to the General Conditions for Contractor's responsibilities regarding patents.

ARTICLE 20 PLUMBING (DIVISION 22) / HEATING, VENTILATING, AND AIR CONDTIONING (DIVISION 23) / ELECTRICAL – COORDINATION REQUIREMENTS

20.1 All electrical work performed for this project shall conform to the California Electrical Code, to Local Building Codes and in conformance with Division 22, 23, and 26 of these specifications, whether the work is provided under the "Plumbing", "Heating, Ventilating, and Air Conditioning", or the "Electrical" Division of these specifications. Where the Division 22 and/or Division 23 Contractor is required to provide electrical work, he shall arrange for the work to be done by a licensed Division 26 Contractor, using qualified electricians. The Division 22 and/or Division 23 Contractor shall be solely and completely responsible for the correct functioning of all equipment regardless of who provided the electrical work.

20.2 The work under Division 22 and/or Division 23 shall include the following:

20.2.1 All motors required by mechanical equipment.

20.2.2 All starters for mechanical equipment which are not provided under the electrical division as part of a motor control center or otherwise indicated on the electrical drawings.

20.2.3 All wiring interior to packaged equipment furnished as an integral part of the equipment.

20.2.4 All control **wiring and conduit** for mechanical control systems.

20.2.5 All control systems required by mechanical equipment.

20.3 The work under Division 26 shall include the following:

20.3.1 All power wiring and conduit; and conduit only for EMS control conductors between each building and the main control panel.

20.3.2 Electrical disconnects as shown on the electrical drawings.

20.3.3 Starters forming part of a motor control center.

20.4 All power wiring and conduit to equipment furnished under Division 22 and/or Division 23 shall be provided under Division 26. Control wiring and conduit, whether line voltage or low voltage, shall be provided under the division which furnishes the equipment.

20.5 Power wiring shall be defined as all wiring between the panelboard switchboard overcurrent device, motor control center starter or switch, and the safety disconnect switch or control panel serving the equipment. Also, the power wiring between safety disconnect switch and the equipment line terminals.

20.6 Control wiring shall be defined as all wiring, either line voltage or low voltage, required for the control and interlocking of equipment, including but not limited to wiring to motor control stations, solenoid valves, pressure switches, limit switches, flow switches, thermostats, humidistats, safety devices, smoke detectors, and other components required for the proper operation of the equipment.

20.7 All motor starters which are not part of motor control centers and which are required for equipment furnished under this Division shall be furnished and installed by the Division furnishing the equipment and power wiring connected under Division 26. Motor starters and control devices in motor control centers shall be furnished and installed under Division 26.

20.8 Division 26 Contractor shall make all final connections of power wiring to equipment furnished under this Division.

20.9 Wiring diagrams complete with all connection details shall be furnished under each respective Section.

20.10 Motor starters supplied by Plumbing and/or Heating, Ventilating and Air Conditioning shall be fused combination type minimum NEMA Size 1, and conform to appropriate NEMA standards for the service required. Provide NEMA type 3R/12 gasketed enclosures in wet locations. Provide all starters with appropriately sized overload protection and heater strips provided in each phase, hand/off auto switches, a minimum of 2 NO and NC auxiliary contacts as required, and an integral disconnecting means. For ½ horsepower motors and below, when control requirements do not dictate the use of a starter, a manual motor starter switch with overload protection in each phase may be provided. Acceptable manufacturers are Allen Bradley, General Electric, Square D, Furnas and Cutler Hammer.

ARTICLE 21 EQUIPMENT ROUGH-IN

21.1 Rough-in all equipment, fixtures, etc. as designed on the drawings and as specified herein. The drawings indicate only the approximate location of rough-ins. Mounting heights of all switches, receptacles, wall mounted fixtures and such equipment must be coordinated with the Architectural Designs. The Contractor shall obtain all rough-in information before progressing with any work for rough-in connections. Minor changes in the contract drawings shall be anticipated and provided for under this Division of the specifications to comply with rough-in requirements.

ARTICLE 22 OWNER FURNISHED AND OTHER EQUIPMENT

22.1 Rough-in and make final connections to all Owner furnished equipment shown on the drawings and specified, and all equipment furnished under other sections of the specifications.

ARTICLE 23 EQUIPMENT FINAL CONNECTIONS

23.1 Provide all final connections for the following:

23.1.1 All equipment furnished under this Division.

23.1.2 Electrical equipment furnished under other sections of the specification.

23.1.3 Owner furnished equipment as specified under this Division.

ARTICLE 24 INSERTS, ANCHORS, AND MOUNTING SLEEVES

24.1 Inserts and anchors must be:

24.1.1 Furnished and installed for support of work under this Division.

24.1.2 Mounting of equipment that is of such size as to be free standing and that equipment which cannot conveniently be located on walls, such as motor starters, etc., shall be rigidly supported on a framework of galvanized steel angle of Unistrut or B-line systems with all unfinished edges painted.

24.1.3 Furnish and install all sleeves as required for the installation of all work under all Sections of this Division and for all communication systems including any communication systems described in this Section which are bid to the General Contractor. Sleeves through floors, roof, and walls shall be as described in "Conduit and Fittings" Section 26 05 33.

ARTICLE 25 SEISMIC ANCHORING

25.1 All switchgear and other free standing electrical equipment or enclosures shall be anchored to the floor and braced at the top of the equipment to the structure. Where details have not been provided on the drawings, anchorage shall comply with CBC Section 1632A and Table 16-A0. The Contractor shall submit drawings signed by the Contractors registered structural Engineer indicating method of compliance prior installation.

ARTICLE 26 RUST PROOFING

26.1 Rust proofing must be applied to all ferrous metals and shall be in accordance with Section 05500 of these specifications and as noted below.

26.1.1 Hot-dipped galvanized shall be applied and after forming of angle-iron, bolts, anchors, etc.

26.1.2 Hot-dipped galvanized coating shall be applied after fabrication for junction boxes and pull boxes cast in concrete.

ARTICLE 27 GENERAL WIRING

27.1 Where located adjacent in walls, outlet boxes shall not be placed back to back, nor shall extension rings be used in place of double boxes, all to limit sound transmission between rooms. Provide short horizontal nipple between adjacent outlet boxes, which shall have depth sufficient to maintain wall coverage in rear by masonry wall.

27.2 In those instances where outlet boxes, recessed terminal boxes, or recessed equipment enclosures are installed in a fire rated assembly, provide "Flamesafe FSD 1077" fire stopping pads or approved equal, over the outlet or box.

27.3 Complete rough-in requirements of all equipment to be wired under the contract are not indicated. Coordinate with respective trades furnishing equipment or with the Architect as the case may be for complete and accurate requirements to result in a neat, workmanlike installation.

ARTICLE 28 SEPARATE CONDUIT SYSTEMS

28.1 Each electrical and signal system shall be contained in a separate conduit system as shown on the drawings and as specified herein. This includes each power system, each lighting system, each signal system of whatever nature, telephone, standby system, sound system, control system, fire alarm system, etc.

28.2 Further, each item of building equipment must have its own run of power wiring. Control wiring may be included in properly sized conduit for equipment feeders of #6 AWG and smaller, having separate conduit for larger sizes.

ARTICLE 29 CLEANUP

29.1 In addition to cleanup specified under other sections, thoroughly clean all parts of the equipment. Where exposed parts are to be painted, thoroughly clean off any spattered construction materials and remove all oil and grease spots. Wipe the surface carefully and scrape out all cracks and corners.

29.2 Use steel brushes on exposed metal work to carefully remove rust, etc., and leave smooth and clean.

29.3 During the progress of the work, keep the premises clean and free of debris.

ARTICLE 30 PAINTING

30.1 Paint all unfinished metal as required in accordance with Division 1 of these specifications. (Galvanized and factory painted equipment shall be considered as having a sub-base finish.)

ARTICLE 31 GENERAL DEMOLITION REQUIREMENTS

31.1 Remove existing work and items which are required to be removed in such manner that minimum damage and disturbance is caused to adjacent and connection work scheduled to remain. Repair or replace existing work schedule.

31.2 Include preparation of existing areas to receive new materials and removal of materials and equipment to alter or repair the existing building as indicated and as specified.

31.3 Perform demolition exercising proper care to prevent injury to the public, workmen and adjoining property.

31.4 Perform the removal, cutting, drilling of existing work with extreme care and use small tools in order not to jeopardize the structural integrity of the building.

31.5 Rebuild to existing condition or better, existing work which has to be removed to allow the installation of new work as required.

31.6 Remove, protect and reinstall existing items as indicated. Replace materials scheduled for reuse which are damaged by the Contractor to the extent that they cannot be reused, with equal quality material, and installation.

31.7 Do not reuse in this project materials and items removed from existing site or building, except with specific written approval by the Architect in each case, unless such removed material or item is specifically indicated or specified to be reused.

31.8 Remove materials and equipment indicated to be salvaged for reinstallation and store to prevent damage, and reinstall as the work progresses. Do not reuse in this project, other materials and equipment removed from existing site or building, except with specific written approval by the Architect in each case.

31.9 Patch areas requiring patching, including damage caused by removing, relocating or adding fixtures and equipment, damages caused by demolition at adjacent materials.

31.10 Do not stockpile debris in the existing building, without the approval of the Architect. Remove debris as it accumulates from removal operations to a legal disposal area.

31.11 Contractor to assume existing oil filled and dry transformers, oil switches, ballasts, lamps, wooden poles, cross arms, computers, computer monitors, and conductor insulation containing materials considered hazardous. Comply with local, state and federal regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution. Contractor shall be responsible for removal of the above hazardous materials where encountered. Include all costs for such removal as part of this contract.

31.12 All fluorescent, compact fluorescent, high intensity discharge, metal halide, mercury vapor, high and low pressure sodium, and neon lamps are to be disposed of as required by the California Waste Rule Regulations as described in the California Code of Regulations, Title 22, Division 4.5 and Chapter 23.

31.13 **Communication System:** Where new communication systems, (including telephone, intercom, clock, security, fire alarm, data, multimedia, CATV or lighting controls) are installed to replace existing systems, unless where otherwise directed the existing systems shall remain fully operational until the new system has been installed and tested. Demolition of the existing systems shall include removal of all equipment and associated wiring and exposed conduits and providing new blank covers for all abandoned device locations.

31.14 **Salvage Power Equipment:** The Contractor shall carefully remove all existing switchboards, panelboards, transformers, and confirm in writing which items the Owner wishes to keep. These items shall be transported to the Owner's maintenance facilities by the Contractor. All remaining items shall be disposed of by the Contractor.

31.15 **Salvage Lighting Equipment:** The Contractor shall confirm in writing which items the Owner wishes to keep. These items shall be transported to the Owner's maintenance facilities by the Contractor. All remaining items shall be disposed of by the Contractor.

31.16 **Salvage Communication Equipment:** The Contractor shall carefully remove all communication devices (telephone, intercom, clock, security, fire alarm, data, multimedia, CATV or lighting controls) and box each type of devices separately. The Contractor shall deliver all items to the Owner's maintenance facility.

ARTICLE 32 PROJECT CLOSEOUT

32.1 Prior to completion of project, compile a complete equipment maintenance manual for all equipment supplied under sections of this Division, in accordance with Division 1 of these specifications and as described below.

32.2 Equipment Lists and Maintenance Manuals:

32.2.1 Prior to completion of job, Contractor shall compile a complete equipment list and maintenance manuals. The equipment list shall include the following items for every piece of material equipment supplied under this Section of the specifications:

32.2.1.1 Name, model, and manufacturer.

32.2.1.2 Complete parts drawings and lists.

32.2.1.3 Local supply for parts and replacement and telephone number.

32.2.1.4 All tags, inspection slips, instruction packages, etc., removed from equipment as shipped from the factory, properly identified as to the piece of equipment it was taken from.

32.3 Maintenance manuals shall be furnished for each applicable section of the specifications and shall be suitably bound with hard covers and shall include all available manufacturers' operating and maintenance instructions, together with "as-built" drawings to properly operate and maintain the equipment. The equipment lists and maintenance manuals shall be submitted in duplicate to the Architect for approval not less than 10 days prior to the completion of the job. The maintenance manuals shall also include the name, address, and phone numbers of all subcontractors involved in any of the work specified herein. Four copies of the maintenance manuals bound in single volumes shall be provided.

ARTICLE 33 RECORD DRAWINGS

33.1 The Division 26 Contractor shall maintain record drawings as specified in accordance with Division 1 of these specifications, and as noted below.

33.2 Drawings shall show locations of all concealed underground conduit runs, giving the number and size of conduit and wires. Underground ducts shall be shown with cross section elevations and shall be dimensioned in relation to permanent structures to indicate their exact location. Drawing changes shall not be identified only with referencing CORs and RFIs, the drawings shall reflect all of the actual additions or changes made. All as-built drawing information shall be prepared by the contractor in AutoCAD, updating the contract computer files as needed to reflect actual installed conditions for all site plans, lighting, power, communication, networking, audio visual, and security or fire alarms systems included in the scope of work for this project.

33.3 One set of these record drawings shall be delivered to the Architect. The engineer will review documents for completeness, and will not be responsible for editing contractor computer files.

ARTICLE 34 CHANGES AND EXTRA WORK

34.1 When **changes** in work are requested, the Division 26 Contractor shall provide unit prices for the work involved in accordance with Division 1 of these specifications, and the following:

34.1.1 The material Costs shall **not exceed** the latest edition of the "Trade Service" end column "C" price list. The materials prices may be higher only where the Contractor can produce invoices to substantiate higher material costs. The Contractor shall submit a print out copy of the trade service sheets with the change order to substantiate these values.

34.1.2 The labor Costs shall **not exceed** the latest edition of the "NECA Manual of Labor Units" **normal column**.

34.2 When **credits** in work are requested, the Division 26 Contractor shall provide unit prices for the work involved in accordance with Division 1 of these specifications, and the following:

34.2.1 The Material Costs shall **not be less than 80% of** the latest edition of the "Trade Service" end column price list. The materials prices may be lower only where the Contractor can produce invoices to substantiate lower material costs. Restocking fees may also be included in this amount where applicable.

34.2.2 The Labor Costs shall **not be less than 80% of** the latest edition of the "NECA Manual of Labor Units" **normal column**.

34.3 Conduit pricing for conduits of all types sized 3" or smaller.

When changes in the scope of work require the Contractor to estimate conduit Installations, they shall **NOT include labor values (only material cost may be included)** for any of the below items. The labor values for conduit installation

represented in the NECA manual are inflated to a point where additional labor for the below items can not be justified.

34.3.1 Couplings.

34.3.2 Set Screw or Compression Fittings, locknuts, Bushings and washers.

34.3.3 Conduit straps and associated screws or nails.

34.3.4 LB fittings or other specialty fittings or specialty mounting hardware may be included where needed.

34.4 Wire pricing for all types and sizes.

When changes in the scope of work require the Contractor to estimate wire installations they shall **NOT include labor values (only material cost may be included)** for any of the below items. The labor values for wire installation represented in the NECA manual are inflated to a point where additional labor for the below items can not be justified.

34.4.1 Locknuts, Bushings, tape, wire markers.

34.5 When changes in the scope of work require other equipment installations such as lighting fixtures, panelboards, switchboards, wiring devices, communications equipment etc. the Contractor shall **NOT include labor values (only material cost may be included)** for any of the below items. The labor values for these equipment items represented in the NECA manual are inflated to a point where additional labor for the below items can not be justified.

34.5.1 Associated screws, nails, bolts, anchors or supports.

34.5.2 Locknuts, washers, tape.

34.6 The total labor hours for extra work will be required to be calculated as follows:

34.6.1 Change orders with 1 to 30 total labor hours

General Laborer	10%	of total labor hours
Journeyman	10%	of total labor hours
Foreman	80%	of total labor hours

34.6.2 Change orders with 31 to 100 total labor hours

General Laborer	20%	of total labor hours
Journeyman	40%	of total labor hours
Foreman	40%	of total labor hours

34.6.3 Change orders with over 100 total labor hours

General Laborer	30%	of total labor hours
Journeyman	50%	of total labor hours
Foreman	20%	of total labor hours

34.7 When change orders are issued which allow the work to be completed in the normal sequence of construction, the labor rates shall be based on the most current "Prevailing Wage" – straight time total hourly rate. When change orders require the Contractor to work out of sequence the "Prevailing Wage" – daily overtime hourly rate shall apply. Special condition situations shall be reviewed on an individual basis for alternate hourly rate schedules.

34.8 Costs **will not** be permitted for additional supervision on site or office time for processing any change order other than the 10% overhead allowance as described in Division 1. Cost for special equipment required to install items for an individual change order are permitted and must be individually identified. Lump Sum cost for small tools or any other cost not specifically required for the change order are not permitted.

34.9 Contractor estimates shall be formatted to clearly identify each of the following:

34.9.1 Line item description of each type of material or labor item.

34.9.2 Description of quantity for each item.

34.9.3 Description of (material cost per / quantity).

34.9.4 Description of (labor cost per / quantity).

34.9.5 Description of total labor hour breakdown per Foreman, Journeyman or General Laborer as described above.

ARTICLE 35 ELECTRONIC FILES

35.1 The Contractor shall make a ***written*** request directly to Johnson Consulting Engineers for electronic drawing files. As a part of the written request, please include the following information:

35.1.1 Clearly indicate each drawing sheet needed (i.e., E1.1, E2.1, etc.).

35.1.2 Identify the name, phone number, mailing address and e-mail address of the person to receive the files.

35.1.3 Provide written confirmation and agreement with the requirements described for payment of computer files, as described below.

35.2 Detail or riser diagram sheets, or any other drawings other than floor plans or site plans, ***will not be made available to the Contractor***.

35.3 Files will only be provided in the AutoCAD format in which they were created.

35.4 Requests for files will be processed as soon as possible; a minimum of 7 working days should be the normal processing time. The Contractor shall be completely responsible for requesting the files in time for their use.

END OF SECTION

SECTION 260519 - POWER CONDUCTORS

PART 1 – GENERAL

1.1 Furnish and install wire and cable for branch circuits and feeders specified herein and as shown on the electrical drawings.

1.2 Submittals: Submit manufacturers' data for the following items:

1.2.1 All cables and terminations

1.3 **<u>Common submittal mistakes which will result in the submittals being rejected:</u>**

1.3.1 Not including all items listed in the above itemized description.

1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining, or clouding the items to be reviewed, or crossing out the items which are not applicable.

1.3.3 Not including actual manufacturer's catalog information of proposed products.

1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed

PART 2 – PRODUCTS

2.1 Wire and cable Rated 120 volt to 600 volt.

2.1.1 All wire and cable shall be new, 600 volt insulated copper, of types specified below for each application. All wire and cable shall bear the UL label and shall be brought to the job in unbroken packages. Wire insulation shall be the color as specified herein and shall be type THWN-2. Insulated conductors shall be installed in all exterior exposed raceways. Conductors for branch circuit lighting, receptacle, power and miscellaneous systems shall be a minimum of No. 12 AWG. Increase conductor size to No. 10 AWG for 120 volt circuits greater than 100 feet from the panel to the load and for 277 volt circuits greater than 200 feet from the panel to the load. Circuit home-runs indicated to be larger than No. 12 must be increased the entire length of the circuit, including equipment grounding conductor. Wire sizes No. 14 through No. 10 shall be solid. No. 8 and larger shall be stranded.

2.1.2 Aluminum conductors will be permitted (only where specifically identified on the drawings. See "600 Volt Feeder Schedule") in sizes 2/0 or larger. Conductors shall be listed by Underwriters Laboratories (UL)

and suitable for operation at 600 volts or less, at a maximum operating temperature of 90N C maximum in wet or dry locations. Conductors shall be marked "SUN-RES". Aluminum alloy conductors shall be compact stranded conductors of STABILOY® (AA-8030) as manufactured by Alcan Cable or Listed equal. AA-8000 Series aluminum alloy conductor material shall be recognized by The Aluminum Association.

2.1.3 MC type armored cable is not permitted.

2.2 Wire and cable for systems below120 volts.

2.2.1 All low voltage and communications systems cables routed underground shall be provided with a moisture resistant outer jacket, West Penn "Aquaseal" or equal, unless otherwise specified.

PART 3 - EXECUTION

3.1 Wire and cable shall be pulled into conduits without strain using powdered soapstone, mineralac, or other approved lubricant. In no case shall wire be repulled if same has been pulled out of a conduit run for any purpose. No conductor shall be pulled into conduit until conduit system is complete, including junction boxes, pull boxes, etc.

3.2 All connections of wires shall be made as noted below:

3.2.1 Connections to outlets and switches: Wire formed around binding post of screw.

3.2.2 No. 10 wire and smaller: Circuit wiring connections to lighting fixtures and other hard wired equipment shall be made with pressure type solderless connectors, Buchanan, Scotchlock, Wing Nut, or approved equal. Alternate "WAGO" #773 series or "IDEAL" #32, 33, 34 and 39 series push wire style connectors are also acceptable.

3.3 All wiring shall be continuous without splicing unless where specifically noted on the drawings or where permitted below.

3.3.1 No. 10 wire and smaller above grade: Quantities as needed, connection made with pressure type solderless connectors, Scotchlock or equal.

3.3.2 No. 10 wire and smaller below grade: Quantities as needed, connection made with 'Raychem' long barrel compression terminals with crimping tool and quantity of crimps as recommended by manufacturer, provide 'Raychem' WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate products must be UL listed for direct burial/submersible and rated to (1000V).

3.3.3 No. 8 wire and larger above grade: Quantities <u>only</u> where indicated, 'Raychem' long barrel compression terminals with crimping tool and

quantity of crimps as recommended by manufacturer, provide 'Raychem' WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate products must be UL listed for direct burial/submersible and rated to (1000V).

3.3.4 No. 8 wire and larger below grade: Quantities only where indicated, 'Raychem' long barrel compression terminals with crimping tool and quantity of crimps as recommended by manufacturer, provide 'Raychem' WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate products must be UL listed for direct burial/submersible and rated to (1000V).

3.4 All wiring throughout shall be color coded as follows:

	480 volt system	208 or 240 volt system
A Phase	Brown	Black
B Phase	Orange	Red
C Phase	Yellow	Blue
Neutral	Grey	White
Ground	Green	Green

3.5 Wiring must be color coded throughout its entire length, except feeders may have color coded plastic tape at both ends and any other accessible point.

3.6 All control wiring in a circuit shall be color coded, each phase leg having a separate color, and with all segments of the control circuit, whether in apparatus or conduit, utilizing the same color coding.

3.7 At all terminations of control wiring, the wiring shall have a numbered T&B or Brady plastic wire marker.

3.8 Cables when installed are to be properly trained in junction boxes, etc., and in such a manner as to prevent any forces on the cable which might damage the cable.

3.9 All conductors to be installed into a common raceway, shall be pulled into the raceway at the same time.

3.10 All conductors shall be installed in such a manner as to not exceed the manufacturers recommended pulling tension and bending radius. The equipment used for pulling must be specifically designed for the purpose. Motorized vehicles such as pickup trucks, are not acceptable.

END OF SECTION

SECTION 260526 - GROUNDING

PART 1 – GENERAL

1.1 Furnish and install grounding and grounding conductors and electrodes as specified herein and as shown on the drawings.

1.2 Submit catalog data for all components.

1.3 **<u>Common submittal mistakes which will result in the submittals being rejected:</u>**

1.3.1 Not including all items listed in the above itemized description.

1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.

1.3.3 Not including actual manufacturer's catalog information of proposed products.

1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – EXECUTION

2.1 Grounding

2.1.1 All panelboard cabinets, equipment, enclosures, and complete conduit system shall be grounded securely in accordance with pertinent sections of CEC Article 250. Conductors shall be copper. All electrically operated equipment shall be bonded to the grounded conduit system. All non-current carrying conductive surfaces that are likely to become energized and subject to personal contact shall be grounded by one or more of the methods detailed in CEC Article 250. All ground connections shall have clean contact surfaces. Install all grounding conductors in conduit and make connections readily accessible for inspection.

2.1.2 Provide an insulated equipment grounding conductor in all branch circuit and feeder raceway systems, sized in accordance with CEC 250-95.

2.1.3 Provide an additional individual insulated grounding conductor for each circuit which contains an isolated ground receptacle or surge suppression receptacle.

2.1.4 Grounding of metal raceways shall be assured by means of provisions of grounding bushings on feeder conduit terminations at the panelboard,

and by means of insulated continuous stranded copper grounding wire extended from the ground bus in the panelboard to the conduit grounding bushings.

2.1.5 Except for connections which access for periodic testing is required, make grounding connections which are buried or otherwise inaccessible by exothermite type process.

2.1.6 The following ohmic values shall be test certified for each item listed. A written report signed and witnessed by the project IOR shall be provided to the engineer. If the ohmic value listed cannot be obtained additional grounding shall be installed to reach the value listed.

2.1.6.1 Service. . . . . .10 ohms.

2.1.6.2 Step down transformers and non-current carrying metal parts . . . . . 25 ohms.

2.1.6.3 Manholes, handholes, etc. . . . . 10 ohms.

END OF SECTION

SECTION 260533 - CONDUIT AND FITTINGS

PART 1 – GENERAL

1.1 Furnish and install conduit and fittings as shown on the drawings and as specified herein.

1.2 Submit Manufacturer's data on the following:

1.2.1 Conduit.

1.2.2 Fittings

1.2.3 Fire stopping Material.

1.2.4 Surface Raceways.

1.3 **Common submittal mistakes which will resulting in the submittals being rejected:**

1.3.1 Not including all items listed in the above itemized description.

1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.

1.3.3 Not including actual manufacturer's catalog information of proposed products.

1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

2.1 Rigid steel conduit, intermediate metal conduit (IMC), electrical metallic tubing (EMT) and flexible metallic conduit shall be steel, hot dipped galvanized after fabrication.

2.2 PVC conduit shall be Carlon or approved equal.

2.3 Liquid tight flexible metal conduit shall be Anaconda Sealtite type UA or approved equal. Fittings shall be Appleton, Crouse-Hinds, Steel City, T&B, or equivalent.

2.4 Fire stopping material shall provide an effective seal against fire, heat, smoke and fire gases. Fire stopping material shall be tested to comply with ASTME 814 and UL 1479. The submittal for this product shall include the UL listed system

number and installation requirements for each type of penetration seal required for this project.

2.5 Each length of conduit shall be stamped with the name or trademark of the manufacturer and shall bear the UL label.

2.6 All plastic conduit shall be rigid, schedule 40, heavy wall PVC. All PVC conduit shall be UL listed. Underground utility company conduits shall comply with local utility co. requirements.

2.7 Plastic conduit shall be stored on a flat surface, and protected from the direct rays of the sun.

2.8 Where branch circuit or communication raceways cannot be concealed in ceilings or walls and are required to be exposed in interior spaces, provide nonmetallic surface raceway system sized per the manufacturer capacity requirements. A full complement of nonmetallic fittings must be available and matching device boxes and cover plates must be provided. The color of the raceway system, components and boxes shall be (white). Where data networking cabling is to be installed, all raceway fittings shall meet Category 5 radius requirements. Where specific raceway types have been noted on the drawings they shall be as follows:

2.8.1	System 'SR'	Hubbell	WALLTRAK 1 series
		Wiremold	ECLIPSE PN05series
		Panduit	LD5 series
		Hellerman-Tyton	TSR2 series
2.8.2	System 'SR2'	Hubbell	WALTRAK 22
		Wiremold	2300D Series
		Panduit	D2P10
		Hellerman-Tyton	TSR3 series
2.8.3	System 'SR3'	Hubbell	BASETRAK series
		Wiremold	5400 - series
		Panduit	70 series
		Hellerman-Tyton	MCR Infostream" series

Provide with offset boxes, inline boxes may only be used where specifically shown on the drawings.

PART 3 – FITTINGS

3.1 All metallic fittings, including those for EMT, flexible conduit, or malleable iron. Die cast fittings of any other material are not permitted.

3.2 Locknuts shall be steel or malleable iron with sharp clean cut threads.

3.3 Entrance seals shall be 0.Z. type FSK or equivalent.

3.4 Bushings and locknuts: Where conduits enter boxes, panels, cabinets, etc., they shall be rigidly clamped to the box by locknuts on the outside, and a lock nut and plastic bushing on the inside of the box. All conduits shall enter the box squarely.

3.5 Furnish and install insulated bushings as per CEC article No. 300 - 4 (F) on all conduits. The use of insulated bushings does not exclude the use of double locknuts to fasten conduit to the box.

3.6 Transition from plastic to steel conduits shall be with PVC female threaded adaptors.

3.7 Couplings and connectors for rigid steel or IMC conduit must be threaded, or compression type (set screw fittings are not permitted).

3.8 Couplings and connectors for EMT shall be compression, watertight. Set screw connectors are not acceptable, except for systems below 120 volts.

3.9 Connectors for flexible metal conduit shall be steel or malleable iron with screw provided to clinch the conduit into the adapter body. For sizes up to ¾" a screw-in, "Jake type," fitting may be used.

3.10 Install approved expansion fittings, or liquid tight flex conduit with a minimum 6" slack for conduits passing through all expansion and seismic joints.

PART 4 - EXECUTION

4.1 All branch circuits shall be installed concealed in walls or above ceilings or in concrete floor slabs. PVC conduits installed in concrete floor slabs shall transition to PVC coated rigid steel where conduits penetrate above finished grade or finished floor.

4.2 Conduit sizes for various numbers and sizes of wire shall be as required by the CEC, but not smaller than ½" for power wiring and ¾" for communications and fire alarm systems unless otherwise noted. Conduit in slab or below grade shall be ¾" minimum trade size, unless otherwise identified.

4.3 Conduit size shall be such that the required number and sizes of wires can be easily pulled in and the Contractor shall be responsible for the selection of the conduit sizes to facilitate the ease of pulling. Conduit sizes shown on the drawings are minimum sizes in accordance with appropriate tables in the CEC. If because of bends or elbows a larger conduit size is required, the Contractor shall so furnish without further cost to the Owner.

4.4 The Contractor shall be entirely responsible for the proper protection of this work from the other trades on the job. When conduit becomes bent or holes are punched through same, or outlets moved after being roughed-in, the Contractor shall replace same, without additional cost to the Owner.

4.5 Rigid steel conduit or IMC shall be used as follows:

4.5.1 Exposed exterior locations.

4.5.2 Exposed interior locations below eight feet above floor, except in electrical rooms and closets.

4.5.3 In hazardous or classified areas as required by CEC.

4.6 EMT conduit shall be used for areas as follows:

4.6.1 All interior communications, signal, and data networking systems.

4.6.2 All interior power wiring systems where not required to be in rigid steel, IMC or flexible conduit.

4.7 Flexible conduit shall be used for areas as follows:

4.7.1 To connect motors, transformers, and other equipment subjected to vibration or where specifically detailed on the drawings.

4.7.2 Flexible conduit shall not be used to replace EMT in other locations where the conduit will be exposed.

4.7.3 Flexible metal conduit shall be ferrous. Installation shall be such that considerable slack is realized. The conduit shall contain separate code sized grounding conductor.

4.7.4 Liquid tight flexible conduit shall be used in conformance with CEC in lengths not to exceed 4'. For equipment connections, route the conduit at 90 degrees to the adjacent path for point of connection. The conduit shall contain separate code sized grounding conductor. Use liquid tight flexible conduit for all equipment connections exposed in possible wet, corrosive or oil contaminated areas, e.g., shops and outside areas.

4.8 Plastic conduit shall be used for all exterior underground, in slab, and below slab on grade conduit installations. Install bell ends at all conduit terminations in manholes and pull boxes. Where plastic conduit transitions from below grade to above grade, <u>no plastic conduit shall extend above finished exterior grade, or above interior finished floor level</u>.

4.9 Plastic conduit joints shall be made up in accordance with the manufacturer's recommendations for the particular conduit and coupling selected. Conduit joint couplings shall be made watertight. Plastic conduit joints shall be made up by brushing a plastic solvent cement on the inside of a plastic fitting and on the outside of the conduit ends. The conduit and fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly.

4.10 All underground conduit depths shall be as detailed on the drawings or a minimum of 30" below finished grade (when not specifically detailed otherwise),

for all exterior underground conduits. Where concrete slurry or concrete encasement is provided, include “Red” color dye in mixture.

4.11 All underground conduits for power systems (600v and higher), shall be concrete encased and a minimum of 48” below grade or as detailed on the drawings. Where concrete slurry or concrete encasement is provided, include “Red” color dye in mixture.

4.12 Conduit shall be continuous from outlet to outlet, cabinet or junction box, and shall be so arranged that wire may be pulled in with the minimum practical number of junction boxes.

4.13 All conduits shall be concealed wherever possible. All conduit runs may be exposed in mechanical equipment rooms, electrical equipment rooms, electrical closets, and in existing or unfinished spaces. No conduit shall be run exposed in finished areas without the specific approval of the Architect.

4.14 All raceways which are not buried or embedded in concrete shall be supported by straps, clamps, or hangers to provide a rigid installation. Exposed conduit shall be run in straight lines at right angles to or parallel with walls, beams, or columns. In no case shall conduit be supported or fastened to other pipes or installed to prevent the ready removal of other trades piping. Wire shall not be used to support conduit.

4.15 It shall be the responsibility of the Contractor to consult the other trades before installing conduit and boxes. Any conflict between the location of conduit and boxes, piping, duct work, or structural steel supports, shall be adjusted before installation. In general, large pipe mains, waste, drain, and steam lines shall be given priority.

4.16 Conduits above lay-in grid type ceilings shall be installed in such a manner that they do not interfere with the "lift-out" feature of the ceiling system. Conduit runs shall be installed to maintain the following minimum spacing wherever practical.

4.16.1 Water and waste piping not less than 3".

4.16.2 Steam and steam condensate lines not less than 12".

4.16.3 Radiation and reheat lines not less than 6".

4.17 Provide all necessary sleeves and chases required where conduits pass through floors or walls as part of the work of this section. Core drilling will only be permitted where approved by the Architect.

4.18 All empty conduits and surface mounted raceways shall be provided with a ¼" polypropylene plastic pull cord and threaded plastic or metal plugs over the ends. Fasten plastic "Dymo" tape label to exposed spare conduit to identify "power" or "communication" system, and to where it goes.

4.19 The ends of all conduits shall be securely plugged, and all boxes temporarily covered to prevent foreign material from entering the conduits during construction. All conduit shall be thoroughly swabbed out with a dry swab to remove moisture and debris before conductors are drawn into place.

4.20 Bending: Changes in direction shall be made by bends in the conduit. These shall be made smooth and even without flattening the pipe or flaking the finish. Bends shall be of as long a radius as possible, and in no case smaller than CEC requirements.

4.20.1 For power conduits for conductors (600v and below), provide minimum 36" radius (vertical) and 72" radius (horizontal) bends.

4.20.2 For power conduits for conductors (greater than 600v), provide minimum 72" radius (vertical) and 72" radius (horizontal) bends.

4.21 Supports: Conduit shall be supported at intervals as required by the California Electrical Code. Where conduits are run individually, they shall be supported by approved conduit straps or beam clamps. Straps shall be secured by means of toggle bolts on hollow masonry, machine screws or bolts on metal surfaces, and wood screws on wood construction. **[No perforated straps or wire hangers of any kind will be permitted. Where individual conduits are routed, or above ceilings, they shall be supported by hanger rods and hangers.]** Conduits installed exposed in damp locations shall be provided with clamp backs under each conduit clamp, to prevent accumulation of moisture around the conduits.

4.22 Where a number of conduits are to be run exposed and parallel, one with another, they shall be grouped and supported by trapeze hangers. Hanger rods shall be fastened to structural steel members with suitable beam clamps or to concrete inserts set flush with surface. A reinforced rod shall be installed through the opening provided in the concrete inserts. Beam clamps shall be suitable for structural members and conditions. Rods shall be galvanized steel 3/8" diameter minimum. Each conduit shall be clamped to the trapeze hanger with conduit clamps.

4.23 All concrete inserts and pipe clamps shall be galvanized. All steel bolts, nuts, washers, and screws shall be galvanized or cadmium plated. Individual hangers, trapeze hangers and rods shall be prime-coated.

4.24 Openings through fire rated floors/walls and/or smoke walls through which conduits pass shall be sealed by Fire stopping material to comply with Division 1 to seal off flame, heat, smoke and fire gases. Sleeves shall be provided for power or communication system cables which are not installed in conduits, and shall be sealed inside and out to comply with manufacturers UL system design details. Where multiple conduits and/or cable tray systems pass thru fire-rated walls at one location, the Contractor shall submit copies of the manufacturers UL system design details proposed for use on this project. All Fire stopping material shall have an hourly fire-rating equal to or higher than the fire rating of the floor or wall through which the conduit, cables, or cable trays pass.

4.25 Provide cap or other sealing type fitting on all spare conduits. Conduits stubbed into buildings from underground where cable only extends to equipment, the conduit/cable end shall be sealed to prevent moisture from entering the room or space.

4.26 All conduits which are part of a paralleled feeder or branch circuit shall be installed underground.

4.27 All conduits which are required as a part of systems specified in Divisions 27 or 28, or any other low voltage communication systems, shall be furnished and installed by the Division 26 Contractor.

4.27.1 The Contractor shall coordinate all conduit requirements with each system supplier prior to bid to determine special conduit system requirements.

4.27.2 The Contractor shall provide a pull rope in all conduits for these systems.

4.27.3 The Contractor shall provide conduit sleeves for all open cable installations thru rated walls or block walls. Provide conduit from each building main termination cabinet or backboard to the nearest accessible ceiling for access into all electrical or communications rooms.

4.28 In addition to the above requirements, the following requirements shall apply to all data networking conduits:

4.28.1 Flexible metal conduit may only be used where required at building seismic and/or expansion joints.

4.28.2 All underground conduits shall be provided with minimum 24" radius elbows (vertical) and 60” (horizontal).

4.28.3 No length of conduit above grade shall be installed to exceed 150 feet between pull boxes, or points of connection, unless where specifically detailed on the drawings.

4.28.4 No length of conduit shall be installed to exceed two 90 degree bends between pull boxes, or points of connection, unless where specifically detailed on the drawings.

4.29 Where surface raceways are installed in interior spaces, the Contractor shall take care to route in straight lines at right angles to or parallel with walls, beams, or columns. All raceways and device boxes shall be securely screwed to the finish surface with zinc screw “Auger” anchors Stk #ZSA1K by Gray Bar Electric or equal. Tape adhesive application will not be permitted.

4.30 The Contractor who installs surface raceway systems shall provide and install complete with wire retention clips, one for every (8) vertical feet or (5) horizontal feet or portion thereof. This Contractor shall also provide <u>each</u> raceway channel with pull strings.

4.31 It shall be the responsibility of the Contractor installing the raceway to coordinate the installation of raceway device plates and inserts with the communications or data contractors.

END OF SECTION

SECTION 260534 - OUTLET AND JUNCTION BOXES

PART 1 – GENERAL

1.1 Furnish and install electrical wiring boxes as specified and as shown on the electrical drawings.

1.2 Submit manufacturer's data for all items.

1.3 <u>Common submittal mistakes which will resulting in the submittals being rejected:</u>

1.3.1 Not including all items listed in the above itemized description.

1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.

1.3.3 Not including actual manufacturer's catalog information of proposed products.

1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

2.1 Boxes shall be as manufactured by Steel City, Appleton, Raco, or approved equal.

2.2 All boxes must conform to the provisions of Article 370 of the CEC. All boxes shall be of the proper size to accommodate the quantity of conductors enclosed in the box. Minimum box size shall be 4" square x 1-½" deep.

2.3 Boxes generally shall be hot dipped galvanized steel with knockouts. Boxes on exterior surfaces or in damp locations shall be corrosion resistant, cast feraloy and shall have threaded hubs for rigid conduit and neoprene gaskets for their covers. Boxes shall be Appleton Type FS, Crouse-Hinds, or the approved equal. Conduit bodies shall be corrosion resistant, cast malleable iron. Conduit bodies shall have threaded hubs for rigid conduit and neoprene gaskets for their covers. Conduit bodies shall be Appleton Unilets, Crouse-Hinds, or the approved equal. Where recessed, boxes shall have square cut corners.

2.4 Deep boxes shall be used in wall covered by wainscot or paneling and in walls or glazed tile, brick, or other masonry which will not be covered with plaster. Through the wall type boxes shall not be used unless specifically called for. All boxes shall be nongangable. Boxes in concrete shall be of a type to allow the

placing of conduit without displacing the reinforcing bars. All lighting fixture outlet boxes shall be equipped with the proper fittings to support and attach a light fixture.

2.5 All light, switch, receptacle, and similar outlets shall be provided with approved boxes, suitable for their function. Back boxes shall be furnished and installed as required for the equipment and/or systems under this contract.

2.6 Pull and junction boxes shall be code gauge boxes with screw covers. Boxes shall be rigid under torsional and deflecting forces and shall be provided with angle from framing where required. Boxes shall be 4" square with a blank cover in unfinished areas and with a plaster ring and blank cover in finished areas. Covers for flush mounted oversize boxes shall extend ¾" past boxes all around. Covers for 4" square boxes shall extend ¼" past box all around.

2.7 All terminal cabinets and junction boxes or equipment back boxes which are required as a part of systems specified in Divisions 27 or 28, or any other low voltage communication systems, shall be furnished and installed by the Division 26 Contractor.

2.7.1 The Division 26 Contractor shall coordinate all box requirements with each system supplier prior to bid to determine special cabinet or back box requirements. The Contractor shall also provide stainless steel blank cover plates for all low voltage systems installed for future equipment.

2.7.2 The Contractor shall provide all plywood backboards indicated on walls or inside equipment enclosures. All backboards shall be a minimum of ¾" thick fire rated type plywood.

2.7.3 The Contractor shall coordinate exact rough in locations and requirements with each system supplier.

2.8 In addition to the above requirements, boxes for data networking wiring and equipment shall comply with the following:

2.8.1 All boxes shall be a minimum of 4-11/16" square x 2-1/8" deep.

2.8.2 Where pull boxes are required on individual conduits 1-¼" or smaller, provide 4-11/16" square x 2-1/8" deep boxes. Where pull boxes are required on conduits larger than 1-¼" for straight pull through, provide eight times the conduit trade size for box length. Where pull boxes are required on conduits larger than 1-¼" for an angle or a U-pull through installation, provide a minimum distance of six times the conduit trade size between the entering and exiting conduit run for each cable.

2.9 Recessed boxes installed in fire rated floors/walls and /or smoke walls shall be sealed by Fire stopping material to comply with Division 1 to seal off flame, heat, smoke and fire gases. The Contractor shall submit copies of the manufacturers UL system design details proposed for use on this project. All

Fire stopping material shall have an hourly fire-rating equal to or higher than the fire rating of the floor or wall through which the conduit, cables, or cable trays pass.

PART 3 – EXECUTION

3.1 Boxes shall be installed where required to pull cable or wire, but in finished areas only by approval of the Architect. Boxes shall be rigidly attached to the structure, independent of any conduit support. Boxes shall have their covers accessible. Covers shall be fastened to boxes with machine screws to ensure continuous contact all around. Covers for surface mounted boxes shall line up evenly with the edges of the boxes.

3.2 Outlets are only approximately located on the plans and great care must be used in the actual location of the outlets by consulting the various detailed drawings and specifications. Outlets shall be flush with finished wall or ceiling, boxes installed symmetrically on such trim or fixture. Refer to drawings for location and orientation of all outlet boxes.

3.3 Furnish and install all plaster rings as may be required. Plaster rings shall be installed on all boxes where the boxes are recessed. Plaster rings shall be of a depth to reach the finished surface. Where required, extension rings shall be installed so that the plaster ring is flush with the finished surface.

3.4 All cabinets and boxes shall be secured by means of toggle bolts on hollow masonry; expansion shields and machine screws or standard precast inserts on concrete or solid masonry; machine screws or bolts on metal surfaces and wood screws on wood construction. All wall and ceiling mounted outlet boxes shall be supported by bar supports extending from the studs or channels on either side of the box. Boxes mounted on drywall or plaster shall be secured to wall studs or adequate internal structure.

3.5 Boxes with unused punched-out openings shall have the openings filled with factory-made knockout seals.

3.6 Where standby power and normal power are to be located in the same outlet box or 480V in a switch box, install partition barriers to separate the various systems.

3.7 All outlet boxes and junction boxes for fire alarm system shall be painted red.

END OF SECTION

SECTION 262416 - PANEL BOARDS

PART 1 – GENERAL

1.1 Furnish and install branch circuit panel boards as specified herein and as indicated on the drawings. Submit manufacturers' data on all items.

1.2 Submit manufacturers' data on all panel boards and components including:

1.2.1 Enclosures and covers

1.2.2 Breakers

1.2.3 Surge Protective Device (SPD) equipment

1.2.4 Incident energy level calculations

1.2.5 Common submittal mistakes which will result in the submittals being rejected:

1.2.5.1 Not arranging the circuit breakers in panels to match the orientations indicated on the drawings. In other words, if a 30 amp breaker is shown on the drawing in Space #2, this must be the location it appears on the submittal schedule. Standard factory arrangements will not be accepted.

1.2.5.2 Not including all items listed in the above itemized description.

1.2.5.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.

1.2.5.4 Not including actual manufacturer's catalog information of proposed products.

1.2.5.5 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

2.1 The interrupting rating of circuit breakers shall be 10,000 amps for the 120/208 system and 14,000 amp for 277/480 volt systems. Refer to drawings for higher interrupting rating requirements. All components and equipment enclosures shall be manufactured by the same manufacturer. Circuit breakers shall be permitted to

be series rated to limit the available fault current to no more than the above ratings.

2.2 All panels shall be fully bussed. Recessed panel enclosures shall be a maximum of 20" wide and 5-3/4" deep for all panels 600 amp rated and less.

2.3 All busses shall be tin-plated aluminum and shall be located in the rear of the panelboard cabinet. Individual circuit breakers shall be bolt on type and removable from the cabinet without disturbing the bussing in any way. All panel boards shall contain ground busses.

2.4 Panel covers shall be door in door style, with one lock. Door lock shall allow access to breakers only. Access to wireways without removal of cover shall be permitted by (non removable) screws behind the locked door. Panel cover shall be provided with full length piano hinge. All locks for all panels provided in this project shall be keyed alike.

2.5 Each panel shall have a two-column circuit index card set under glass or glass equivalent on the inside of the door. Each circuit shall be identified as to use and room or area. Areas shall be designated by room numbers. Room numbers shown on the drawings may change and contractor shall verify final room numbers with the architect prior to project completion.

2.6 Tandem mounted or wafer type breakers are not acceptable.

2.7 Multiple breakers shall have one common trip handle or be internally connected. Handle ties are not acceptable.

2.8 Breaker arrangements shown in the drawings shall be maintained. The circuit breakers in panels must match the orientations indicated on the drawings. In other words, if a 30 amp breaker is shown on the drawing in Space #2, this must be the location it appears on the submittal schedule. Standard factory arrangements will not be accepted.

2.9 Where conductor sizes exceed the standard breaker lug wire range, or where multiple conductors per phase are required, the panelboard manufacturer shall provide the breaker with suitable lugs for terminating the specified conductors.

2.10 Acceptable manufacturers are Square D, Eaton, Siemens or General Electric.

2.11 Equipment manufactured by any other manufacturers not specifically listed in Section 2.10 are <u>not</u> considered equal, or approved for use on this project.

PART 3 – EXECUTION

3.1 Painting of panelboard covers in finished areas shall be done by the general contractor.

3.2 Provide a spare 3/4" conduit stubbed to an accessible area for each of every three (3) spares or spaces provided in recessed panel boards.

3.3 All lugs shall be torque tested in the presence of the inspector of record.

Arc Flash and Shock Hazard

3.4 The Contractor is to provide, and submit to the engineer for approval, incident energy level calculations as determined using the methodologies described in NFPA 70E or IEEE standard 1584-2002.

3.4.1 **All studies shall be performed by "Emerson Electric" (858) 695-9551, MTA (858) 472-0193, or Terra Power Solutions (858) 380-8170. Studies performed by manufactures or other engineering or testing companies must submit qualifications for approval by Johnson Consulting Engineers, 7 days prior to bid for this project**.

3.5 A warning label, as specified in the above standard, shall be placed on each switchboard, panelboard, and safety switch indicating the incident energy levels on the equipment to warn qualified personnel in accordance with NFPA 70E, section 110.16 Labels shall be laminated white micarta with black lettering on each. Letters shall be no less than 3/8" high.

3.6 The incident level calculations for each piece of equipment shall be given to the owner and maintained on file by the maintenance department

3.7 The design goal is to minimize the incident energy to which a maintenance employee may be exposed.

END OF SECTION

SECTION 262816 - DISCONNECTS

PART 1 – GENERAL

1.1 Furnish and install all disconnect switches as shown on the drawings and as required by the CEC.

1.2 Submit manufacturers' data for all disconnects and fuses.

1.2.1 Disconnects

1.2.2 Fuses

1.3 **Common submittal mistakes which will result in the submittals being rejected:**

1.3.1 Not including all items listed in the above itemized description.

1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.

1.3.3 Not including actual manufacturer's catalog information of proposed products.

1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

2.1 Acceptable manufacturers shall be Square D, Cutler Hammer, Siemens or General Electric.

2.2 Equipment manufactured by any other manufacturers not specifically listed in Section 2.1 are not considered equal, or approved for use on this project.

2.3 All switches shall be heavy-duty type, externally operated, quick-make, quick-break, rated 600 volts or 240 volts as required, with the number of poles and ampacity as noted. All switches for motors shall be HP rated. Switches shall have NEMA-Type 1 enclosures, except switches located where exposed to outdoor conditions shall have NEMA Type 3R enclosure. Switches generally shall be fused except where noted to be non-fused on the drawings.

2.4 Where fuses are indicated, fuses shall be Bussman or Littlefuse (no known equal). Fuses shall be current limiting type with time delay characteristics to suit the equipment served.

PART 3 – EXECUTION

3.1 Mount all switches to structure or U-channel support. U-channel supports shall be cleaned and painted to prevent rust.

3.2 Switches shall be accessible with proper clearances in front per CEC 110-16.

3.3 All lugs shall be torque tested in the presence of the inspector of record.

3.4 Arc Flash and Shock Hazard

3.4.1 The contractor is to provide, and submit to the engineer for approval, incident energy level calculations as determined using the methodologies described in NFPA 70E or IEEE standard 1584-2002.

3.4.2 A warning label, as specified in the above standard, shall be placed on each switchboard, panelboard, and safety switch indicating the incident energy levels on the equipment to warn qualified personnel in accordance with NFPA 70E, section 110.16 Labels shall be laminated white micarta with black lettering on each. Letters shall be no less than 3/8" high.

3.4.3 The incident level calculations for each piece of equipment shall be given to the owner and maintained on file by the maintenance department.

3.4.4 The design goal is to minimize the incident energy to which a maintenance employee may be exposed and in no case more than 8 cal./cm².

END OF SECTION

SECTION 269090 -TESTING

PART 1 – GENERAL

1.1 Upon completion of the electrical work, the entire installation shall be tested by the Contractor, and demonstrated to be operating satisfactorily to the Architect, Engineer, Inspector and Owner.

1.2 All testing and corrections shall be made prior to demonstration of operation to the Architect, Engineer, Inspector and Owner.

1.3 In addition to the demonstration of operation, the Contractor is also required to review the content and quality of instructions provided on items demonstrated with the Architect, Engineer, Inspector and Owner.

PART 2 – EXECUTION

2.1 Wiring shall be tested for continuity, short circuits and/or accidental grounds. All systems shall be entirely free from "grounds," "short circuits," and any or all defects.

2.2 Motors shall be operating in proper rotations, and control devices functioning properly. Check all motor controllers to determine that properly sized overload devices are installed, and all other electrical equipment for proper operation.

2.3 Tests and adjustments shall be made prior to acceptance of the electrical installation by the Architect, and a certificate of inspection and acceptance of the electrical installation by local inspection authorities shall be provided.

2.4 All equipment or wiring provided which tests prove to be defective or operating improperly shall be corrected or replaced promptly, at no additional cost to the Owner.

2.5 Test all motor and feeder circuits with a "megger" tester to determine that insulation values conform to Section 110-20, California Electrical Code (CED). Test reports must be submitted and approved by the engineer before final acceptance.

2.6 Test all grounding electrode connections to assure a resistance of no more than 10 ohms is achieved. Augment grounding until the ohmic value stated above is achieved. Provide certified test results to the Architect, Engineer and Inspector.

END OF SECTION

CALIFORNIA MILITARY INSTITUTE
HVAC UPGRADES

PERRIS UNION HIGH SCHOOL DISTRICT

CONSTRUCTION DOCUMENTS

1/29/2016

BakerNowicki
design studio
731 Ninth Avenue, Suite A
San Diego, California 92101
619.795.2450

G1.0

CALIFORNIA MILITARY INSTITUTE
HVAC UPGRADES
PERRIS UNION HIGH SCHOOL DISTRICT

755 NORTH 'A' STREET
PERRIS, CA 92570

SYMBOLS

- NORTH ARROW
- ITEM / ELEVATION — SPOT ELEVATION
- ITEM / ELEVATION — FINISH FLOOR LEVEL
- A / 1 — STRUCTURAL GRID LINES
- MATCH LINE
- DTL # / SHT # — DETAIL REFERENCE TAG (DETAIL NUMBER, SHEET NUMBER)
- DTL # / SHT # — BUILDING SECTION TAG (DETAIL NUMBER, SHEET NUMBER)
- DTL# / SHT # — BUILDING ELEVATION TAG (DETAIL NUMBER, SHEET NUMBER)
- ROOM / 101 / 9'-0" — ROOM NAME TAG (ROOM NUMBER, ROOM CEILING HEIGHT)
- DTL # / DTL # / SHT # / DTL # — INTERIOR ELEVATION TAG (DETAIL NUMBER, SHEET NUMBER)

APPLICABLE CODES

1. ALL CONSTRUCTION SHALL BE DONE IN ACCORDANCE WITH:

   2013 BUILDING STANDARDS ADMINISTRATIVE CODE, PART 1, CBSC

   2013 CALIFORNIA BUILDING CODE (CBC), PART 2, CBSC
   (2012 INTERNATIONAL BUILIDNG CODE & 2013 CALIFORNIA AMENDMENTS)

   2013 CALIFORNIA ELECTRICAL CODE (CEC), PART 3, CBSC
   (2011 NATIONAL ELECTRICAL CODE & 2013 CALIFORNIA AMENDMENTS)

   2013 CALIFORNIA MECHANICAL CODE (CMC) PART 4, CBSC
   (2012 UNIFORM MECHANICAL CODE & 2013 CALIFORNIA AMENDMENTS)

   2013 CALIFORNIA PLUMBING CODE (CPC), PART 5, CBSC
   (2012 UNIFORM PLUMBING CODE & 2013 CALIFORNIA AMENDMENTS)

   2013 CALIFORNIA ENERGY CODE, PART 6, CBSC

   2013 HISTORICAL BUILDING CODE, PART 8, CBSC

   2013 CALIFORNIA FIRE CODE, PART 9, CBSC
   (2012 INTERNATIONAL FIRE CODE & 2013CALIFORNIA AMENDMENTS)

   2013 CALIFORNIA GREEN BUILDING STANDARDS CODE, PART 11, CBSC

   2013 CALIFORNIA REFERENCED STANDARDS, PART 12, CBSC

   TITLE 8 C.C.R., CH. 4, SUB-CH. 6 - ELEVATOR SAFETY ORDERS

   TITLE 19 C.C.R., PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS

2. ALL BARRIER FREE ITEMS SHALL COMPLY WITH TITLE 21 AND 24 OF THE CALIFORNIA CODE OF REGULATIONS, 2013.

3. ALL WORK AND MATERIALS SHALL BE IN FULL ACCORDANCE WITH THE REQUIREMENTS OF THESE CODES AND ALL APPLICABLE LOCAL ORDINANCES. WHERE CODES CONFLICT, THE MORE STRINGENT SHALIAPPLY.

4. PROTECTION DURING WELDING: CONFORM TO TITLE 8, C.C.R. FURTHER PROTECT OCCUPANTS AND THE PUBLIC WITH PORTABLE SOLID VISION BARRICADES AROUND LOCATION WHERE WELDING IS BEING PERFORMED. PROVIDE SIGNS WARNING AGAINST LOOKING AT WELDING WITHOUT PROPER EYE PROTECTION OR EQUIVALENT. SEE C.F.C. FOR REQUIREMENTS FOR ON SITE WELDING.

5. DURING THE ENTIRE CONSTRUCTION PERIOD, IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN CONDITIONS AT THE PROJECT SITE TO MEET THE REQUIREMENTS OF D.S.A. AND THE CALIFORNIA OCCUPATIONAL REGULATIONS. THIS PROVISION SHALL COVER THE CONTRACTOR'S EMPLOYEES AND ALL OTHER PERSONS WORKING UPON OR VISITING THE SITE. THE CONTRACTOR SHALL BECOME FULLY INFORMED OF ALL APPLICABLE STANDARDS AND REGULATIONS AND INFORM ALL PERSONS AND REPRESENTATIVES RESPONSIBLE FOR WORK UNDER THIS CONTRACT.

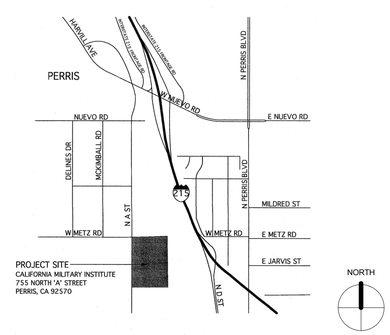
APPLICABLE STANDARDS

NFPA 13	AUTOMATIC SPRINKLER SYSTEMS	2013 EDITION
NFPA 14	STANDPIIPE SYSTEMS	2013 EDITION
NFPA 17	DRY CHEMICAL EXTINGUISHING SYSTEMS	2013 EDITION
NFPA 17A	WET CHEMICAL SYSTEMS	2013 EDITION
NFPA 20	STATIONARY PUMPS	2013 EDITION
NFPA 22	WATER TANKS FOR PRIVATE FIRE PROTECTION	2013 EDITION
NFPA 24	PRIVATE FIRE MAINS (CA AMENDED)	2013 EDITION
NFPA 25	INSPECTION, TESTING & MAINTENEANCE OF WATER BASED FIRE PROTECTION SYSTEMS	2006 CA EDITION
NFPA 72	NATIONAL FIRE ALARM CODE (CA AMENDED)	2013 EDITION
NFPA 80	FIRE DOOR AND OTHER OPENING PROTECTIVES	2013 EDITION
NFPA 110	EMERGENCY AND POWER STANDBY SYSTEMS	2013 EDITION
NFPA 253	CRITICAL RADIANT FLUX OF FLOOR COVERING SYSTEMS	2006 EDITION
NFPA 2001	CLEAN AGENT FIRE EXTINGUISHING SYSTEMS	2012 EDITION
UL 300	CLASS I HOOD FIRE SUPPRESSION SYSTEMS	2005 EDITION
UL 464	AUDIBLE SIGNAL APPLIANCES	2003 EDITION
UL 521	HEAT DETECTORS FOR FIRE PROTECTIVE SIGNALING SYSTEMS	1999 EDITION
UL 1424	CABLES FOR POWER-LIMITED FIRE PROTECTIVE SIGNALING CIRCUITS	2005 EDITION
UL 1971	SIGNALING DEVICES FOR HEARING IMPAIRED	2002 EDITION
ICC 300	BLEACHERS, FOLDING AND TELESCOPIC SEATING & GRANDSTANDS	2012 EDITION

INSPECTOR OF RECORD

PROJECTS NOT REQUIRING DSA APPROVAL SHALL COMPLY WITH ALL CURRENTLY EFFECTIVE DESIGN, CONSTRUCTION AND INSPECTION PROVISIONS OF THE CALIFORNIA CODE OF REGULATIONS, TITLE 24, AS ADOPTED BY DSA.

VICINITY MAP
NOT TO SCALE



PROJECT DESCRIPTION

HVAC UPGRADES AT BUILDING 'O' & 'J'

Statement of General Conformance
FOR ARCHITECTS/ENGINEERS WHO UTILITZE PLANS,
INCLUDING BY NOT LIMITED TO SHOP DRAWINGS, PREPARED BY OTHER LICENSED DESIGN PROFESSIONALS AND/OR CONSULTANTS

☒ All drawings or sheets listed on the cover or index sheet (Civil, Landscape, Structural, Mechanical, Plumbing, Electrical)
☐ This drawing, page of specifications/calculations

have been prepared by other design professionals or consultants who are licensed and/or authorized to prepare such drawings in this state. It has been examined by me for:

1. design intent and appears to meet the appropriate requirements of Title 24, California Code of Regulations and the project specifications prepared by me, and
2. coordination with my plans and specifications and is acceptable for incorporation into the construction of this project.

The Statement of General Conformance "shall not be construed as relieving me of my rights, duties, and responsibilities under Sections 17302 and 81138 of the Education Code and Sections 4-336, 4-341 and 4-344" of Title 24, Part 1. *(Title 24, Part 1, Section 4-317 (b))*

I find that: ☒ All drawings or sheets listed on the cover or index sheet
☐ This drawing or page

☐ is/are in general conformance with the project design, and	☒ is/are in general conformance with the project design intent, and
☐ has/have been coordinated with the project plans and specifications.	☒ has/have been coordinated with the project plans and specifications.
Signature / Date	Signature / Date: 01/29/2016
Architect or Engineer designated to be in general responsible charge	Architect or Engineer designated to be in general responsible charge
Print Name	Print Name: Alfred Gessel
License Number / Expiration Date	License Number: C30244 / Expiration Date: 6/30/17

Schedule-SHEET LIST	
Sheet Number	Sheet Name
G1.0	COVER SHEET
G2.0	TITLE SHEET / SHEET INDEX
G2.1	GENERAL NOTES
A1.0.1	OVERALL SITE PLAN
A2.1.1	FLOOR PLANS/ ROOF PLANS
M0.1	MECHANICAL LEGENDS AND GENERAL NOTES
M0.2	MECHANICAL SCHEDULES
M2.1	MECHANICAL DEMO FLOOR AND ROOF PLAN - BLDG O & J
M2.2	MECHANICAL FLOOR AND ROOF PLAN - BLDG O & J
M5.1	MECHANICAL DETAILS
E1.0	ELECTRICAL LEGEND
E1.1	BLDG O & J - FLOOR PLAN & ROOF PLAN POWER
E1.2	PANEL SCHEDULE & DETAILS

PROJECT DIRECTORY

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PERRIS UNION HIGH SCHOOL DISTRICT
CALIFORNIA MILITARY INSTITUTE HVAC UPGRADES

LICENSED ARCHITECT ALFRED F. GESSEL NO. C30244 EXP. 6-30-17 STATE OF CALIFORNIA

TITLE SHEET / SHEET INDEX

NO. DATE ISSUE

PROJECT NO15040-00
DATE: 1/29/2016

DRAWING
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ABBREVIATIONS

&	AND
△	ANGLE
@	AT
AB	ANCHOR BOLT
ABAN	ABANDON
ABS	ACRYLONITRILE BUTADIENE STYRENE
ABV	ABOVE
AC	AIR CONDITIONING
AC	ASPHALTIC CONCRETE
ACOUS	ACOUSTICAL
AC PVG	ASPHALT CONCRETE PAVING
ACP	ACOUSTICAL PANEL
ACT	ACOUSTICAL TILE
ACU	AIR CONDITIONING UNIT
AD	AREA DRAIN
ADDL	ADDITIONAL
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AGGR	AGGREGATE
AHU	AIR HANDLING UNIT
AL	ALUMINUM
ALT	ALTERNATE
AMT	AMOUNT
ANOD	ANODIZED
AP	ACCESS PANEL
APPROX	APPROXIMATE
ARCH	ARCHITECT/ARCHITECTURAL
ASD	AUTOMATIC SPRINKLER DRAIN
ASPH	ASPHALT
ASSY	ASSEMBLY
AV	AUDIO VISUAL
AWP	ACOUSTICAL WALL PANEL
BAL	BALANCE
BBD	BULLETIN BOARD
BBRG	BALL BEARING
BC	BACK OF CURB
BD	BOARD
BG	BUMPER GUARD
BETW	BETWEEN
BEV	BEVEL
BITUM	BITUMINOUS
BLDG	BUILDING
BLK	BLOCK
BLKG	BLOCKING
BLKHD	BULKHEAD
BLW	BELOW
BM	BEAM
BM	BENCH MARK
BMU	BRICK MASONRY UNIT
BOF	BOTTOM OF FOOTING
BOT	BOTTOM
BRG	BEARING
BRS	BRASS
BRZ	BRONZE
BSMNT	BASEMENT
BUR	BUILT-UP ROOF
℄	CENTERLINE
C&G	CURB AND GUTTER
C/C	CENTER TO CENTER
CAB	CABINET
CB	CORNER BEAD
CB	CATCHBASIN
CBD	CHALKBOARD
CCTV	CLOSED CIRCUIT TELEVISION
CCW	COUNTER CLOCKWISE
CEM	CEMENT
CER	CERAMIC
CI	CAST IRON
CIP	CAST IRON PIPE
CJ	CONSTRUCTION JOINT
CF	CLEAR FINISH COATING
CFX	CLEAR FINISH COATING - EXTERIOR
CG	CORNER GUARD
CL	CENTER LINE
CLG	CEILING
CLG DIFF	CEILING DIFFUSER
CLG HT	CEILING HEIGHT
CLG REG	CEILING REGISTER
CLO	CLOSET
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CO	CLEANOUT
COL	COLUMN
COM	COMMON
COMB	COMBINATION
COMPL	COMPLETE
CONC	CONCRETE
CONC FL	CONCRETE FLOOR
COND	CONDENSER/CONDENSATE
CONF	CONFERENCE
CONN	CONNECTION
CONSTR	CONSTRUCTION
CONT	CONTINUOUS/CONTINUATION
CONTR	CONTRACT/CONTRACTOR
COORD	COORDINATE
CORR	CORRIDOR
COTG	CLEAN OUT TO GRADE
COV	COVER
COV PL	COVER PLATE
CP	CONCRETE PAVING
CP	CONTROL PANEL
CPT	CARPET
CPVC	CHLORINATED POLYVINYL CHLORIDE
CR	CRASHRAIL
CR	COAT RACK/COAT ROD
CRSTL	COLD ROLLED STEEL
CS	CHANGING STATION
CSK	COUNTERSINK
CSMNT	CASEMENT
CT	CERAMIC TILE
CTV	CABLE TELEVISION
CU YD	CUBIC YARD
CW	COLD WATER
CYL	CYLINDER
DAT	DATUM
DBL ACT	DOUBLE ACTING
DEMO	DEMOLITION
DEPT	DEPARTMENT
DET	DETAIL
DF	DRINKING FOUNTAIN
DH	DOUBLE HUNG
DIAG	DIAGONAL
DIAM	DIAMETER
DIFF	DIFFERENCE
DIFF	DIFFUSER
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DISP	DISPENSER
DIV	DIVISION
DL	DEAD LOAD
DN	DOWN
DO	DITTO
DR	DOOR
DRN	DRAIN
DS	DIRECTIONAL SIGN
DS	DOWNSPOUT
DUPL	DUPLICATE
DW	DISHWASHER
DWG	DRAWING
DWL	DOWEL
DWR	DRAWER
DWV	DRAIN WASTE & VENT
E	EAST
EA	EACH
(E)	EXISTING
EC	ELASTOMERIC COATING
ECON	ECONOMIZER
ECU	EVAPORATIVE COOLING UNIT
EF	EACH FACE
EHD	ELECTRIC HAND DRYER
EJ	EXPANSION JOINT
EL	ELEVATION
ELAST	ELASTOMERIC
ELEC	ELECTRIC(AL)
ELEV	ELEVATOR
EMER	EMERGENCY
ENAM	ENAMEL
ENCL	ENCLOSURE
ENGR	ENGINEER
ENTR	ENTRANCE
EP	ELECTRICAL PANEL
EOP	EDGE OF PAVEMENT
EPDM	ETHYLENE PROPYLENE DIENE MONOMER
EQ	EQUAL
EQL SP	EQUALLY SPACED
EQUIP	EQUIPMENT
ES	EACH SIDE
EST	ESTIMATE
ESMNT	EASEMENT
EW	EACH WAY
EWC	ELECTRICAL WATER COOLER
EXH	EXHAUST
EXIST	EXISTING
EXIST GR	EXISTING GRADE
EXP	EXPANSION
EXP JT	EXPANSION JOINT
EXT	EXTERIOR
F/F	FACE TO FACE
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FC	FOOTCANDLE
FCO	FLOOR CLEANOUT
FCU	FAN COIL UNIT
FD	FIRE DAMPER
FD	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FDN	FOUNDATION
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FEM	FEMALE
FGL	FIBERGLASS
FHC	FIRE HOSE CABINET
FHMS	FLAT HEAD MACHINE SCREW
FHWS	FLAT HEAD WOOD SCREW
FH	FIRE HYDRANT
FIN	FINISH
FIXT	FIXTURE
FF	FINISH FLOOR
FG	FINISH GRADE
FL	FLASHING
FL	FLOW LINE
FLR	FLOOR/FLOORING
FLR FIN	FLOOR FINISH
FLUOR	FLUORESCENT
FOC	FACE OF CONCRETE
FOF	FACE OF FINISH
FOM	FACE OF MASONRY
FOS	FACE OF STUD
FPM	FEET PER MINUTE
FREQ	FREQUENCY
FS	FLOOR SINK
FSPKR	FIRE SPRINKLER
FSS	FOLDING SHOWER SEAT
FSTNR	FASTENER
FT	FOOT
FTG	FITTING
FTG	FOOTING
FURR	FURRING
FURN	FURNITURE
FUT	FUTURE
FWC	FABRIC WALL COVERING
G	GAS
GA	GAGE/GAUGE
GAL	GALLON
GALV	GALVANIZED
GB	GRAB BAR
GI	GALVANIZED IRON
GL	GLASS
GLU LAM	GLUE LAMINATED
GLBM	GLUE LAMINATED BEAM
GLZ	GLAZING
GMU	GLASS MASONRY UNIT
GND	GROUND
GOVT	GOVERNMENT
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GR	GRADE/GRADING
GRC	GRAFITTI RESISTANT COATING
GR BM	GRADE BEAM
GR LN	GRADE LINE
GRTG	GRATING
GRV	GRAVITY ROOF VENTILATOR
GSTL	GALVANIZED STEEL
GV	GRAVITY VENT
GVL	GRAVEL
GVTR	GAS VENT THROUGH ROOF
GYP	GYPSUM
GBD	GYPSUM BOARD
H	HIGH
H PLAM	HIGH PRESSURE LAMINATE
HB	HOSE BIBB
HC	HOLLOW CORE
HC	HOSE CABINET
HD	HEAD
HDBD	HARDBOARD
HDR	HEADER
HDWL	HEADWALL
HDWR	HARDWARE
HGR	HANGER
HGT	HEIGHT
HHWS	HEX HEAD WOOD SCREW
HM	HOLLOW METAL
HO	HOLD-OPEN
HORIZ	HORIZONTAL
HP	HIGH POINT
HR	HOUR
HS	HIGH STRENGTH
HSB	HIGH STRENGTH BOLT
HTG	HEATING
HTR	HEATER
HVY	HEAVY
HVAC	HEATING, VENTILATION, AIR CONDITIONING
HW	HOT WATER
HYD	HYDRANT
ID	INSIDE DIAMETER
IF	INSIDE FACE
ILLUM	ILLUMINATION
INCAND	INCANDESCENT
INL	INLET
INSTL	INSTALLATION
INSUL	INSULATION
INT	INTERIOR
INV	INVERT
INV EL	INVERT ELEVATION
IP	IRON PIPE
IPS	INSIDE PIPE SIZE
IPS	INTERNATIONAL PIPE STANDARD
ISO	ISOMETRIC
IWH	INSTANTANEOUS WATER HEATER
JAN	JANITOR
JB	JUNCTION BOX
JST	JOIST
JT	JOINT
KD	KILN DRIED
KD	KNOCK DOWN
KO	KNOCKOUT
KPL	KICKPLATE
L	LEFT
LAD	LADDER
LAM	LAMINATED
LAT	LATERAL
LAV	LAVATORY
LB	LAG BOLT
LB	POUND
LDG	LANDING
LDR	LEADER
LF	LINEAR FOOT
LG	LONG
LH	LEFT HAND
LHR	LEFT HAND REVERSE
LIN	LINEAR
LKR	LOCKER
LL	LIVE LOAD
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LOC	LOCATION
LONG	LONGITUDINAL
LP	LOW POINT
LP	LOW PRESSURE
LS	LUMP SUM
LT	LIGHT
LT WT	LIGHTWEIGHT
LTG	LIGHTING
LTG PNL	LIGHTING PANEL
LUB	LUBRICATE
LV	LOW VOLTAGE
LVL	LEVEL
LVR	LOUVER
LVR	LEVER
LWC	LIGHTWEIGHT CONCRETE
M	MIRROR
MACH RM	MACHINE ROOM
MAINT	MAINTENANCE
MAN	MANUAL
MARB	MARBLE
MAS	MASONRY
MATL	MATERIAL
MAU	MAKE-UP AIR UNIT
MAX	MAXIMUM
MB	MACHINE BOLT
MB	MIXING BOX
MBF	THOUSAND BOARD FEET
MBD	MARKER BOARD
MC	MOMENT CONNECTION
MC	MEDICINE CABINET
MDF	MEDIUM DENSITY FIBERBOARD
MDO	MEDIUM DENSITY OVERLAID
MECH	MECHANICAL
MED	MEDIUM
MEMB	MEMBRANE
MET	METAL
MEZZ	MEZZANINE
MFGR	MANUFACTURER
MH	MANHOLE
MI	MILE
MIR	MIRROR
MGL	MIRROR GLASS
MLDG	MOLDING
MLWK	MILLWORK
MO	MASONRY OPENING
MOD	MODULE
MON	MONUMENT
MPH	MILES PER HOUR
MR	MOP RACK
MS	MIRROR WITH SHELF
MTD	MOUNTED
MTG	MEETING
MTG	MOUNTING
MTR	METER
MTR	MORTAR
MULL	MULLION
MULT	MULTIPLE
#	NUMBER
N	NORTH
NA	NOT APPLICABLE
NAT	NATURAL
NCP	NON-REINFORCED CONCRETE PIPE
NEG	NEGATIVE
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NPS	NOMINAL PIPE SIZE
NRC	NOISE REDUCTION COEFFICIENT
NST	NATURAL STONE TILE
NTS	NOT TO SCALE
O/O	OUT TO OUT
OA	OUTSIDE AIR
OA	OVERALL
OBS	OBSCURE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OD	OUTSIDE DIMENSION
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED OWNER INSTALLED
OH	OPPOSITE HAND
OHD	OVERHEAD
OHWS	OVAL HEAD WOOD SCREW
OPNG	OPENING
OPP	OPPOSITE
OPT	OPTIONAL
ORD	OVERFLOW ROOF DRAIN
ORIG	ORIGINAL
OVFL	OVERFLOW
OZ	OUNCE
d	PENNY
PAR	PARALLEL
PB	PANIC BAR
PBD	PARTICLEBOARD
PC	PIECE
PC	POINT OF CURVE
PC	PORTLAND CEMENT
PCF	POUNDS PER CUBIC FOOT
PD	PLANTER DRAIN
PERF	PERFORATED
PERIM	PERIMETER
PERM	PERMANENT
PERP	PERPENDICULAR
PF	PAINT FINISH
PFX	PAINT FINISH - EXTERIOR
PGL	PLASTIC GLAZING
PH	PHASE
PHOTO	PHOTOGRAPH
PHS	PHILLIP HEAD SCREW
PI	POINT OF INTERSECTION
PIV	POST INDICATOR VALVE
PKG	PACKAGE
PL	PLATE
PL	PROPERTY LINE
PLAM	PLASTIC LAMINATE
PLAS	PLASTER
PLAT	PLATFORM
PLBG	PLUMBING
PLF	POUNDS PER LINEAR FOOT
PLYWD	PLYWOOD
PNL	PANEL
PNT	PAINT
POL	POLISHED
PORT	PORTABLE
POS	POSITIVE
PR	PAIR
PRCST	PRECAST
PREFAB	PREFABRICATED
PREFIN	PREFINISHED
PRELIM	PRELIMINARY
PREP	PREPARATION
PRKG	PARKING
PROJ	PROJECT
PROP	PROPERTY
PS	PROJECTION SCREEN
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PTD	PAPER TOWEL DISPENSER
PTN	PARTITION
PTR	PAPER TOWEL RECEPTACLE
PTS	PNUEMATIC TUBE STATION
PVC	POLYVINYL CHLORIDE
PVG	PAVING
PVMT	PAVEMENT
PWR	POWER
QT	QUARRY TILE
QTR	QUARTER
QTY	QUANTITY
QUAL	QUALITY
RA	RETURN AIR
RA GR	RETURN AIR GRILLE
RAD	RADIUS
RB	RUBBER BASE
RBR	RUBBER
RC	REINFORCED CONCRETE
RCP	PREINFORCED CONCRETE PIPE
RD	ROAD
RD	ROOF DRAIN
REC	RECESSED
RECD	RECEIVED
RECIRC	RECIRCULATE
RECPT	RECEPTACLE
RECPT	RECEPTIONIST
RECT	RECTANGULAR
REF	REFERENCE
REFL	REFLECTOR
REFR	REFRIGERATOR
REG	REGISTER
REINF	REINFORCED/REINFORCING
REM	REMOVABLE
RE	RIM ELEVATION
REQD	REQUIRED
RESIL	RESILIENT
RET	RETURN
RFG	ROOFING
RH	RELATIVE HUMIDITY
RH	RIGHT HAND
RHMS	ROUND HEAD MACHINE SCREW
RHR	RIGHT HAND REVERSE
RHWS	ROUND HEAD WOOD SCREW
RLG	RAILING
RM	ROOM
RND	ROUND
RO	ROUGH OPENING
ROW	RIGHT OF WAY
RPW	RIGID PROTECTIVE WALLCOVERING
RS	ROOM SIGN
RSF	RESILIENT SHEET FLOORING
RTF	RESILIENT TILE FLOOR
RWC	RAIN WATER CONDUCTOR
RWF	RESILIENT WOOD FLOOR
RWL	RAIN WATER LEADER
S	SOUTH
S	SHELF
SA	SUPPLY AIR
SAG	SUPPLY AIR GRILLE
SALV	SALVAGE
SAN	SANITARY
SAT	SATURATION
SB	SPLASH BLOCK
SC	SHOWER CURTAIN
SC	SOLID CORE
SCD	SEAT COVER DISPENSER
SCHED	SCHEDULE
SD	SOAP DISPENSER
SD	STORM DRAIN
SD	SUPPLY DIFFUSER
SDS	SITE DIRECTIONAL SIGN
SEC	SECOND
SECT	SECTION
SGL	SINGLE
SHT	SHEET/SHEETING
SHTHG	SHEATHING
SHV	SHELVES/SHELVING
SHT	SHEET
SHTHG	SHEATHING
SIM	SIMILAR
SLV	SLEEVE
SM	SHEET METAL
SMS	SHEET METAL SCREW
SNK	SINK
SP	SPACING
SPCL	SPECIAL
SPEC	SPECIFICATION
SPD	SANITARY PRODUCTS DISPENSER
SFRM	SPRAYED FIRE RESISTIVE MATERIAL
SPKLR	SPRINKLER
SPKR	SPEAKER
SPLY	SUPPLY
SPW	SANITARY PRODUCTS WASTE RECEPTACLE
SQ	SQUARE
SQ FT	SQUARE FOOT
SQ IN	SQUARE INCH
SQ YD	SQUARE YARD
SS	SANITARY SEWER
SR	SHOWER ROD
SSNK	SERVICE SINK
SSTL	STAINLESS STEEL
ST	STREET
ST	STAIN FINISH
STA	STATION
STAG	STAGGERED
STC	SOUND TRANSMISSION CLASS
STD	STANDARD
STIF	STIFFENER
STIR	STIRRUP
STL	STEEL
STOR	STORAGE
STRUCT	STRUCTURAL
STX	STAIN FINISH - EXTERIOR
SUH	SUSPENDED UNIT HEATER
SUSP	SUSPENDED
SV	STONE VENEER
SWHR	SHOWER
SWR	SEWER
SYM	SYMBOL
SYM	SYMMETRICAL
SYNTH	SYNTHETIC
SYS	SYSTEM
T	TEE
T	THERMOSTAT
T	TREAD
T&B	TOP AND BOTTOM
T&G	TONGUE AND GROOVE
TAN	TANGENT
TB	TOWEL BAR
TBD	TACKBOARD
TBD	TO BE DETERMINED
TBT	THIN BRICK TILE
TC	TOP OF CONCRETE
TC	TOP OF CURB
TD	TOWEL DISPENSER
TD	TRENCH DRAIN
TDR	TOWEL DISPENSER WASTE RECEPTACLE
TE	TOP ELEVATION
TECH	TECHNICAL
TEL	TELEPHONE
TEMP	TEMPERED
TEMP	TEMPERATURE
TEMP	TEMPORARY
TER	TERRAZZO
TERM	TERMINAL
THK	THICKNESS
THRESH	THRESHOLD
THRU	THROUGH
TOBM	TOP OF BEAM
TOC	TOP OF CURB
TOF	TOP OF FOOTING
TOL	TOLERANCE
TOM	TOP OF MASONRY
TOP	TOP OF PAVING
TOP	TOP OF PARAPET
TOS	TOP OF SHEATHING
TOS	TOP OF STEEL
TOT	TOTAL
TOW	TOP OF WALL
TPH	TOILET PAPER HOLDER
TPL	TOP OF PLATE
TRANS	TRANSPARENT
TRMS	TAMPER RESISTANT METAL SCREW
TRWS	TAMPER RESISTANT WOOD SCREW
TS	TUBE STEEL
TV	TELEVISION
TYP	TYPICAL
UC	UNDERCUT
UNFIN	UNFINISHED
UNGND	UNDERGROUND
UNIF	UNIFORM
UNO	UNLESS NOTED OTHERWISE
UR	URINAL
UTIL	UTILITY
UV	ULTRAVIOLET
VAC	VACUUM
VAV	VARIABLE AIR VOLUME
VB	VALVE BOX
VB	VINYL BASE
VCT	VINYL COMPOSITION TILE
VCP	VITRIFIED CLAY PIPE
VCTBD	VINYL COVERED TACKBOARD
VENT	VENTILATOR
VERT	VERTICAL
VEST	VESTIBULE
VIB	VIBRATION
VIT	VITREOUS
VNR	VENEER
VOL	VOLUME
VS	VEHICULAR SIGN
VTR	VENT THROUGH ROOF
VWC	VINYL WALL COVERING
W	WEST
W/	WITH
W/O	WITHOUT
W/W	WALL TO WALL
WC	WATER CLOSET
WCO	WALL CLEANOUT
WD	WOOD
WDW	WINDOW
WF	WIDE FLANGE
WGL	WIRE GLASS
WH	WALL HYDRANT
WHTR	WATER HEATER
WI	WROUGHT IRON
WIC	WOODWORK INSTITUTE OF CALIFORNIA
WID	WIDTH
WL	WATER LINE
WL	WIND LOAD
WP	WORKING POINT
WP	WATERPROOF
WR	WATER RESISTANT
WR	WASTE RECEPTACLE
WSCT	WAINSCOT
WSP	WET STAND PIPE
WT	WEIGHT
WTR	WATER
WTRPRF	WATERPROOFING
WWF	WELDED WIRE FABRIC
XFMR	TRANSFORMER
YB	YARD BOX
YD	YARD
ZA	ZINC ALLOY

FINISH NOTES

1. ALL CEILING HEIGHT DIMENSIONS MEASURED TO FINISH SURFACES UNLESS NOTED OTHERWISE.

2. EXTEND BASE MATERIAL & FINISHES BEHIND ALL MOVABLE EQUIPMENT AND INTO ALL ALCOVES, KNEESPACES AND SIMILAR AREAS, UNLESS NOTED OTHERWISE.

3. WHEN COUNTERTOP SPLASH IS REQUIRED, EXTEND SPLASH ON SIDES WHERE COUNTER JOINS ADJACENT WALL SURFACE UNLESS NOTED OTHERWISE.

4. ALL INTERIOR FINISHES SHALL COMPLY WITH CHAPTERS 8 AND 25, PART 2, TITLE 24, CCR, INCLUDING TABLE 803.5, AND TABLES 2506.2, 2507.2, 2508.1, 2508.5, 2511.1.1 & 2512.6.

5. PROVIDE BACKING PLATES OR BLOCKING BEHIND ALL WALL MOUNTED EQUIPMENT, CASEWORK, AND ACCESSORIES AS REQUIRED FOR POSITIVE ATTACHMENT TO STRUCTURE.

FIRE & LIFE SAFETY NOTES

1. ALL INTERIOR FINISHES SHALL CONFORM TO THE REQUIREMENTS OF CHAPTER 8, PART 2, TITLE 24, CCR. ALL FINISHES SHALL HAVE A FLAME SPREAD RATING OF 75 OR LESS AND A SMOKE DENSITY NOT TO EXCEED 450 WHEN TESTED IN ACCORDANCE WITH CBC 2007 & ASTM E 84, and SHALL HAVE A CLASS A OR B FLAME SPREAD CLASSIFICATION PER TABLE 803.5 .

2. ALL INSULATION MATERIALS INSTALLED WITHIN ROOF - CEILING ASSEMBLIES, ATTICS, OR WALLS SHALL HAVE A FLAME - SPREAD RATING NOT TO EXCEED 25 AND A SMOKE DENSITY NOT TO EXCEED 450 WHEN TESTED IN ACCORDANCE WITH CBC 2007 & ASTM E 84.

3. PENETRATIONS THROUGH RATED WALLS AND FLOORS SHALL BE SEALED WITH A MATERIAL CAPABLE OF PREVENTING THE PASSAGE OF FLAMES AND HOT GASES WHEN SUBJECTED TO THE REQUIREMENTS OF ASTM-E-814 AND CBC 2007 AND IN COMPLIANCE WITH THE PROJECT MANUAL.

4. ALL ELECTRICAL, MECHANICAL, AND PLUMBING PENETRATIONS, INCLUDING CONDUITS AND PIPING, THROUGH FIRE RATED WALL, FLOOR AND CEILING ASSEMBLIES SHALL BE TIGHTLY AND SOLIDLY SEALED WITH FIRESTOPPING COMPLYING WITH CBC 2007 & ASTM E 814 AND THE PROJECT MANUAL. WHERE ITEM PENETRATES AN AREA SEPARATION WALL, THE SECTION PASSING THROUGH THE WALL SURFACE AND THE FIXTURE CONNECTIONS THERETO SHALL BE ONLY OF METAL.

5. PROVIDE A PORTABLE FIRE EXTINGUISHER WITH A RATING OF NOT LESS THAN 2-A-10BC WITHIN A 75 FOOT TRAVEL DISTANCE TO ALL PORTIONS OF THE BUILDING ON EACH FLOOR.

6. PROVIDE A PORTABLE FIRE EXTINGUISHER WITH A RATING OF NOT LESS THAN 1-BC FOR ELECTRICAL ROOMS, MECHANICAL ROOMS, ELEVATOR MACHINE ROOMS AND TRASH ROOMS.

7. PROVIDE AN APPROPRIATE NUMBER OF PORTABLE FIRE EXTINGUISHERS WITH A RATING OF NOT LESS THAN 4A-60BC FOR PROTECTION DURING CONSTRUCTION.

8. THE CONTRACTOR SHALL PROVIDE AND INSTALL TEMPORARY PEDESTRIAN PROTECTION AS REQUIRED BY LOCAL CODE AND SPECIFICATION.

9. DO NOT BLOCK EXITS AT ANY TIME.

10. DUCT INSULATION APPLIED TO THE EXTERIOR SURFACE OF DUCTS LOCATED IN BUILDINGS SHALL HAVE A FLAME SPREAD OF NOT MORE THAN 25 AND A SMOKE-DEVELOPED RATING OF NOT MORE THAN 50 WHEN TESTED AS A COMPOSITE INSTALLATION INCLUDING INSULATION, FACING MATERIALS, TAPES AND ADHESIVES AS NORMALLY APPLIED.

11. THE FIRE ALARM SYSTEM SHALL CONFORM TO ARTICLE 760 OF THE CALIFORNIA ELECTRICAL CODE, STANDARDS AS DEFINED IN CHAPTER 35 CALIFORNIA BUILDING CODE AND APPLICABLE NFPA STANDARDS.

12. FIRE SPRINKLER SYSTEM AND AUTOMATIC EXTINGUISHING SYSTEM. DRAWINGS SHALL BE STAMPED AND SIGNED BY A C-16 CONTRACTOR, LICENSED FIRE PROTECTION ENGINEER, LICENSED MECHANICAL ENGINEER OR LICENSED CIVIL ENGINEER. PROVIDE TESTING IN THE PRESENCE OF THE ENFORCING AGENCY AT VARIOUS STAGES AND UPON COMPLETION AS SPECIFIED AND AS DIRECTED BY THE ENFORCING AGENCY. THE ARCHITECT WILL REVIEW SHOP DRAWINGS FOR HEAD TYPE, LOCATION CONFLICT AND SEISMIC RESTRAINT ONLY.

GENERAL NOTES

1. DURING THE ENTIRE CONSTRUCTION PERIOD, IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN CONDITIONS AT THE PROJECT SITE, TO MEET THE REQUIREMENTS OF THE FEDERAL OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND CALIFORNIA OCCUPATIONAL REGULATIONS . THIS PROVISION SHALL COVER THE CONTRACTOR'S EMPLOYEES AND ALL OTHER PERSONS WORKING UPON OR VISITING THE SITE. THE CONTRACTOR SHALL BECOME FULLY INFORMED OF ALL APPLICABLE STANDARDS AND REGULATIONS AND INFORM ALL PERSONS AND REPRESENTATIVES RESPONSIBLE FOR WORK UNDER THIS CONTRACT.

2. CONFIRM ALL NEW AND EXISTING CONDITIONS WITH THE CONTRACT DOCUMENTS. NOTIFY ARCHITECT IMMEDIATELY IN WRITING OF ALL DISCREPANCIES OR CONFLICTS. DO NOT PROCEED WITH WORK IN THE AREA OF DISCREPANCY OR CONFLICT UNTIL DIRECTION IS GIVEN BY ARCHITECT. IF CONTRACTOR PROCEEDS WITHOUT DIRECTION FROM ARCHITECT, IT SHALL BE AT CONTRACTORS RISK, AND CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REQUIRED CORRECTIVE ACTION.

3. IN NO CASE SHALL WORKING DIMENSIONS BE SCALED FROM DRAWINGS. WRITTEN DIMENSIONS TAKE PRECEDENCE OVER SCALED GRAPHICS. NOTIFY ARCHITECT IMMEDIATELY IN WRITING OF ALL ADDITIONAL REQUIRED DIMENSIONS. DO NOT PROCEED WITH WORK IN THE AREA OF DISCREPANCY OR CONFLICT UNTIL DIRECTION IS GIVEN BY ARCHITECT. IF THE CONTRACTOR PROCEEDS WITHOUT DIRECTION FROM ARCHITECT, IT SHALL BE AT CONTRACTORS RISK, AND CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REQUIRED CORRECTIVE ACTION.

4. CORRECT ALL WORK INSTALLED IN CONFLICT WITH THE CONSTRUCTION DOCUMENTS BY CONTRACTOR AS DIRECTED BY ARCHITECT AND AT NO ADDITIONAL EXPENSE TO THE OWNER.

5. VISIT JOB SITE PRIOR TO BEGINNING WORK AND VERIFY ALL DIMENSIONS AND CONDITIONS.

6. SECURE AND PAY FOR ALL PERMITS, GOVERNMENTAL FEES AND LICENSES REQUIRED FOR PROPER COMPLETION OF THE WORK. REQUEST ALL INSPECTIONS REQUIRED BY LOCAL GOVERNMENTAL AGENCIES AND COORDINATE THE WORK ACCORDINGLY.

7. WHERE WORK OR EQUIPMENT IS INDICATED "N.I.C." (NOT IN CONTRACT) ON THE DRAWINGS, SUCH WORK AND/OR EQUIPMENT SHALL BE PROVIDED BY OTHERS. CONTRACTOR SHALL COORDINATE AND COOPERATE TO EFFECT SUCH INSTALLATION.

8. ALL PLAN DIMENSIONS SHOWN AT CENTER OF WALL REPRESENT CENTER LINE OF STUD OR STRUCTURAL ELEMENT UNLESS NOTED OTHERWISE.

9. ALL PLAN DIMENSIONS FOR MASONRY AND CONCRETE REPRESENT FACE OF MATERIAL AND OPENING UNLESS NOTED OTHERWISE.

10. ALL DIMENSIONS SHOWN ARE TO FACE OF STUD AT NEW CONSTRUCTION AND FACE OF FINISH AT EXISTING CONSTRUCTION, UNLESS NOTED OTHERWISE.

11. DIMENSIONS ARE NOT ADJUSTABLE WITHOUT THE REVIEW OF ARCHITECT UNLESS NOTED (+/-) OR “VERIFY”. DIMENSIONS NOTED “HOLD” SHALL BE CONSIDERED AS ABSOLUTE AND USED FOR LAY-OUT CONTROL UNLESS OTHERWISE DIRECTED BY ARCHITECT.

12. ALL HEIGHTS ARE DIMENSIONED FROM TOP OF SLAB UNLESS NOTED "AFF" (ABOVE FINISH FLOOR).

13. "TYPICAL" MEANS COMPARABLE CHARACTERISTICS FOR THE ELEVATION OR DETAIL NOTED. WHEN A DETAIL OR NOTE IS IDENTIFIED AS “TYPICAL”, CONTRACTOR SHALL APPLY THIS DETAIL OR NOTE TO EVERY LIKE CONDITION, WHETHER OR NOT THE REFERENCE IS REPEATED IN EVERY INSTANCE. VERIFY DIMENSIONS AND ORIENTATION ON PLANS.

14. PROVIDE WORK NOT SPECIFICALLY DETAILED OR SPECIFIED IN ACCORDANCE WITH DETAILS OR SIZES COVERING SIMILAR WORK.

15. "SIMILAR" MEANS COMPARABLE CHARACTERISTICS FOR THE ELEVATION OR DETAIL NOTED VERIFY DIMENSIONS AND ORIENTATION ON PLANS.

16. ABBREVIATIONS THROUGHOUT THE DOCUMENTS COMPLY WITH DOCUMENT ABBREVIATION LIST OR ARE THOSE IN COMMON USE. ARCHITECT WILL DEFINE THE INTENT OF ANY IN QUESTION.

17. PROVIDE FOR THE PROPER SEQUENCE OF CONSTRUCTION, LOCATION AND SIZE OF OPENINGS. COORDINATE ALL CONSTRUCTION AS INDICATED BY THE CONTRACT DOCUMENTS, INCLUDING SHOP DRAWINGS REVIEWED BY ARCHITECT.

18. TAKE ALL MEASURES TO ACCOMPLISH THE WORK WITH THE MINIMUM OF INTERRUPTION TO NORMAL BUILDING PROCEDURES. NOTIFY OWNER IN ADVANCE OF HVAC, ELECTRICAL OR OTHER BUILDING SYSTEM SHUT-OFFS. MINIMIZE NOISE AND DUST GENERATION TO MAXIMUM EXTENT POSSIBLE. COMPLY WITH REQUIREMENTS AS SPECIFIED IN PROJECT MANUAL.

19. REMOVE ALL TRASH AND DEBRIS DAILY. DO NOT STORE BUILDING MATERIALS IN CORRIDORS AT ANY TIME. COMPLY WITH REQUIREMENTS AS SPECIFIED IN PROJECT MANUAL.

20. PERFORM ALL CUTTING, PATCHING, AND FINISHING NECESSARY TO RESTORE THE BUILDING AND SITE TO ORIGINAL CONDITION OF ALL EXISTING PORTIONS OF THE BUILDING AND SITE AFFECTED BY CONTRACTORS WORK, TO THE SATISFACTION OF ARCHITECT AND OWNER.

21. VERIFY POINTS OF CONNECTION, INCLUDING SIZES AND LOCATIONS, AND ALL OTHER REQUIRED OPERATING CRITERIA WITH EQUIPMENT MANUFACTURER.

22. COORDINATE THE LOCATION AND TYPE OF ALL ACCESS PANELS REQUIRED FOR ACCESSING MECHANICAL, PLUMBING, ELECTRICAL AND OTHER BUILDING SYSTEMS WITH ARCHITECT.

23. CONTRACTOR SHALL INSURE ALL CONSTRUCTION SHALL REMAIN ACCESSIBLE AND EXPOSED FOR INSPECTION PURPOSES UNTIL APPROVED BY THE INSPECTOR OF RECORD. FOR CONTINUOUS INSPECTION, TESTING, AND OBSERVATION REQUIREMENTS, REFER TO THE TESTING AND OBSERVATION PROGRAM.

24. PROTECTION DURING WELDING: CONFORM TO TITLE 8, C.C.R. FURTHER PROTECT OCCUPANTS AND THE PUBLIC WITH PORTABLE SOLID VISION BARRICADES AROUND LOCATION WHERE WELDING IS BEING PERFORMED. PROVIDE SIGNS WARNING AGAINST LOOKING AT WELDING WITHOUT PROPER EYE PROTECTION OR EQUIVALENT. SEE C.F.C. FOR REQUIREMENTS FOR ON SITE WELDING.

25. SEE CFC ARTICLE 14 FOR FIRE SAFETY DURING CONSTRUCTION.

26. VERIFY DIMENSIONS, LOCATIONS OF EXISTING UTILITIES, AND CONITIONS ON THE JOB SITE PRIOR TO THE START OF WORK OR PORTIONS OF THE WORK. NOTIFY THE ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES BETWEEN THE ACTUAL FIELD CONDITIONS AND THE CONSTRUCTION DOCUMENTS. EXISTING CONDITIONS ARE INDICATED AS A RESULT OF FIELD OBSERVATIONS, INFORMATION SHOWN ON AVAILABLE DOCUMENTS AND FIELD CONDITIONS AT THE TIME OF PREPARATION, AND ARE NOT GUARANTEED TO BE ACCURATE.

27. WHERE ANY CONFLICT OCCURS BETWEEN THE REQUIREMENTS OF LAWS, CODES, ORDINANCES, RULES AND REGULATIONS, THE MOST STRINGENT SHALL GOVERN.

28. WHERE NO SPECIFIC DETAIL IS SHOWN, THE FRAMING OR CONSTRUCTION SHALL BE IDENTICAL OR SIMILAR TO THAT INDICATED FOR LIKE CASES OF CONSTRUCTION OR PER COMMON INDUSTRY PRACTICE IF THERE ARE NO LIKE CASES.

29. CHANGES TO THE APPROVED DRAWINGS AND/OR SPECIFICATIONS SHALL BE MADE BY ADDENDA OR A CHANGE ORDER APPROVED BY THE DIVISION OF THE STATE ARCHITECT AS REQUIRED BY SECTION 4-338, PART 1, TITLE 24, CCR.

30. CONTRACTOR TO COOPERATE WITH OWNER PROVIDED TESTING LAB TO OBTAIN TEST SAMPLES. THE INSPECTOR FOR AGENCY HAVING JURISDICTION SHALL HAVE FULL ACCESS TO THE WORK AT ALL TIMES.

31. CONTRACTOR'S SAFETY BARRICADE (TEMPORARY FENCING) SHALL PROTECT PUBLIC FROM CONSTRUCTION ACTIVITIES. THE SAFETY BARRICADE SHALL PROTECT AND SECURE THE CONSTRUCTION AREA. TEMPORARY FENCING SHALL ALSO BE PROVIDED TO PROTECT AND SECURE STORAGE YARDS. EXACT LOCATION OF SAFETY BARRICADE AND OTHER TEMPORARY FENCING SHALL BE APPROVED BY THE OWNER PRIOR TO INSTALLATION.

32. PENETRATIONS OF ANY KIND, INCLUDING THOSE REQUIRING CUTTING, BORING, SAWCUTTING OR DRILLING THROUGH EXISTING OR NEW STRUCTURAL ELEMENTS IS NOT TO BE STARTED UNTIL THE DETAILS HAVE BEEN REVIEWED BY THE OWNER AND THE D.S.A. FIELD ENGINEER, IF DETAILS DO NOT SHOW OR CONFORM TO THE APPROVED DRAWINGS.

33. CONTACT UNDERGROUND UTILITY SERVICE TO CHECK PUBLIC UTILITIES PRIOR TO STREET WORK. LOCATE ON-SITE UTILITIES BY POTHOLING OR OBTAIN AND PAY FOR THE SERVICES OF A UTILITY LOCATOR.

34. WHERE CONFLICTS OCCUR IN THE DOCUMENTS, BID THE MORE EXPENSIVE ITEM.

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PERRIS UNION HIGH SCHOOL DISTRICT
CALIFORNIA MILITARY INSTITUTE HVAC UPGRADES

LICENSED ARCHITECT
ALFRED F. GESSEL
NO.C30244
EXP 6-30-17
STATE OF CALIFORNIA

GENERAL NOTES

NO. DATE ISSUE

PROJECT NO15040-00
DATE: 1/29/2016

DRAWING
G2.1

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PERRIS UNION HIGH SCHOOL DISTRICT
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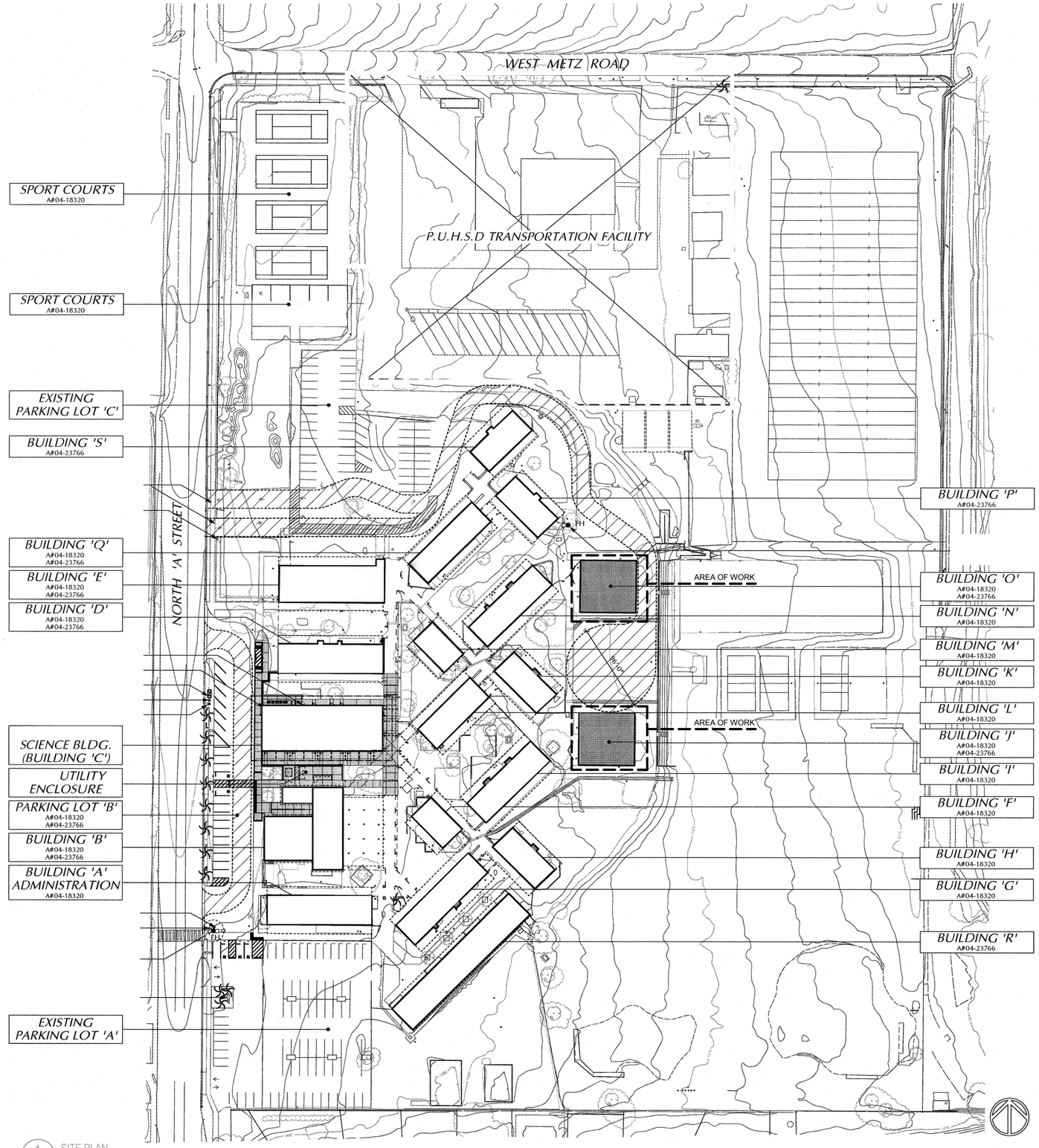
KEYNOTES



1 SITE PLAN
1" = 50'-0"

OVERALL SITE PLAN

NO.	DATE	ISSUE

PROJECT NO15040-00
DATE: 1/29/2016

DRAWING
A1.0.1

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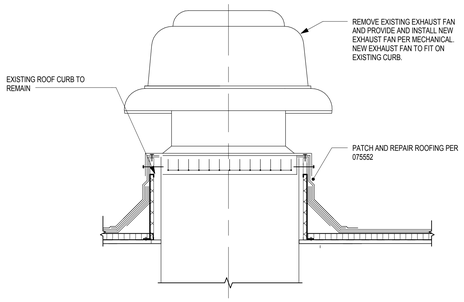
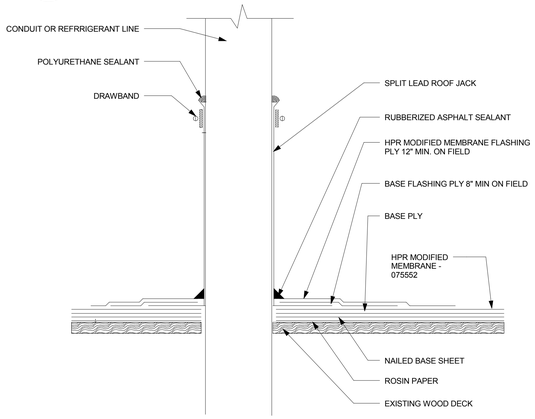
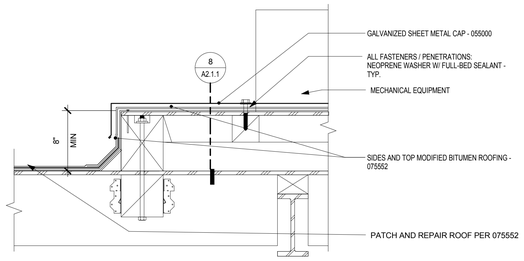


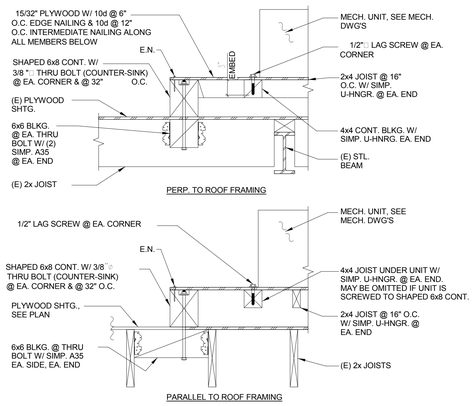
5 A2.1.1 ROOF - EXHAUST FAN CURB
1/2" = 1'-0"



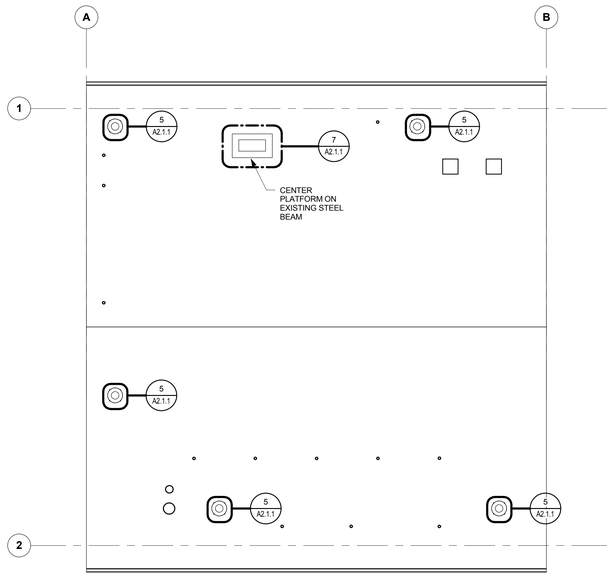
6 ROOF PENETRATION DETAIL
3" = 1'-0"



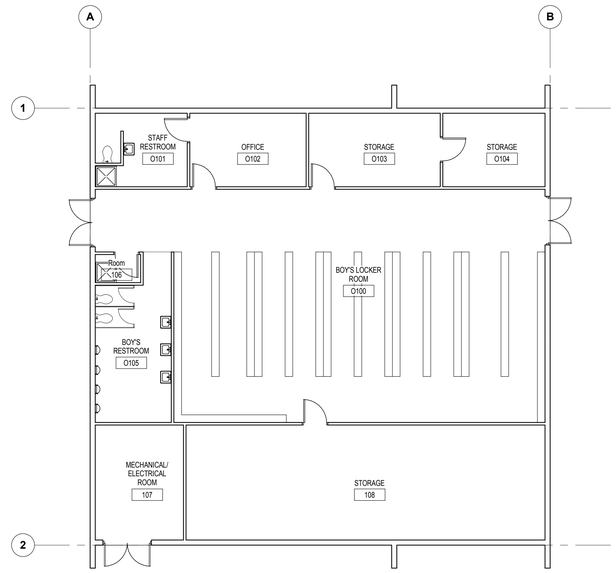
7 A2.1.1 ROOF - EQUIPMENT PLATFORM
1 1/2" = 1'-0"



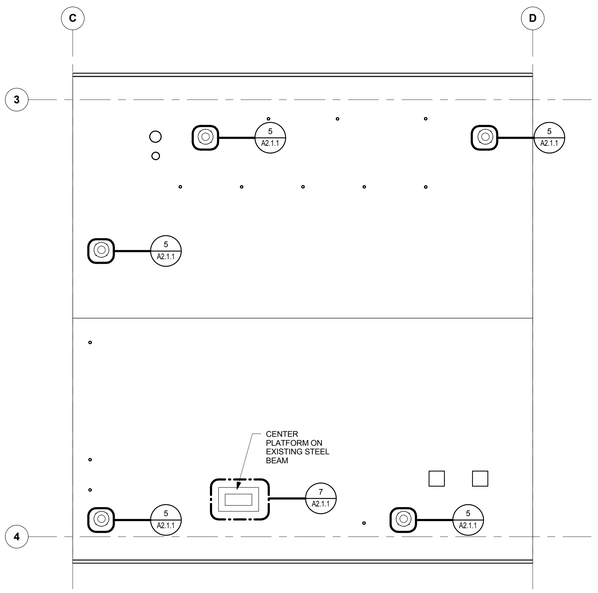
8 A2.1.1 ROOF - PLATFORM FRAMING
1" = 1'-0"



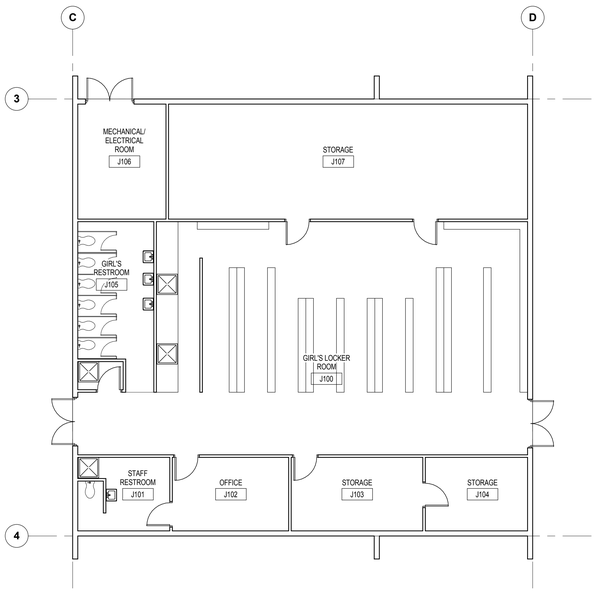
3 ROOF PLAN-BUILDING O
1/8" = 1'-0"



1 FLOOR PLAN-BUILDING O
1/8" = 1'-0"



4 ROOF PLAN-BUILDING J
1/8" = 1'-0"



2 FLOOR PLAN-BUILDING J
1/8" = 1'-0"

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PERRIS UNION HIGH SCHOOL DISTRICT
CALIFORNIA MILITARY INSTITUTE HVAC UPGRADES

KEYNOTES

LICENSED ARCHITECT
LICENSED F. GERST
NO.C30244
EXP. 6-30-17
STATE OF CALIFORNIA

FLOOR PLANS/ ROOF PLANS

NO.	DATE	ISSUE

PROJECT NO15040-00
DATE: 1/29/2016

DRAWING
A2.1.1

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MECHANICAL LEGEND

SYMBOL	ABBREV.	DESCRIPTION
		REMOVE EXISTING EQUIPMENT OR PIPING SHOWN HATCHED
		REMOVE AND RELOCATE EXISTING EQUIPMENT OR PIPING SHOWN HATCHED
	POC	POINT OF CONNECTION
	POD	POINT OF DISCONNECT
(E)		COORDINATE WITH ELECTRICAL
CD	CD	CONDENSATE DRAIN (A.C)
RD	RD	REFRIGERANT DISCHARGE
RL	RL	REFRIGERANT LIQUID
RS	RS	REFRIGERANT SUCTION
		PIPE DOWN
		PIPE UP
UR1		PIPE RISE (OR DN. FOR DROP)
		DIRECTION OF FLOW IN PIPE
DN.	DN.	DOWN OR DROP
UP	UP	RISE OR RISER
	FC	FLEXIBLE CONNECTION (PIPE)
20x6		DUCTWORK (1ST NUMBER INDICATES WIDTH SHOWN), NET INSIDE DIMENSION
	TV	SQUARE ELBOW WITH TURNING VANES
		RADIUS ELBOW
	MVD	MANUAL VOLUME DAMPER
	MOD	MOTOR OPERATED DAMPER
	BDD	BACKDRAFT DAMPER
FD	FD	FIRE DAMPER
SD	SD	DUCT MOUNTED SMOKE DETECTOR
SFD	SFD	AUTOMATIC SMOKE AND FIRE DAMPER
	FLEX	FLEXIBLE CONNECTION (DUCTWORK)
	FLEX	FLEXIBLE CONNECTION OR SEISMIC JOINT
		LINED DUCTWORK (OR PLENUM)
UR1		DUCT RISE IN DIRECTION OF FLOW
DN1		DUCT DROP IN DIRECTION OF FLOW
		ROUND DUCT UP
		ROUND DUCT DOWN
		SUPPLY DUCT UP
		SUPPLY DUCT DOWN
	RA/OA	RETURN AIR DUCT/OUTSIDE AIR DUCT UP
		RETURN AIR DUCT/OUTSIDE AIR DUCT DOWN
		EXHAUST AIR DUCT UP
		EXHAUST AIR DUCT DOWN
		DUCT TRANSITION
	CD	CEILING DIFFUSER
	RR	RETURN REGISTER
	ER	EXHAUST REGISTER
T EAU-#	T*STAT	THERMOSTAT OR TEMPERATURE SENSOR (NUMBER INDICATES EQUIPMENT ZONE SERVED)
CO2		CARBON DIOXIDE SENSOR
¢	CFM	CUBIC FEET PER MINUTE
OR		SYMBOL, SEE EQUIPMENT SCHEDULE

SYMBOL	ABBREV.	DESCRIPTION
	AMB	AMBIENT
	BLDG	BUILDING
	BHP	BRAKE HORSEPOWER
	CAP	CAPACITY
	CFM	CUBIC FEET PER MINUTE
	°F	DEGREES FAHRENHEIT
	DIA. ø	DIAMETER
	DN.	DOWN
	DWGS.	DRAWINGS
	DB	DRY BULB
	(E)	EXISTING
	EER	ENERGY EFFICIENCY RATION
	EFF.	EFFICIENCY
	ENT.	ENTERING
	ESP	EXTERNAL STATIC PRESSURE
	FAU	FORCED AIR UNIT
	FLA	FULL LOAD AMPS
	HZ	HERTZ
	HP	HORSEPOWER
	LBS	POUNDS
	LRA	LOCKED ROTOR AMPS
	MAX.	MAXIMUM
	MBH	ONE THOUSAND B.T.U.'s PER HOUR
	MCA	MAXIMUM CONTINUOUS AMPS
	MECH.	MECHANICAL
	MEP	MECHANICAL, ELECTRICAL AND PLUMBING
	MIN.	MINIMUM
	MOCP	MAXIMUM OVER CURRENT PROTECTION
	OPER	OPERATING
	OSA	OUTSIDE AIR
	PH	PHASE
	QTY	QUANITY
	RLA	RATED LOAD AMPS
	SA	SUPPLY AIR
	SEER	SEASONAL ENERGY EFFICIENCY RATION
	SF	SQUARE FEET
	T	THERMOSTAT
	TYP.	TYPICAL
	V	VOLTS
	WB	WET BULB
	WT	WEIGHT
	W/	WITH

PLAN CHECK NOTES:

1. CERTIFICATE OF ACCEPTANCE (MECH-2A AND ENV-2A) AND ALL RELATED ACCEPTANCE DOCUMENTS SHALL BE SUBMITTED TO THE FIELD INSPECTOR DURING CONSTRUCTION. CERTIFICATE OF OCCUPANCY WILL NOT BE ISSUED UNTIL THESE FORMS ARE REVIEWED AND APPROVED.
2. ALL PIPING AND DUCT WORK SHALL BE INSULATED CONSISTENT WITH THE REQUIREMENTS OF SECTIONS 118, 123, 124 TITLE 24 ENERGY STANDARDS AND CHAPTER 6 OF CMC.
3. ALL HVAC SYSTEMS SHALL MEET THE CONTROL REQUIREMENTS PER SECTION 112 AND 122 E.E.S.
4. ALL HVAC EQUIPMENT AND APPLIANCES SHALL MET THE REQUIREMENTS PER SECTION 111-113, 115, 120-124 TITLE 24 ENERGY STANDARDS.
5. PROVIDE SMOKE DETECTORS IN MAIN SUPPLY AIR DUCTS OF AIR MOVING SYSTEMS EXCEEDING 2000 CFM PER SECTION 609.0 CMC.

TITLE 24 NOTES:

1. HVAC SYSTEMS SHALL MEET THE LATEST CONTROL REQUIREMENTS OF SECTIONS 112 & 122 ENERGY EFFICIENCY STANDARDS.
2. DOORS AND WINDOWS SHALL MEET MINIMUM INFILTRATION REQUIREMENTS OF SECTION 116 ENERGY EFFICIENCY STANDARDS.
3. INSULATION AND FLEXIBLE DUCT SHALL COMPLY WITH STATE FIRE MARSHAL CRITERIA AND SHALL NOT EXCEED FLAME SPREAD OF 25 AND SMOKE DEVELOPED OF 50 PER ASTM-84, NFPA-225, AND U.L. 723.
4. ALL WORK SHALL BE IN ACCORDANCE WITH CITY CODES, CALIFORNIA ENERGY CONSERVATION STANDARDS, TITLE - 24, AND ALL OTHER APPLICABLE CODES.
5. ALL PIPING AND DUCTWORK SHALL BE INSULATED CONSISTENT WITH THE REQUIREMENTS OF SECTIONS 118, 123, 124 TITLE 24 ENERGY STANDARDS AND CHAPTER 6 OF CALIFORNIA MECHANICAL CODE.

CA GREEN BUILDING NOTES:

1. IN MECHANICALLY VENTILATED BUILDINGS, PROVIDE OCCUPIED AREAS OF BUILDING WITH AIR FILTRATION MEDIA FOR OUTSIDE AND RETURN AIR PRIOR TO OCCUPANCY THAT PROVIDES AT LEAST MERV OF 8 (REF. SECTION 5.504.5.3).
2. PROVIDE TESTING AND ADJUSTING OF HVAC SYSTEMS AND CONTROLS PER 5.713.10.4.
3. IF THE HVAC SYSTEM IS USED DURING CONSTRUCTION, RETURN AIR FILTERS WITH A MERV 8 RATING SHALL BE USED PER 5.714.4.1.
4. DUCT OPENINGS AND OTHER RELATED AIR DISTRIBUTION OPENINGS SHALL BE COVERED DURING CONSTRUCTION PER 5.714.4.1.
5. INSTALLED HVAC EQUIPMENT SHALL NOT CONTAIN CFC'S OR HALONS PER 5.714.8.1.

ANCHORAGE NOTES:

MEP COMPONENT ANCHORAGE NOTE

ALL MECHANICAL, PLUMBING, AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA APPROVED CONSTRUCTION DOCUMENTS. WHERE NO DETAIL IS INDICATED THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2010 CBC, SECTIONS 1615A.1.12 THROUGH 1615A.1.22 AND ASCE 7.05 CHAPTER 6 AND 13.

1. ALL PERMANENT EQUIPMENT AND COMPONENTS.
2. TEMPORARY OR MOVABLE EQUIPMENT THAT IS PERMANENTLY ATTACHED (E.G.: HARD-WIRED) TO BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS, OR WATER.
3. MOVABLE EQUIPMENT THAT IS STATIONED IN ONE PLACE FOR MORE THAN 8 HOURS AND HEAVIER THAN 400 POUNDS IS REQUIRED TO BE ANCHORED WITH TEMPORARY ATTACHMENTS.

THE ATTACHMENT OF THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE, BUT NEED NOT BE DETAILED ON THE PLANS. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING, AND CONDUIT.

A. COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVING A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.

B. COMPONENTS WEIGHING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS LESS THAN 5 POUNDS PER FOOT WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.

FOR THOSE ELEMENTS THAT DO NOT REQUIRE DETAILS ON THE APPORVED DRAWINGS, THE INSTALLATION SHALL BE SUBJECT TO THE APPROVAL OF THE STRUCTURAL ENGINEER OF RECORD, AND THE DSA STRUCTURAL ENGINEER. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH THE ABOVE REQUIREMENTS.

PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEM BRACING NOTE

PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS SHALL BE BRACED TO COMPLY WITH THE FORCES AND DISPLACEMENTS PRESCRIBED IN ASCE 7-05 SECTION 13.3 AS DEFINED IN ASCE 7-05 SECTION 13.6.8, 13.6.7, 13.6.5.6, AND 2010 CBC 1615A.1.20, 1615A.1.21, AND 1615A.1.22.

THE BRACING AND ATTACHMENTS TO THE STRUCTURE SHALL BE DETAILED ON THE APPROVED DRAWINGS OF THEY SHALL COMPLY WITH ONE OF THE OSHPD PRE-APPROVALS (OPA #) AS MODIFIED TO SATISFY ANCHORAGE REQUIRMENTS OF ACI 318, APPENDIX D.

COPIES OF THE MANUAL SHALL BE AVAILABLE ON THE JOBSITE PRIOR TO THE START OF HANGING AND BRACING OF THE PIPE, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS.

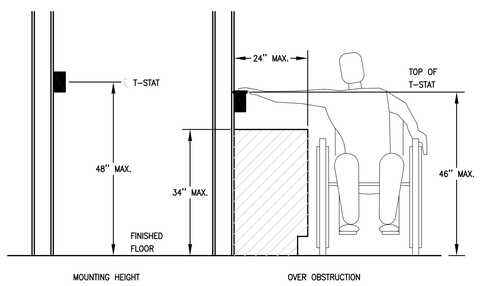
THE STRUCTURAL ENGINEER OF RECORD SHALL VERIFY THE ADEQUACY OF THE STRUCTURE TO SUPPORT THE HANGER AND BRACE LOADS.

GENERAL NOTES:

1. THESE DRAWINGS ARE A GENERAL GRAPHIC PRESENTATION OF THE WORK. DUCTWORK, PIPING, AND EQUIPMENT, AS SHOWN, ARE SCHEMATIC. FABRICATE AND INSTALL BASED ON ACTUAL FIELD MEASUREMENT. COORDINATE WITH OTHER TRADES. PROVIDE A COMPLETE SET OF SHOP DRAWINGS REFLECTING ACTUAL DIMENSIONS, ACCESS REQUIREMENTS, AND DETAILS BASED UPON THE ACTUAL EQUIPMENT PROCURED. MAINTAIN AN UP TO DATE SET OF AS-BUILT DRAWINGS AT THE JOB SITE.
2. COMPLY WITH CALIFORNIA MECHANICAL CODE (CMC), CALIFORNIA PLUMBING CODE (CPC), AND NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), AND GOVERNING CODES. THERE SHALL BE NO EXCEPTION. REPORT DEFICIENCIES WITHIN THIRTY (30) DAYS UPON AUTHORIZATION TO PROCEED.
3. REVIEW ALL DRAWINGS AND SPECIFICATIONS INCLUDING ARCHITECTURAL, STRUCTURAL, CIVIL, MECHANICAL, PLUMBING, AND ELECTRICAL. ANY QUESTIONS SHALL BE BROUGHT UP, IN WRITING, TO THE ATTENTION OF THE ENGINEER BEFORE THE START OF CONSTRUCTION.
4. PROVIDE ACCESS AND CLEARANCE FOR MAINTENANCE FOR MECHANICAL EQUIPMENT AND COMPONENTS AS RECOMMENDED BY EQUIPMENT MANUFACTURER AND APPLICABLE CODES.
5. HANDLE, STORE AND INSTALL EQUIPMENT PER MANUFACTURER'S INSTRUCTIONS.
6. INSTALL VALVES WITH UNIONS OR FLANGES AT EACH PIECE OF EQUIPMENT ARRANGED TO ALLOW SERVICE MAINTENANCE, AND EQUIPMENT REMOVAL WITHOUT SYSTEM SHUT-DOWN.
7. BRACE AND SUPPORT PIPES, CONDUIT, AND DUCTWORK IN ACCORDANCE WITH SMACNA GUIDELINES FOR SEISMIC RESTRAINTS OF MECHANICAL AND PLUMBING PIPING SYSTEM.
8. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATION OF DIFFUSERS, REGISTERS, GRILLES, AND ACCESS PANELS.
9. ALL DUCT DIMENSIONS, AS SHOWN ON MECHANICAL DRAWINGS ARE CLEAR INSIDE DIMENSIONS.
10. INSULATION AND FLEXIBLE DUCT SHALL COMPLY WITH STATE FIRE MARSHALL CRITERIA AND SHALL NOT EXCEED FLAME SPREAD OF 25 AND SMOKE DEVELOPED OF 50 PER ASTM-84, NFPA-223, AND UL 723.
11. INSULATE PIPING AND DUCTWORK IN ACCORDANCE WITH THE GOVERNING CODES.
12. COMMISSION AND START-UP THE MECHANICAL SYSTEMS TO ASSURE A COMPLETE AND OPERATIONAL HVAC SYSTEM IN ACCORDANCE WITH ASHRAE AND NEBB.
13. ALL SQUARE ELBOWS IN DUCTWORK SHALL HAVE TURNING VANES. PROVIDE MANUAL VOLUME DAMPER AT EACH BRANCH DUCT TAKE- OFF SERVING EACH AIR TERMINAL DEVICE. PROVIDE BALANCING DAMPERS FOR EACH MAIN DUCT TAKE-OFF IN ACCORDANCE WITH SMACNA IN ORDER TO ASSURE A COMPLETELY BALANCED SYSTEM.
14. COORDINATE WITH ELECTRICAL AND CONTROL CONTRACTORS FOR ALL POWER REQUIREMENTS PRIOR TO BID.
15. COORDINATE WITH ELECTRICAL AND CONTROL CONTRACTORS FOR ALL POWER REQUIREMENTS PRIOR TO ORDERING ANY EQUIPMENT.
16. UPON INSTALLATION OF ALL EQUIPMENT, DEVICES, VIBRATION ISOLATION, ETC., PROVIDE WRITTEN CONFIRMATION BY EQUIPMENT MANUFACTURER'S REPRESENTATIVES TO ENSURE COMPLIANCE WITH MANUFACTURER'S REQUIREMENTS.
17. PROVIDE DETAILS AND SEISMIC CALCULATIONS FOR ALL EQUIPMENT ON VIBRATION ISOLATION. ALL DETAILS SHALL BE STAMPED BY A STRUCTURAL ENGINEER FROM VIBRATION ISOLATION MANUFACTURER.
18. THE CONTRACTOR SHALL SELECT ALL CIRCUIT SETTERS/BALANCING VALVES FOR ACTUAL FLOW THROUGH THE PIPE AND THE PROPER PRESSURE DROP TO ENSURE PROPER OPERATION AND NOT BASED ON PIPE SIZES.

PROJECT NOTES

1. CONTRACTOR SHALL COORDINATE ARCHITECTURAL REFLECTED CEILINGS PLANS WITH ALL DISCIPLINES TO VERIFY CLEARANCES BETWEEN HVAC DUCTS, HVAC PIPING, LIGHT FIXTURES, ELECTRICAL DATA CONDUITS, PLUMBING LINES, FIRE PROTECTION LINES, STRUCTURAL MEMBERS, ETC. SPECIAL ATTENTION IS REQUIRED ALONG THE LENGTH OF MAIN MECHANICAL SUPPLY AND RETURN AIR DUCTS WHERE THERE IS LIMITED CLEARANCE FOR PASSAGE OR ROUTING OF UTILITIES.
2. THE SPACE FOR DUCT WORK & MECHANICAL EQUIPMENT FOR THIS PROJECT IS LIMITED. COORDINATION WITH OTHER TRADES IS CRITICAL. PROCEED WITH PREPARATION OF SHOP DRAWINGS IMMEDIATELY UPON RECEIVING AN AUTHORIZATION TO PROCEED FOR THE PROJECT. COMPLETE SHOP DRAWINGS PRIOR TO MATERIAL FABRICATION AND INSTALLATION. SHOP DRAWINGS SHALL BE REVIEWED BY COMMISSIONING AGENT PRIOR TO SUBMITTAL.
3. PROVIDE ORIGINALLY PREPARED CONTRACTOR'S SHOP DRAWINGS IN ELECTRONIC FORMAT. IN ADDITION TO THE REQUIREMENTS SPECIFIED ELSEWHERE, THE SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING:
   - a. DUCT, PIPE AND PLUMBING ELEVATIONS.
   - b. DOUBLE LINE DUCTWORK AND PIPING (6" AND LARGER).
   - c. ACTUAL SIZE OF PURCHASED EQUIPMENT. PER APPROVED CONTRACTOR'S SHOP DRAWINGS.
   - d. ACCESS PANELS INCLUDING CEILING PANELS.
   - e. ACCESS CLEARANCES FOR EQUIPMENT.
   - f. ACTUAL LOCATIONS OF CEILING DIFFUSERS, REGISTERS, AND RETURN REGISTERS.
   - g. LOCATIONS OF STRUCTURAL MEMBERS SUCH AS BEAMS.
   - h. ACTUAL LOCATIONS OF CONTROL PANELS AND POWER CONNECTIONS TO EQUIPMENT.
   - i. COLOR CODED DUCT AND PIPING BASED ON MATERIAL USED.
   - j. MINIMUM 1/4"=1'0" SCALE DRAWINGS.
   - k. LABEL AND TAG SCHEDULE FOR EQUIPMENT.
   - l. DUCT TRANSITIONS TO CLEAR BEAMS OR TIGHT AREAS.
   - m. ROOM TEMPERATURE SENSOR LOCATIONS.
   - n. POINT OF CONNECTION TO UTILITIES OUTSIDE THE BUILDING.
   - o. SECTIONS OR 3-D DRAWINGS OF CONGESTED AREAS.
   - p. GRID LINES.
   - q. UTILITY PROFILES FOR UNDERGROUND PIPING.
4. DO NOT COMMENCE WITH ANY INSTALLATION, DEMOLITION OR ORDERING OF ANY EQUIPMENT OR MATERIAL FABRICATION WITHOUT AN APPROVED SHOP DRAWING SUBMITTAL.
5. FOR EACH SUBMITTAL, THE CONTRACTOR SHALL PROVIDE A LETTER (ON COMPANY LETTERHEAD) AND SIGNED BY THE PROJECT MANAGER INDICATING THE SUBMITTAL HAS BEEN FULLY IN HOUSE REVIEWED TO ENSURE FULL COMPLIANCE WITH THE CONTRACT DOCUMENTS AND COORDINATION WITH OTHER TRADES. ANY EXCEPTIONS TO THE CONTRACT DOCUMENTS SHALL BE CLEARLY INDICATED ON THIS LETTER. ANY DISCREPANCIES/EXCEPTIONS NOT IDENTIFIED IN WRITING SHALL BE CORRECTED AT THE SOLE EXPENSE OF THE CONTRACTOR AND AT NO EXPENSE TO THE OWNER AND ENGINEER.
6. ALL ITEMS ARE NEW U.N.O.



MOUNTING HEIGHT OVER OBSTRUCTION (1 / M0.1)

SCALE: NONE

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MECHANICAL LEGENDS AND GENERAL NOTES

NO.	DATE	ISSUE
1	XX/XX/XX	-

PROJECT NO 15040-00
DATE: 1/29/2016

DRAWING
M0.1

DUCTLESS SPLIT SYSTEM HEAT PUMP SCHEDULE

SYMBOL	DESCRIPTION	AREA SERVED	INDOOR FAN SECTION											SYMBOL	OUTDOOR SECTION										COMBINED CAPACITY										REMARKS
			INDOOR FAN MOTOR										OPER. WT. LBS.		OUTDOOR FAN		COMPRESSOR		ELECTRICAL DATA					OPER. WT. LBS.	COOLING				HEATING			SEER	MIN. OA CFM	
			CFM	E.S.P.	DRIVE	HP	V	PH	Hz	FLA	MCA	MOCP			HP	FLA	LRA	RLA	V	PH	Hz	MCA	MOCP		TOTAL CAP. MBH	SENSIBLE CAP. MBH	AMB °F	ENT DB °F	ENT WB °F	AMB °F	OUTPUT MBH	HSPF			
DFC O-1	CARRIER RAV-SP240AT/RAV-SP240KRT	OFFICE O102	560	0.1	DIRECT	--	208	1	60	0.5	–	–	45	CU O-1	--	--	22.0	17.0	208	1	60	24.0	40	175	21.6	13.7	105	83	64	47	26.4	9.8	16.7	NR	1 2 3 4 –
DFC J-1	CARRIER RAV-SP240AT/RAV-SP240KRT	OFFICE J102	560	0.1	DIRECT	--	208	1	60	0.5	–	–	45	CU J-1	--	--	22.0	17.0	208	1	60	24.0	40	175	21.6	13.7	105	83	64	47	26.4	9.8	16.7	NR	1 2 3 4 –

1 ROUTE AND SIZE REFRIGERANT PIPING PER MANUFACTURERS RECOMMENDATIONS 2 PROVIDE WITH CONDENSATE PUMP AND DISCHARGE TO NEAREST LAVATORY 3 PROVIDE MASON SSLFH SPRING ISOLATORS WITH 2" DEFLECTION ON LEVEL CURB 4 PROVIDE WITH WIRED THERMOSTAT.

EXHAUST FAN SCHEDULE

SYMBOL	DESCRIPTION	AREA SERVED	CFM	E.S.P.	DRIVE	RPM	MIN. WHEEL DIA.	MOTOR				MAX. OPER. WT. (LBS.)	REMARKS
								BHP.	HP.	V	PH		
EF O-1	COOK 165 ACEB	STAFF RESTROOM O101	2700	1.0	BELT	1293	16.5	0.839	1.00	115	60	145	1 2 3 4 PROVIDE WITH ROOF CURB ADAPTOR AND BIRDSCREEN
EF O-2	COOK 245 ACEB	STORAGE O103 & O104	5100	1.25	BELT	885	24.5	2.11	3.00	460	60	265	1 2 3 4 PROVIDE WITH ROOF CURB ADAPTOR AND BIRDSCREEN
EF O-3	COOK 245 ACEB	BOYS RESTROOM O105	5100	1.25	BELT	885	24.5	2.11	3.00	460	60	265	1 2 3 4 PROVIDE WITH ROOF CURB ADAPTOR AND BIRDSCREEN
EF O-4	COOK 245 ACEB	STORAGE O106	5100	1.25	BELT	885	24.5	2.11	3.00	460	60	265	1 2 3 4 PROVIDE WITH ROOF CURB ADAPTOR AND BIRDSCREEN
EF O-5	COOK 245 ACEB	STORAGE O106	5100	1.25	BELT	885	24.5	2.11	3.00	460	60	265	1 2 3 4 PROVIDE WITH ROOF CURB ADAPTOR AND BIRDSCREEN
EF J-1	COOK 245 ACEB	STORAGE J107	5100	1.25	BELT	885	24.5	2.11	3.00	460	60	265	1 2 3 4 PROVIDE WITH ROOF CURB ADAPTOR AND BIRDSCREEN
EF J-2	COOK 245 ACEB	STORAGE J107	5100	1.25	BELT	885	24.5	2.11	3.00	460	60	265	1 2 3 4 PROVIDE WITH ROOF CURB ADAPTOR AND BIRDSCREEN
EF J-3	COOK 245 ACEB	GIRLS RESTROOM J105	5100	1.25	BELT	885	24.5	2.11	3.00	460	60	265	1 2 3 4 PROVIDE WITH ROOF CURB ADAPTOR AND BIRDSCREEN
EF J-4	COOK 165 ACEB	STAFF RESTROOM J101	2700	1.0	BELT	1293	16.5	0.839	1.00	115	60	145	1 2 3 4 PROVIDE WITH ROOF CURB ADAPTOR AND BIRDSCREEN
EF J-5	COOK 245 ACEB	STORAGE J103 & J104	5100	1.25	BELT	885	24.5	2.11	3.00	460	60	265	1 2 3 4 PROVIDE WITH ROOF CURB ADAPTOR AND BIRDSCREEN

1 OPERATE ON TIME OF DAY SCHEDULE THROUGH TIME CLOCK. 2 FAN SHOWN MAY BE REDUCED IN AIRFLOW AND STATIC AFTER THE BID AND PRE TAB ARE COMPLETED. 3 PROVIDE WITH BELT TENSIOR-ROTARY
4 PROVIDE WITH HIGH EFFICIENCY MOTOR

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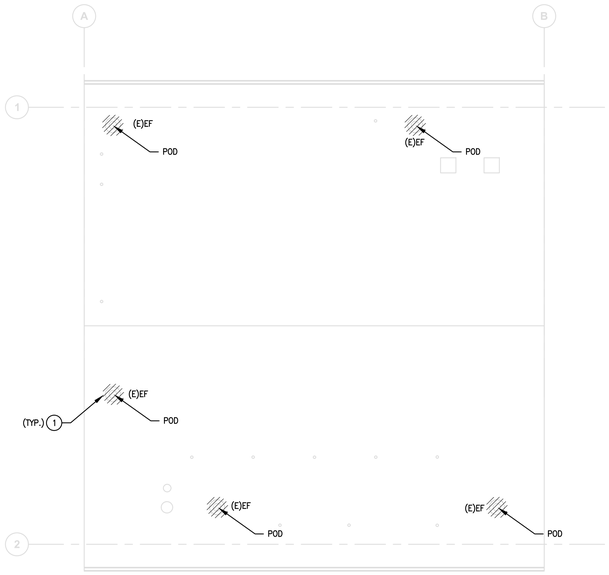
MECHANICAL SCHEDULES

NO.	DATE	ISSUE
1	XX/XX/XX	-

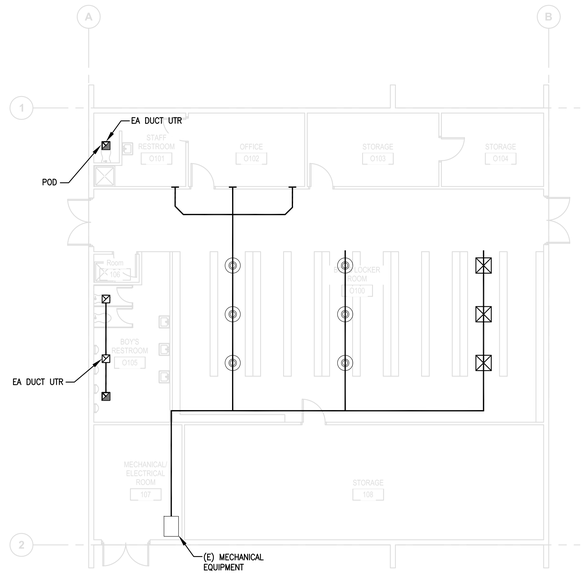
PROJECT NO 15040-00
DATE: 1/29/2016

DRAWING
M0.2



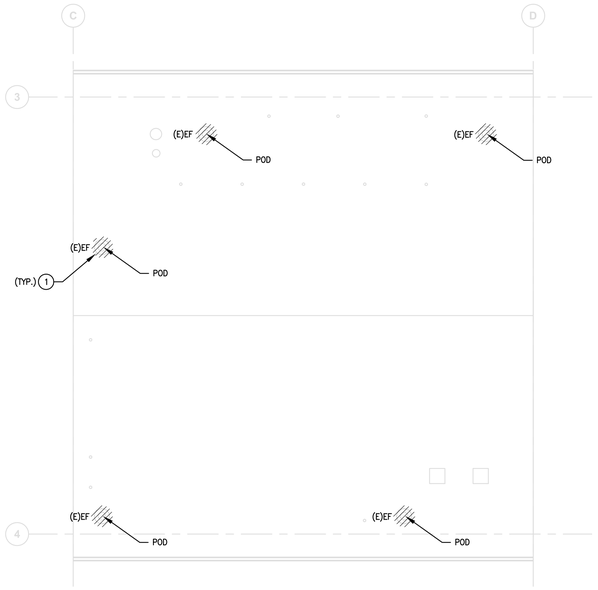
3 MECHANICAL DEMO. ROOF PLAN - BUILDING O

1/8" = 1'-0"



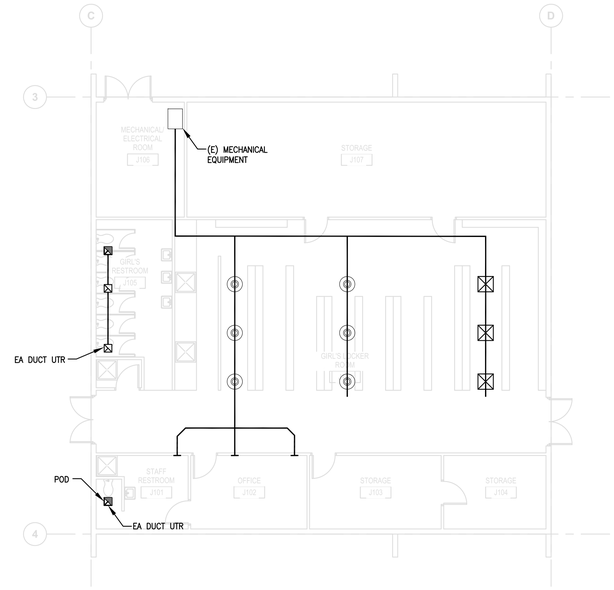
1 MECHANICAL DEMO. FLOOR PLAN - BUILDING O

1/8" = 1'-0"



4 MECHANICAL DEMO. FLOOR PLAN - BUILDING J

1/8" = 1'-0"



2 MECHANICAL DEMO. FLOOR PLAN - BUILDING J

1/8" = 1'-0"

GENERAL NOTES:

A. CONTRACTOR TO VERIFY IN FIELD ALL EXISTING CONDITIONS PRIOR TO BID. REPORT DISCREPANCIES TO ENGINEER AND OWNER.

B. EXISTING INFORMATION AS SHOWN IS FROM EXISTING AS-BUILT DRAWINGS. FIELD VERIFIED TO EXTENT POSSIBLE.

C. THE CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO START OF ANY DEMOLITION.

SCOPE OF WORK

1. PROVIDE A COMPLETE TEST AND BALANCE PRIOR TO START OF WORK. TAB SHALL INCLUDE THE FOLLOWING AT A MINIMUM.
   A. EXISTING AIRFLOWS OF EXHAUST GRILLES.
   B. A PLAN SHOWING EXISTING DUCT ROUTING AND SIZING.
   C. EXISTING FAN INFORMATION INCLUDING BUT NOT LIMITED TO: FAN HORSEPOWER, WHEEL DIAMETER, PULLEY SIZE, VOLTAGE, PHASE, ETC.
2. PROVIDE TAB PLAN TO ENGINEER FOR REVIEW.
3. REMOVE AND REPLACE EXISTING EXHAUST FANS WITH FANS AS SPECIFIED AFTER THE PRE TAB IS COMPLETED.
4. TAB NEW FAN TO CFMS AS COORDINATED WITH ENGINEER.

KEY NOTES:

1. REMOVE CROSS HATCHED MECHANICAL EQUIPMENT, ACCESSORIES, PIPING AND MATERIALS (TYP).

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PERRIS UNION HIGH SCHOOL DISTRICT
CALIFORNIA MILITARY INSTITUTE HVAC UPGRADES

REGISTERED PROFESSIONAL ENGINEER VINCENT PEDRO MECHANICAL STATE OF CALIFORNIA 5691
MA ENGINEERS
5160 Carroll Canyon Rd, Suite 200
San Diego, California 92121
Consulting Mechanical Engineers
@858 200-0030
@858 200-0037
www.ma-engr.com

MECHANICAL DEMO. FLOOR AND ROOF PLAN - BLDG. O & J

NO.	DATE	ISSUE
1	XX/XX/XX	-

PROJECT NO 15040-00
DATE: 1/29/2016

DRAWING
M2.1

GENERAL NOTES:

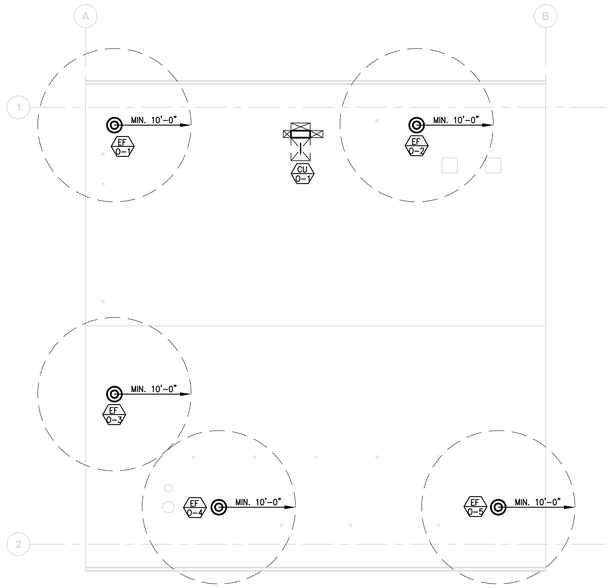
A. CONTRACTOR TO VERIFY IN FIELD ALL EXISTING CONDITIONS PRIOR TO BID. REPORT DISCREPANCIES TO ENGINEER AND OWNER.

B. EXISTING INFORMATION AS SHOWN IS FROM EXISTING AS-BUILT DRAWINGS. FIELD VERIFIED TO EXTENT POSSIBLE.

C. THE CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO START OF ANY DEMOLITION.

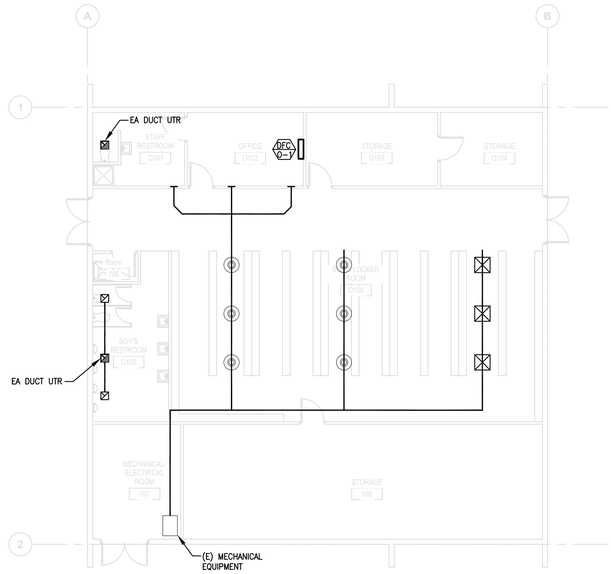
KEY NOTES:

1. PROVIDE TAB OF ALL GRILLES.



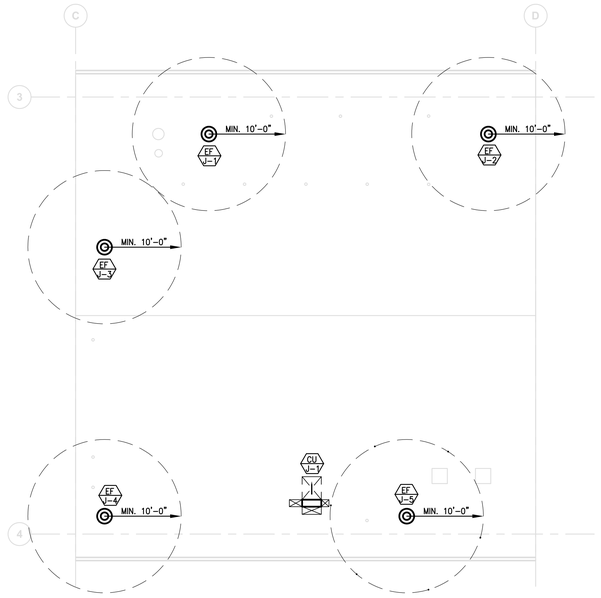
3 MECHANICAL ROOF PLAN - BUILDING O

1/8" = 1'-0"



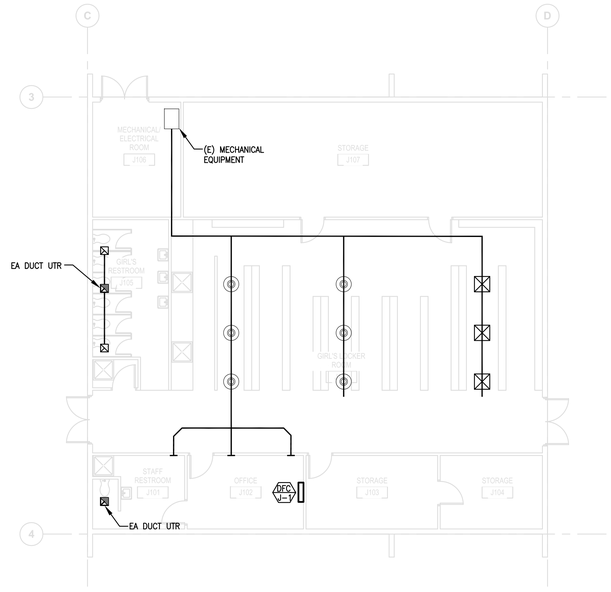
1 MECHANICAL FLOOR PLAN - BUILDING O

1/8" = 1'-0"



4 MECHANICAL FLOOR PLAN - BUILDING J

1/8" = 1'-0"



2 MECHANICAL FLOOR PLAN - BUILDING J

1/8" = 1'-0"

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MECHANICAL FLOOR AND ROOF PLAN - BLDG. O & J

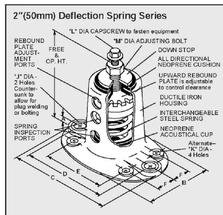
NO.	DATE	ISSUE
1	XX/XX/XX	-

PROJECT NO 15040-00
DATE: 1/29/2016

DRAWING
M2.2

SSLFH DATA SHEET DS-203-6.2 — MASON INDUSTRIES

2"(50mm) Deflection Spring Series



TYPE SSLFH RATINGS

Size	Rated Capacity (lbs) (kg)	Rated Defl (in)(mm)	Mount Constant (lb/in)(kg/mm)	Spring Color/ Stripe	Max. G Rating
SSLFH-B-20	20 9	2.40 61	8 0.1	Tan	155.0
SSLFH-B-26	26 12	2.18 55	12 0.2	White/Blue	115.2
SSLFH-B-35	35 16	2.20 56	16 0.3	Purple	88.6
SSLFH-B-50	50 23	2.20 56	24 0.4	White/Red	82.0
SSLFH-B-65	65 30	2.10 53	31 0.6	Brown	47.7
SSLFH-B-85	85 39	2.10 53	40 0.7	White/Black	36.5
SSLFH-B-115	115 52	2.00 51	57 1.0	Silver	27.0
SSLFH-B-150	150 68	2.00 51	75 1.3	Orange	20.7
SSLFH-B2-210	210 95	2.12 54	99 1.8	Silver	14.8
SSLFH-B2-290	290 131	2.00 51	144 2.6	Blue	10.7
SSLFH-B2-455[1]	450 204	2.00 51	224 4.0	Tan	6.9
SSLFH-B2-665[1]	665 302	2.00 51	340 6.0	Gray	4.8
SSLFH-C2-125	125 57	2.50 64	50 0.9	Purple	30.4
SSLFH-C2-170	170 77	2.40 61	70 1.3	Brown	22.4
SSLFH-C2-210	210 95	2.30 58	90 1.6	Red	18.1
SSLFH-C2-260	260 118	2.20 56	120 2.1	White	14.6
SSLFH-C2-330	330 150	2.00 51	165 2.9	Black	11.5
SSLFH-C2-460	460 209	2.00 51	230 4.1	Blue	8.3
SSLFH-C2-610	610 277	2.00 51	305 5.4	Green	6.2
SSLFH-C2-860[1]	860 390	2.00 51	440 7.8	Gray	4.3
SSLFH-C2-1210[1]	1210 549	2.00 51	605 10.8	Silver	3.1
SSLFH-C2-1540[1]	1540 699	2.00 51	770 13.7	Grey*	2.5
SSLFH-C2-1870[1]	1870 848	2.00 51	935 16.6	Silver*	2.0

*with RED inner spring

TYPE SSLFH DIMENSIONS (inches mm)

Size	A	B	C	D	E	F	J	K	L	M	Free & Op Ht
SSLFH-B-682	1/2	6	9 1/4	7 1/2	5 1/2	1 5/8	3/4	5/8	1/2	7/8	7 1/2
SSLFH-C2	1/2	7	11	9	6	2	7/8	3/4	5/8	1	8
SSLFH-B-682	13	152	235	191	140	41	19	16	13	22	191
SSLFH-C2	13	178	279	229	152	51	22	19	16	25	203

*Published ratings allow minimum 25% additional travel to solid. For a full 50% specified minimum use the following ratings:

Size	Derated Capacity (lbs) (kg)	Defl (in) (mm)	Size	Derated Capacity (lbs) (kg)	Defl (in) (mm)
B2-455	410 186	1.83 46.5	C2-1210	1016 461	1.67 42.4
B2-665	565 256	1.66 42.2	C2-1540	1285 583	1.67 42.4
C2-860	800 363	1.82 46.2	C2-1870	1560 708	1.67 42.4

PLUG WELDED RATINGS

Size	Horizontal (lbs) (kg)	Vertical (lbs) (kg)
SSLFH-B	3100 1406	4345 1971
SSLFH-C	3800 1724	5630 2554

TYPICAL PLUG WELD

Plug Welded Testing and Calculations were performed to meet OSHPD criteria.

SPRING DATA

Size	Spring OD (in)(mm)	Free Ht (in) (mm)	Ratio Ka/Kv	Ratio OD/OH
B & B2	2 3/4 70	4 102	0.65-0.90	0.75-1.25
C	2 7/8 73	4 1/8 105	0.90-1.00	0.92

INSTALLATION INSTRUCTIONS

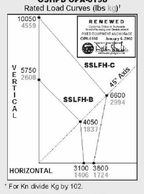
1. Remove cap screw "L" and place mountings under hole in equipment base.
2. If supports are badly off level, shim mounting level before securing.
3. Pass cap screw "L" through hole in equipment base and screw loosely into adjusting bolt "M".
4. Repeat this procedure in all mounting locations.
5. Keep "Upward Rebound Plate" from turning by restraining it with a screw driver through the adjustment port.
6. Take two full counter-clockwise turns on each adjusting bolt "M" and continue even adjustment of all mounts until all springs are loaded and mountings are back to Free and Operating Height.
7. Take no more than two additional counter-clockwise turns on any "M" adjusting bolt to level equipment.
8. Tighten cap screws "L" to secure equipment.
9. Turn rebound plate clockwise to lower or counter-clockwise to raise. Adjust plate so there is 1/8"(3mm) clearance between top of plate and underside of all directional neoprene cushion.

SPECIFICATION

Equipment shall be installed on resilient mountings designed and rated to resist seismic forces in all directions. The snubber shall be adjustable in the vertical up direction and allow a maximum of 1/4" (6mm) travel in the vertical and horizontal direction before contacting the resilient snubbing collars. Mountings shall have an Anchorage Preapproval "OPA" Number from OSHPD in the state of California attesting to the minimum listed certified Horizontal and Vertical load ratings.

All mountings shall have adjusting bolts that are rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Mountings shall have a minimum of 2 spring inspection ports. Submittals shall include spring diameters, deflections, and calculations signed by a registered engineer showing that the seismic loads the mountings are to resist have been properly calculated. Mountings shall be Type SSLFH as manufactured by Mason Industries, Inc.

OSHPD OPA-0198
Rated Load Curves (lbs kg)[1]



[1] For Kn divide Kg by 102.

Horizontal, Vertical and 45° plotted Ratings are California OSHPD approved values having the OSHPD Anchorage Preapproval Number OPA-0198. Testing and calculations were performed to meet OSHPD criteria.

To use approved OSHPD rated load curves:

1) Calculate Vertical and Horizontal Forces on mountings including translations and overturning moments. 2) Plot Horizontal Load vs Vertical Load. The point must fall within the area below the OSHPD curve.

Tm401
1/04

Printed in U.S.A.

MASON SSLFH CUT SHEET

NO SCALE

209

4 / M5.1

MASON INDUSTRIES, Inc.
Manufacturers of Vibration Control Products
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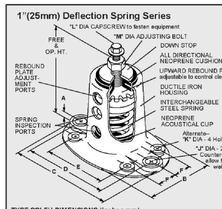
2100 W. Crescent Ave., Suite D, Anaheim, CA 92801, 714/535-2727, FAX 714/535-5738, info@MasonAnaheim.com, www.MasonAnaheim.com

CAPTIVE SPRING MOUNT for SEISMIC and RESTRAINED SERVICE 1"(25mm) & 2"(50mm) DEFLECTION

TYPE **SSLFH** DATA SHEET DS-203-6.2

1"(25mm) Deflection Spring Series



TYPE SSLFH RATINGS

Size	Rated Capacity (lbs) (kg)	Rated Defl (in)(mm)	Mount Constant (lb/in)(kg/mm)	Spring Color/ Stripe	Max. G Rating
SSLFH-A-45	45 20	1.60 41	28 0.5	Blue	37.8
SSLFH-A-75	75 34	1.50 38	50 0.9	Orange	22.7
SSLFH-A-125	125 57	1.33 34	94 1.7	Brown	13.6
SSLFH-A-200	200 91	1.15 29	174 3.1	Black	8.5
SSLFH-A-310	310 141	1.00 25	310 5.6	Yellow	5.5
SSLFH-A-400	400 181	1.00 25	400 7.2	Green	4.3
SSLFH-A-510	510 231	1.00 25	510 9.2	Red	3.3
SSLFH-A-625	625 283	1.00 25	625 11.3	White	2.7
SSLFH-B-65	65 29	2.10 53	31 0.6	Brown	47.7
SSLFH-B-85	85 39	2.10 53	40 0.7	White*	36.5
SSLFH-B-115	115 52	2.00 51	57 1.0	Silver	27.0
SSLFH-B-150	150 68	2.00 51	75 1.3	Orange	20.7
SSLFH-B-280	280 127	1.80 41	174 3.1	Green	11.1
SSLFH-B-450	450 204	1.31 33	344 6.2	Red	6.9
SSLFH-B-750	750 340	1.12 28	670 12.1	White	4.1
SSLFH-B-1000	1000 454	1.00 25	1000 18.2	Blue	3.1
SSLFH-B-1250	1250 567	1.00 25	1250 22.7	Gray	2.5
SSLFH-B-1650	1650 748	1.00 25	1650 30.0	Black	1.9
SSLFH-C-1000	1000 454	1.00 25	1000 18.2	Black	3.8
SSLFH-C-1350	1350 612	1.00 25	1350 24.5	Yellow	2.8
SSLFH-C-1750	1750 794	1.00 25	1750 31.8	Black*	2.2
SSLFH-C-2100	2100 953	1.00 25	2100 38.1	Yellow*	1.9
SSLFH-C-2385	2385 1082	1.00 25	2385 43.3	Yellow**	1.6
SSLFH-C-2650	2650 1202	1.00 25	2650 48.1	Red**	1.4
SSLFH-C-2935	2935 1331	1.00 25	2935 53.2	Red**	1.3

*with Black stripe *with Red inner spring **with Green inner spring

TYPE SSLFH DIMENSIONS (inches mm)

Size	A	B	C	D	E	F	J	K	L	M	Free & Op Ht
SSLFH-A	1/4	4	6 1/4	4 3/4	4	1 1/8	3/4	1/2	3/8	3/4	6
SSLFH-B	1/2	6	9 1/4	7 1/2	5 1/2	1 5/8	3/4	5/8	1/2	7/8	7 1/2
SSLFH-C	1/2	7	11	9	6	2	7/8	3/4	5/8	1	8
SSLFH-A	6	102	159	121	102	29	19	13	10	19	152
SSLFH-B	13	152	235	191	140	41	19	16	13	22	191
SSLFH-C	13	178	279	229	152	51	22	19	16	25	203

SPRING DATA

Size	Spring OD (in)(mm)	Free Ht (in) (mm)	Ratio Ka/Kv	Ratio OD/OH
A-45-400	1 3/4 44	3 76	0.70-0.90	0.58-1.25
A-510-625	1 3/4 44	3 1/8-3 3/8 79-86	0.50-0.60	0.74-0.82
B	2 3/8 60	4 102	0.65-0.90	0.76-1.25
C	2 7/8 73	4 1/8 105	0.90-1.00	0.92

PLUG WELDED RATINGS

Size	Horizontal (lbs) (kg)	Vertical (lbs) (kg)
SSLFH-A	1650 748	5500 2495
SSLFH-B	3100 1406	4345 1971
SSLFH-C	3800 1724	5630 2554

TYPICAL PLUG WELD

Plug Welded Testing and Calculations were performed to meet OSHPD criteria.

INSTALLATION INSTRUCTIONS

1. Remove cap screw "L" and place mountings under hole in equipment base.
2. If supports are badly off level, shim mounting level before securing.
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SPECIFICATION

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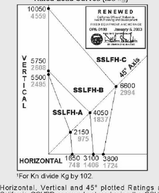
All mountings shall have adjusting bolts that are rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Mountings shall have a minimum of 2 spring inspection ports. Submittals shall include spring diameters, deflections, and calculations signed by a registered engineer showing that the seismic loads the mountings are to resist have been properly calculated. Mountings shall be Type SSLFH as manufactured by Mason Industries, Inc.

OSHPD OPA-0196
Rated Load Curves (lbs kg)[1]



[1] For Kn divide Kg by 102.

Horizontal, Vertical and 45° plotted Ratings are California OSHPD approved values having the OSHPD Anchorage Preapproval Number OPA-0196. Testing and calculations were performed to meet OSHPD criteria.

To use approved OSHPD rated load curves:

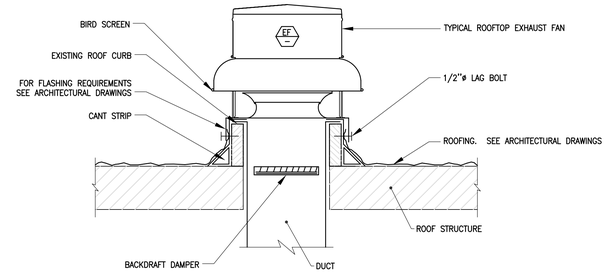
1) Calculate Vertical and Horizontal Forces on mountings including translations and overturning moments. 2) Plot Horizontal Load vs Vertical Load. The point must fall within the area below the OSHPD curve.

MASON SSLFH CUT SHEET

NO SCALE

221

5 / M5.1

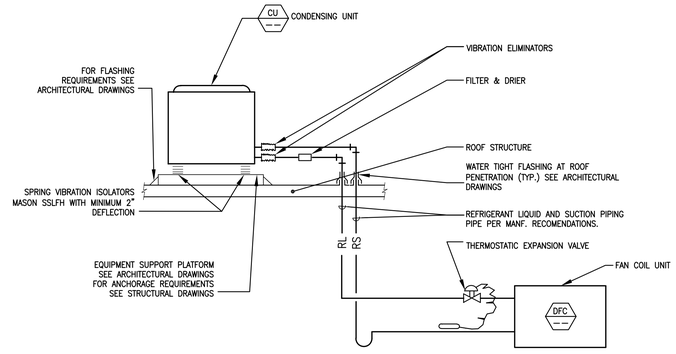


ROOF MOUNTED EXHAUST FAN DETAIL

NO SCALE

110

1 / M5.1

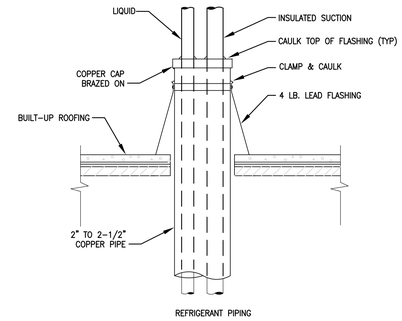


REFRIGERANT PIPING DIAGRAM

NO SCALE

200

2 / M5.1



REFRIGERANT PIPING THRU ROOF DETAIL

NO SCALE

202

3 / M5.1

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PERRIS UNION HIGH SCHOOL DISTRICT
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REGISTERED PROFESSIONAL ENGINEER — MICHAEL P. FEGO — MECHANICAL — STATE OF CALIFORNIA — 5691

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www.ma-engr.com

MECHANICAL DETAILS

NO.	DATE	ISSUE
1	XX/XX/XX	-

PROJECT NO 15040-00
DATE: 1/29/2016

DRAWING
M5.1

ELECTRICAL SYMBOL LEGEND

POWER

- DUPLEX RECEPTACLE, WALL MOUNTED, +18" A.F.F. (U.O.N.)
- DUPLEX RECEPTACLE IN WEATHERPROOF ENCLOSURE +18" A.F.F. (U.O.N.)
- CODE SIZED JUNCTION BOX, CEILING OR WALL MOUNTED
- FUSED DISCONNECT SWITCH, WHERE SHOWN NF = NON-FUSED.
- CONDUIT AND WIRE, CONCEALED IN CEILING OR WALL
- CONDUIT AND WIRE, CONCEALED IN OR UNDER FLOOR
- FLEXIBLE CONDUIT CONNECTION
- BRANCH CIRCUIT HOMERUN TO PANEL. SLASHES INDICATE NUMBER OF CONDUCTORS. EQUIPMENT GROUND WIRE NOT INDICATED U.O.N. #12 CONDUCTORS ARE MINIMUM, NO HASH MARKS = MIN (2) #12
- CONDUIT DROP OR TRANSITION.
- PANELBOARD SURFACE MOUNTED
- PANELBOARD RECESSED
- DISTRIBUTION SWITCHBOARD
- STEPDOWN TRANSFORMER
- (E) UNDERGROUND (EXISTING) WHERE SHOWN.

GENERAL SEISMIC REQUIREMENTS

1. ALL ELECTRICAL EQUIPMENT SHALL BE BRACED OR ANCHORED TO RESIST A HORIZONTAL FORCE ACTING IN ANY DIRECTION USING: 2001 CBC CHAPTER16, SECTION 1632A & TABLE 16A-O OF THE VOL. 2 TITLE 24, 2001 CBC.

   1a. IN LIEU OF CALCULATIONS PER NOTE 1 (ABOVE) - THE ANCHORAGE SHALL BE CAPABLE OF WITHSTANDING A LATERAL FORCE EQUAL TO 2.2 Wp ACTING SIMULTANEOUSLY WITH A VERTICAL FORCE =EQUAL TO 0.72Wp (BOTH FORCES AT SERVICE LEVEL, THESE VALUES CORRESPOND TO AN Ip=1.15 AND Cs=0.66, FOR OTHER VALUES OF Ip AND Cs, THE LATERAL AND VERTICAL FORCE CAN BE ADJUSTED ACCORDINGLY.).

   1b. INCLUSION OF VERTICAL FORCE PER TABLE 16-0 FOOTNOTE 20 (FOR EMERGENCY POWER SUPPLIES & COMMUNICATIONS EQUIPMENT ONLY.).

   1c. THE CAPACITY OF THE ANCHORAGE CONNECTORS IN SHEAR AND/OR TENSION SHALL BE CLEARLY INDICATED IN THE CALCULATIONS, WHICH INDICATE, ICBO REPORT NO. (IF APPLICABLE) THEIR TOTAL NUMBER, SIZE, GRADE, EMBEDMENT, EDGE DISTANCES, AND OTHER FACTORS WHICH AFFECT THE CAPACITY IN SHEAR AND TENSION.

2. CUTTING, BORING, SAWCUTTING OR DRILLING THROUGH THE NEW OR EXISTING STRUCTURAL ELEMENTS TO BE DONE ONLY WHEN SO DETAILED IN THE DRAWINGS OR ACCEPTED BY THE ARCHITECT WITH THE APPROVAL OF DSA REPRESENTATIVE.

3. ALL WELDING SHALL BE SPECIALLY INSPECTED BY AN AWS-CWI QUALIFIED INSPECTOR APPROVED BY DSA/ORS.

4. ALL BRACING OF CONDUITS SHALL BE INSTALLED IN ACCORDANCE WITH SMACNA SEISMIC RESTRAINT MANUAL: "GUIDELINES FOR MECHANICAL SYSTEMS", 1991 OR LATEST EDITION. OSHPD R *2010.

5. WHERE BRACING DETAILS ARE NOT SHOWN ON THE DRAWINGS OR IN THE GUIDELINES, THE FIELD INSTALLATION SHALL BE SUBJECT TO THE APPROVAL OF THE ARCHITECT, ELECTRICAL ENGINEER AND DSA FIELD ENGINEER.

6. A COPY OF THE GUIDELINES PUBLISHED BY SMACNA AND APPROVED BY DSA SHALL BE PROVIDED BY THE CONTRACTOR AND KEPT ON THE JOB AT ALL TIMES.

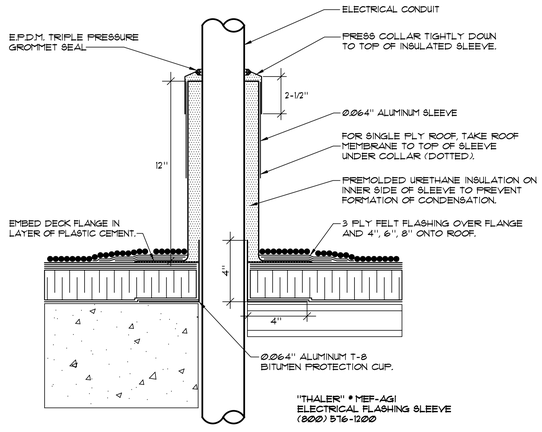
7. ANCHORAGE DETAILS FOR EQUIPMENT WHICH ARE NOT APPROVED DURING PLAN REVIEW ARE SUBJECT TO APPROVAL OF THE STRUCTURAL ENGINEER PRIOR TO INSTALLATION AND INSPECTION BY THE PROJECT INSPECTOR.

GENERAL PROJECT NOTES:

1. UNLESS WHERE OTHERWISE NOTED, ALL WORK INDICATED ON THESE DRAWINGS SHALL BE CONSIDERED NEW WORK.
2. UNLESS WHERE OTHERWISE NOTED, ALL DIMENSIONS ARE TO BE CENTERLINE OF THE DEVICE.
3. "GENERAL NOTES" SHOWN ON AN INDIVIDUAL DRAWING APPLY TO ALL WORK SHOWN ON THAT SHEET. "KEY NOTES" ONLY APPLY TO SPECIFIC ITEMS WHERE ANNOTATED AT SPECIFIC LOCATIONS. SOME KEY NOTES MAY NOT APPLY TO ANY SPECIFIC ITEMS.

ABBREVIATIONS

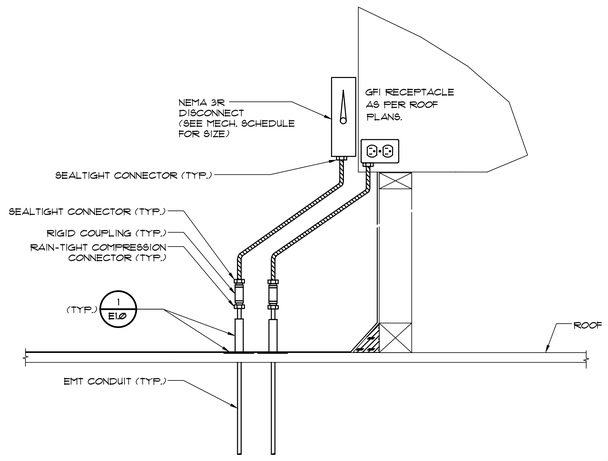
A	AMPERE (AMPS)
AC	ALTERNATING CURRENT
AF	AMPS-FRAME (RATING)
AIC	AMP INTERRUPTING CURRENT
AM	AMMETER
AS	AMP SWITCH (FUSED SWITCH RATING)
AT	AMPS-TRIP (RATING)
AWG	AMERICAN WIRE GAUGE
BC	BARE COPPER
BLDG	BUILDING
C	CONDUIT
CB	CIRCUIT BREAKER
CO	CONDUIT ONLY
CT	CURRENT TRANSFORMER
CU	COPPER
CFOI	CONTRACTOR FURNISHED OWNER INSTALLED
CFCI	CONTRACTOR FURNISHED CONTRACTOR INSTALLED
DPDT	DOUBLE POLE DOUBLE THROW
DPST	DOUBLE POLE SINGLE THROW
DWG	DRAWING
EX	EXISTING
FLA	FULL LOAD AMPS
FVR	FULL VOLTAGE REVERSING
FVNR	FULL VOLTAGE NON-REVERSING
GFI	GROUND FAULT INTERRUPTER
GRD/GND	GROUND
HID	HIGH INTENSITY DISCHARGE
HOA	HAND-OFF-AUTOMATIC
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
HZ	HERTZ
KW	KILOWATT
LCL	LONG CONTINUOUS LOAD
LRA	LOCKED ROTOR AMPS
LTG	LIGHTING
MCC	MOTOR CONTROL CENTER
MCM (KCM)	THOUSAND CIRCULAR MILS
MECH	MECHANICAL
NC	NORMALLY CLOSED
NF	NON-FUSED
NO	NORMALLY OPEN/NUMBER
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED OWNER INSTALLED
P	POLE
PH	PHASE
POC	POINT OF CONNECTION
PRS	PVC COATED RIGID STEEL (CONDUIT)
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE DUCT
SWBD	SWITCHBOARD
TYP	TYPICAL
UG	UNDERGROUND
UON	UNLESS OTHERWISE NOTED
V	VOLT
VA	VOLTAMPERES
VM	VOLTMETER
VL	VERIFY LOCATION
W	WIRE/WATTS
WP	WEATHERPROOF (NEMA TYPE 3R)
WT	WATERTIGHT
XP	EXPLOSION PROOF (RATED FOR AREA HAZARD)



CONDUIT ROOF PENETRATION DETAIL

NO SCALE

DET-E01 — 1 / E1.0



A/C UNIT CONNECTION DETAIL

NO SCALE

DET-M01 — 2 / E1.0

MECHANICAL EQUIPMENT SCHEDULE

MARK	VOLTAGE/ PHASE	CONDUIT/ WIRE	FUSE	DISC. SWITCH	PANEL	REMARKS
DPC O-1	208V / 1 PH	3/4"C, 3#12, 1#12 GND	NA	MANUAL MOTOR STARTER SWITCH	PANEL 'O'	0.5 FLA
DPC J-1	208V / 1 PH	3/4"C, 3#12, 1#12 GND	NA	MANUAL MOTOR STARTER SWITCH	PANEL 'J'	0.5 FLA
CU O-1	208V / 3 PH	1"C, 3#10, 1#10 GND	40	60A / 2P / 3R	PANEL 'O'	24 MCA (1)
CU J-1	208V / 3 PH	1"C, 3#10, 1#10 GND	40	60A / 2P / 3R	PANEL 'J'	24 MCA (1)
EF O-1	120V / 1 PH	EXISTING	NA	MANUAL MOTOR STARTER SWITCH	.	0.25 HP, 6 MCA
EF O-2	120V / 1 PH	EXISTING	NA	MANUAL MOTOR STARTER SWITCH	.	0.167 HP, 5 MCA
EF O-3	120V / 1 PH	EXISTING	NA	MANUAL MOTOR STARTER SWITCH	.	0.167 HP, 5 MCA
EF O-4	120V / 1 PH	EXISTING	NA	MANUAL MOTOR STARTER SWITCH	.	0.167 HP, 5 MCA
EF O-5	120V / 1 PH	EXISTING	NA	MANUAL MOTOR STARTER SWITCH	.	0.167 HP, 5 MCA
EF J-1	120V / 1 PH	EXISTING	.	MANUAL MOTOR STARTER SWITCH	.	0.167 HP, 5 MCA
EF J-2	120V / 1 PH	EXISTING	.	MANUAL MOTOR STARTER SWITCH	.	0.167 HP, 5 MCA
EF J-3	120V / 1 PH	EXISTING	.	MANUAL MOTOR STARTER SWITCH	.	0.167 HP, 5 MCA
EF J-4	120V / 1 PH	EXISTING	.	MANUAL MOTOR STARTER SWITCH	.	0.25 HP, 6 MCA
EF J-5	120V / 1 PH	EXISTING	.	MANUAL MOTOR STARTER SWITCH	.	0.167 HP, 5 MCA
	.	"C, #, # GND	.	A / P / R	.	MCA
	.	"C, #, # GND	.	A / P / R	.	MCA
	.	"C, #, # GND	.	A / P / R	.	MCA
	.	"C, #, # GND	.	A / P / R	.	MCA
	.	"C, #, # GND	.	A / P / R	.	MCA
	.	"C, #, # GND	.	A / P / R	.	MCA
	.	"C, #, # GND	.	A / P / R	.	MCA
	.	"C, #, # GND	.	A / P / R	.	MCA

BakerNowicki design studio
624 Broadway, Suite 405, San Diego, California 92101
619.795.2450
www.bndesignstudio.com

PERRIS UNION HIGH SCHOOL DISTRICT
CALIFORNIA MILITARY INSTITUTE HVAC UPGRADES

KEY NOTES:

1. INDOOR UNIT FED FROM OUTDOOR UNIT. PROVIDE CONDUIT AND CONDUCTORS FROM INDOOR UNIT TO OUTDOOR UNIT AS REQUIRED BY MECHANICAL.

REGISTERED PROFESSIONAL ENGINEER GARY D. JOHNSON No. E 11512 Exp. 6-30-2016 ELECTRICAL STATE OF CALIFORNIA
#15081 1/22/2016
JOHNSON CONSULTING ENGINEERS, INC.
Power | Lighting | Multimedia
Communications | Data Networking
12875 Brookprinter Place, Suite 300
Poway, CA 92064
P 858.679.4030 | F 858.513.0559
www.jce-inc.com

ELECTRICAL LEGEND

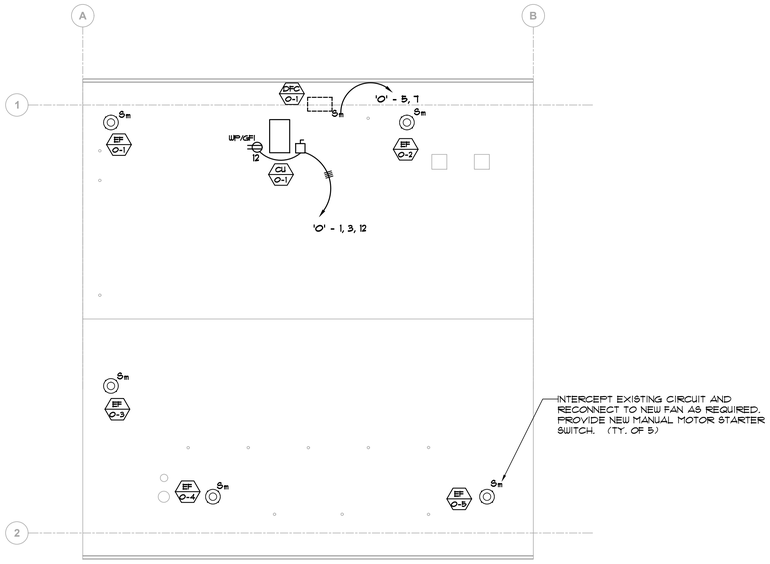
NO.	DATE	ISSUE
1	XX/XX/XX	-

PROJECT NO 15040-00
DATE: 1/29/2016

DRAWING

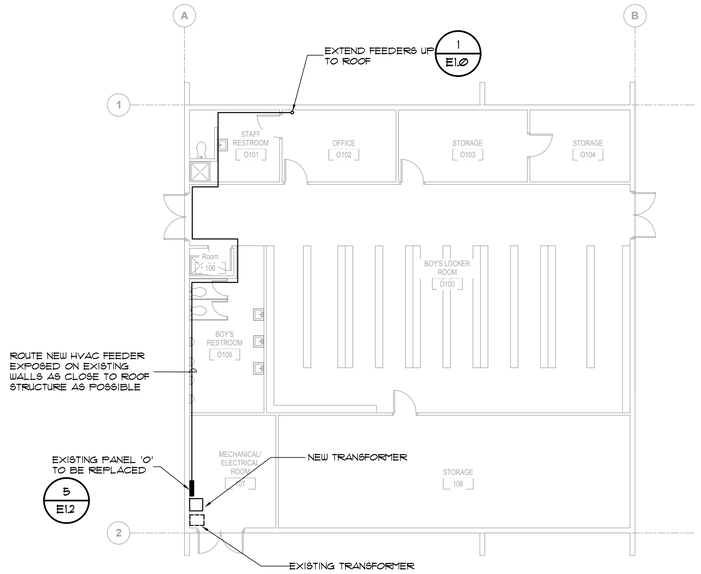
E1.0

PLOT DATE: 1/22/2016 1:46:22 PM 01/22/16 1:46:22pm 240 yzhang
FILE: N:\2015\15081\001-E1.0.dwg
LAST SAVED BY: 1/22/2016 1:43:50 PM YZHANG



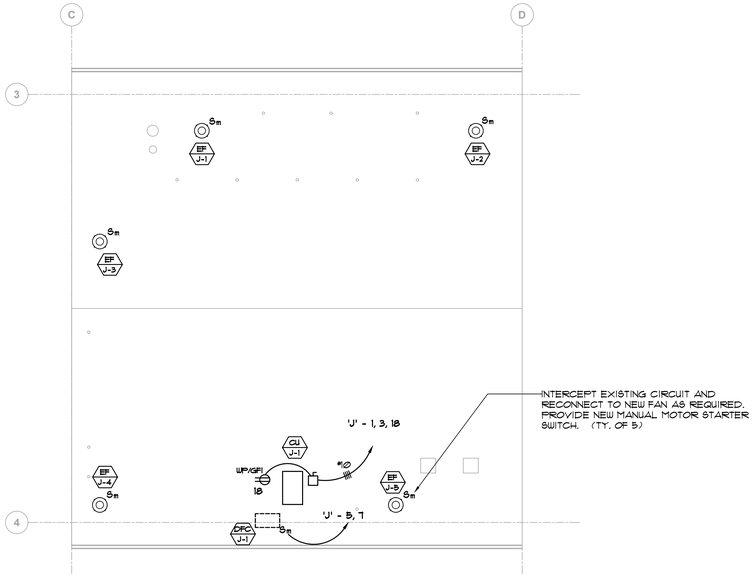
3 ROOF PLAN-BUILDING O

1/8" = 1'-0"



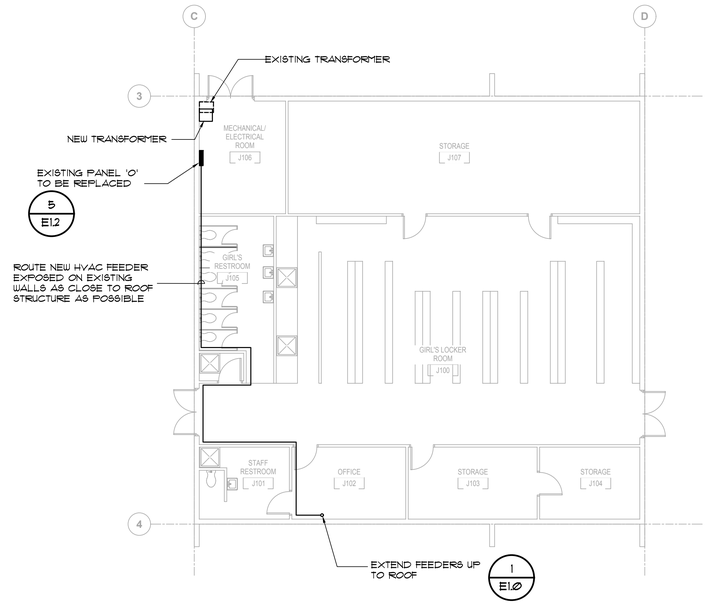
1 FLOOR PLAN-BUILDING O

1/8" = 1'-0"



4 ROOF PLAN-BUILDING J

1/8" = 1'-0"



2 FLOOR PLAN-BUILDING J

1/8" = 1'-0"

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www.bndesignstudio.com

PERRIS UNION HIGH SCHOOL DISTRICT
CALIFORNIA MILITARY INSTITUTE HVAC UPGRADES

REGISTERED PROFESSIONAL ENGINEER
GARY D. JOHNSON
No. 11512
Exp. 6-30-2016
ELECTRICAL
STATE OF CALIFORNIA
#5081 1/23/2016
JOHNSON CONSULTING ENGINEERS, INC.
Power | Lighting | Multimedia
Communications | Data Networking
12875 Brookprinter Place, Suite 300
Poway, CA 92064
P 858.679.4030 | F 858.513.0559
www.jce-inc.com

BLDG O & J - FLOOR PLAN & ROOF PLAN POWER

NO.	DATE	ISSUE
1	XX/XX/XX	-

PROJECT NO 15040-00
DATE: 1/29/2016

DRAWING

E1.1

PLOT DATE: 1/23/2016 10:41:41 AM
01/23/16 10:41:41am 96 yzhang
FILE: N:\2015\15081\001-E11.dwg
LAST SAVED BY: 1/23/2016 10:41:24 AM YZHANG

120/208	120/208 3PH, 4WIRE	60 AMP	Main	Breaker X	ENCLOSURE TYPE	ENCLOSURE NOTE
	200% Neutral Bus			Lug	X NEMA TYPE 1	
J	(INTEGRAL)TVSS Protection		Enclosure	Recessed	NEMA TYPE 3R	
	(REMOTE)TVSS Protection			Surface X	NEMA TYPE 4X	
	Service Entrance Rated	GENERAL DISTRIBUTION	PROVIDE LOCK ON BREAKER DEVICES FOR ALL EMERGENCY LIGHTING,			
	Load Side Feed thru Lugs	BREAKER REQUIREMENTS :	MOTORS, AND FIRE ALARM EQUIPMENT SERVED FROM THIS PANEL			

LCL	NHL	CIRCUIT DESCRIPTION	AMP	POLE	NO	PHASE A	PHASE B	PHASE C	NO	AMP	POLE	CIRCUIT DESCRIPTION	LCL	NHL
X		CU - J1	60	2	1	2880			2	15	1	EXISTING CIRCUITS		
					3	600			4	15	1	EXISTING CIRCUITS		
X					5		2880		6	20	1	EXISTING CIRCUITS		
		DFC-J1	20	2	7	60	600	60	8	20	2	EXISTING CIRCUITS		
					9	1500		600	10					
		EXISTING CIRCUITS	20	1	11		400		12	20	1	EXISTING CIRCUITS		
					13	400	150	400	14	20	1	Spare		
		EXISTING CIRCUITS	20	1	15			400	16	20	1	Spare		
					17		600		18	20	1	ROOF RECEPT		
		EXISTING CIRCUITS	15	1	19	600	200	600	20	20	1	SPACE		
					21			200	22	20	1	SPACE		
		EXISTING CIRCUITS	20	1	23				24	20	1	SPACE		
					25				26					
		EXISTING CIRCUITS	20	1	27				28					
					29				30					
		EXISTING CIRCUITS	20	1	31				32					
					33				34					
		EXISTING CIRCUITS	20	1	35				36					
					37				38					
		EXISTING CIRCUITS	20	1	39				40					
					41				42					
SPECIAL PANEL									NOTE #1					
NOTE									NOTE #2					
NHL= Non Harmonic Load		TOTAL LOAD PER PHASE				6040	4830	2260						
LCL= Long Continuous Load		25% LONG CONTINUOUS LOADS				720	720	0	HIGH PHASE	6760	/ 0.9pf = KVA @	120V	62.6	AMPS
									ALL PHASES	14570	/ 0.9pf = KVA @	208V/3Ph	45.0	AMPS
		SUB PANEL												
Max. Neut. Load		SUB PANEL							DEMAND PER					
86 AMPS		TOTAL CONNECTED LOAD				6760	5550	2260		NEC 220-34	0 sq. ft.			AMPS

NOTE: CONTRACTOR SHALL FIELD MEASURE THE AMPACITY OF ALL EXISTING CIRCUITS PRIOR TO DEMOLITION AND RECONNECT TO NEW PANEL TO BALANCE THE LOAD ON ALL PHASES.

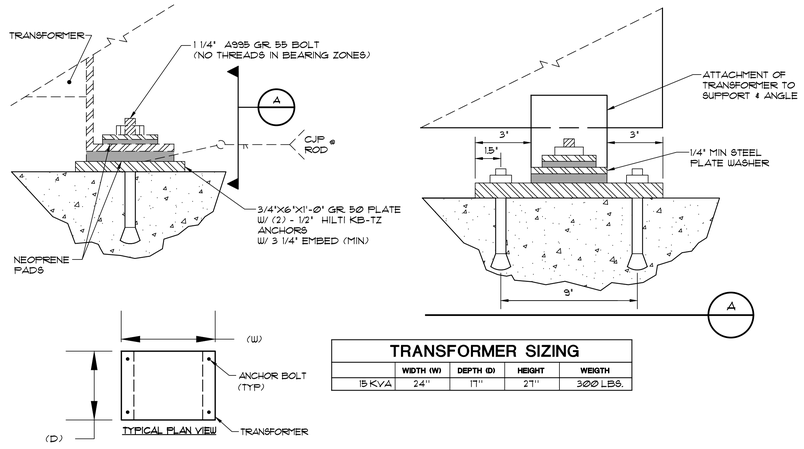
PANEL 'J'
NO SCALE
1 / E1.2

PANEL 'O'
NO SCALE
2 / E1.2

120/208	120/208 3PH, 4WIRE	60 AMP	Main	Breaker X	ENCLOSURE TYPE	ENCLOSURE NOTE
	200% Neutral Bus			Lug	X NEMA TYPE 1	
O	(INTEGRAL)TVSS Protection		Enclosure	Recessed	NEMA TYPE 3R	
	(REMOTE)TVSS Protection			Surface X	NEMA TYPE 4X	
	Service Entrance Rated	GENERAL DISTRIBUTION	PROVIDE LOCK ON BREAKER DEVICES FOR ALL EMERGENCY LIGHTING,			
	Load Side Feed thru Lugs	BREAKER REQUIREMENTS :	MOTORS, AND FIRE ALARM EQUIPMENT SERVED FROM THIS PANEL			

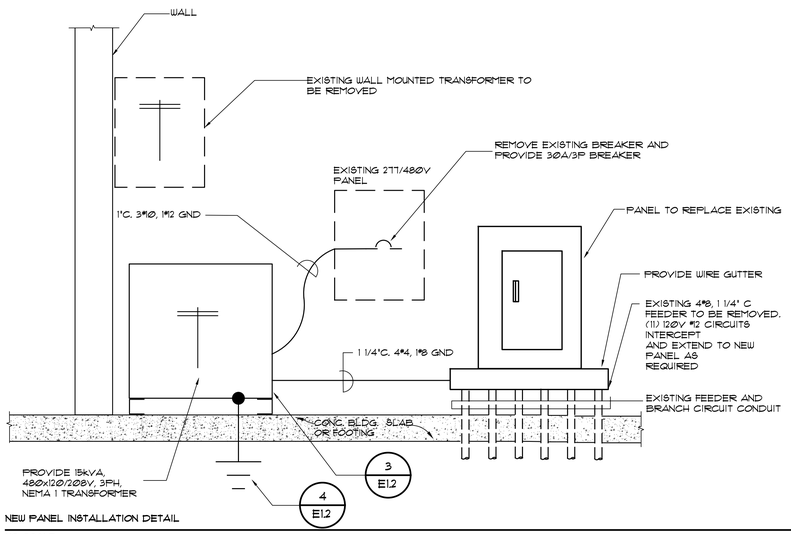
LCL	NHL	CIRCUIT DESCRIPTION	AMP	POLE	NO	PHASE A	PHASE B	PHASE C	NO	AMP	POLE	CIRCUIT DESCRIPTION	LCL	NHL
X		CU - O1	60	2	1	2880			2	15	1	EXISTING CIRCUITS		
					3	600			4	15	1	EXISTING CIRCUITS		
X					5		2880		6	20	1	EXISTING CIRCUITS		
		DFC-O1	20	2	7	60	600	60	8	20	2	EXISTING CIRCUITS		
					9	1500		600	10					
		EXISTING CIRCUITS	20	1	11		400		12	20	1	ROOF RECEPT		
					13	400	150	400	14	20	1	Spare		
		EXISTING CIRCUITS	20	1	15			400	16	20	1	Spare		
					17		600		18	20	1	SPACE		
		EXISTING CIRCUITS	20	1	19	600	200	600	20	20	1	SPACE		
					21			200	22	20	1	SPACE		
		SPACE	20	1	23				24	20	1	SPACE		
					25				26					
		SPACE			27				28					
					29				30					
					31				32					
					33				34					
					35				36					
					37				38					
					39				40					
					41				42					
SPECIAL PANEL									NOTE #1					
NOTE									NOTE #2					
NHL= Non Harmonic Load		TOTAL LOAD PER PHASE				6040	4830	1810						
LCL= Long Continuous Load		25% LONG CONTINUOUS LOADS				720	720	0	HIGH PHASE	6760	/ 0.9pf = KVA @	120V	62.6	AMPS
									ALL PHASES	14120	/ 0.9pf = KVA @	208V/3Ph	43.6	AMPS
		SUB PANEL												
Max. Neut. Load		SUB PANEL							DEMAND PER					
86 AMPS		TOTAL CONNECTED LOAD				6760	5550	1810		NEC 220-34	0 sq. ft.			AMPS

NOTE: CONTRACTOR SHALL FIELD MEASURE THE AMPACITY OF ALL EXISTING CIRCUITS PRIOR TO DEMOLITION AND RECONNECT TO NEW PANEL TO BALANCE THE LOAD ON ALL PHASES.

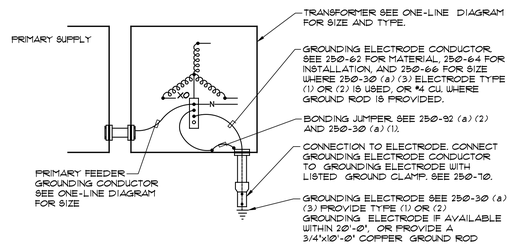


TRANSFORMER SIZING				
	WIDTH (W)	DEPTH (D)	HEIGHT	WEIGTH
15 KVA	24"	17"	27"	300 LBS.

TRANSFORMER ANCHORAGE DETAIL
NO SCALE
3 / E1.2



NEW PANEL INSTALLATION DETAIL
NO SCALE
5 / E1.2



THREE PHASE TRANSFORMER GROUNDING
NO SCALE
DET-06 (NEC CEC)
4 / E1.2

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619.795.2450
www.bndesignstudio.com

PERRIS UNION HIGH SCHOOL DISTRICT
CALIFORNIA MILITARY INSTITUTE HVAC UPGRADES

REGISTERED PROFESSIONAL ENGINEER GARY D. JOHNSON No. 15512 6-30-2016 ELECTRICAL STATE OF CALIFORNIA
#15081 1/22/2016
JOHNSON CONSULTING ENGINEERS, INC.
Power | Lighting | Multimedia
Communications | Data Networking
12875 Brookprinter Place, Suite 300
Poway, CA 92064
P 858.679.4030 | F 858.513.0559
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PANEL SCHEDULE & DETAILS

NO.	DATE	ISSUE
1	XX/XX/XX	-

PROJECT NO 15040-00
DATE: 1/29/2016

DRAWING
E1.2

PLOT DATE: 1/22/2016 1:54:52 PM 01/22/16 1:54:52pm 240 yzhang
FILE: N:\2015\15081\001-E1.2.dwg
LAST SAVED BY: 1/22/2016 1:54:45 PM YZHANG

BID FORM

TO: Perris Union High School District, herein called "District".

1. Pursuant to and in compliance with your Notice Inviting Bids and other documents relating thereto, the undersigned bidder, having familiarized himself with the terms of the contract, the local conditions affecting the performance of the contract and the cost of the work at the place where the work is to be done, hereby proposes and agrees to perform within the time stipulated, the contract, including all of its component parts, and everything required to be performed, including its acceptance by the District, and to provide and furnish any and all of the labor, materials, tools, expendable equipment, and all utility and transportation services necessary to perform the contract and complete in a workmanlike manner all of the work required in connection with the following:

Bid #022516 California Military Institute HVAC Upgrades

Scope as described in the Notice Inviting Bids, all in strict conformance with the drawings and other contract documents on file at the Facilities Planning Department of said District for amounts set forth herein.

2. ADDENDA

The undersigned has thoroughly examined any and all Addenda issued during the bid period and is thoroughly familiar with all contents thereof and acknowledges receipt of the following Addenda: (Bidder to list all addenda).

ADDENDUM NO. _____ DATE RECEIVED _____
ADDENDUM NO. _____ DATE RECEIVED _____
ADDENDUM NO. _____ DATE RECEIVED _____
ADDENDUM NO. _____ DATE RECEIVED _____

3. BASE BID :

TOTAL CASH PURCHASE PRICE IN WORDS (including any applicable allowances):

_____ DOLLARS

TOTAL CASH PURCHASE PRICE NUMERICAL (including any applicable allowances):

($_____) including all applicable taxes and licenses.

4. ALTERNATES: (If Applicable) The following amounts shall be added to or deducted from the Base Bid at the District's option.

Alternate 1 (Add / Deduct)*_____

Alternate 2 (Add / Deduct)*_____

Alternate 3 (Add / Deduct)*_____

Alternate 4 (Add / Deduct)*_____

*Line out "add" or "deduct" depending on which is not applicable. However, any other method or designation which clearly identifies the nature of the item shall also be acceptable. In absence of any clear indication of the additive or deductive nature of the item, it shall be assumed that the item is intended to be deductive in nature.

BID FORM

5. DISTRICTS RIGHT TO REJECT: 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 forty-five (45) days.

6. It is understood and agreed that if written notice of the acceptance of this bid is mailed, telegraphed or delivered to the undersigned after the opening of the bid, and within the time this bid is required to remain open, or at any time thereafter before this bid is withdrawn, the undersigned will execute and deliver to the District a contract in the form attached hereto in accordance with the bid as accepted, and that he will also furnish and deliver to the District the Performance Bond and Payment Bond as specified, all within seven (7) days after receipt of notification of award, and that the work under the contract shall be commenced by the undersigned Bidder, if awarded the proceed, and shall be completed by the Contractor in the time specified in the contract documents.

7. NOTICE OF AWARD: Notice of Award or other correspondence should be addressed to the undersigned at the address stated on next page.

8. NAME OF PRINCIPALS: The names of all persons interested in the foregoing proposal as principals are as follows:

   _____

   _____

   _____

   (IMPORTANT NOTICE: If Bidder or other interested person is a corporation, state legal name of corporation, also names of the president, secretary treasurer and manager thereof; if a co-partnership, state true name of firm, also names of all individual, state first and last names in full.)

9. The undersigned Bidder declares that he or she is licensed in accordance with the act providing for registration of Contractors and the documentation of this licensure is as follows:

   Bidder's License Number is: _____

   Classification: _____

   License Expiration Date Is: _____

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

10. The undersigned Bidder declares that he or she:

    - ☐ Is a resident California company
    - ☐ Is not a resident California company

    The undersigned certifies (or declares) under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

11. In the event the Bidder to whom Notice of Award is given fails or refuses to post the required bonds and return executed copies of the agreement form within five (5) calendar days from the date of receiving the Notice of Award, the District may declare the Bidder's bid deposit or bond forfeited as damages.

BID FORM

_____
Proper Name of Bidder

By:_____ By:_____
Signature Signature

_____ _____
Typed or Printed Name Typed or Printed Named

_____ _____
Title Title

NOTE: If bidder is a corporation, the legal name of the corporation shall be set forth above together with the signature of authorized officers or agents and the document shall bear the corporate seal; if Bidder is a partnership, the true name of the firm shall be set forth above together with the signature of the partner or partners authorized to sign contracts on behalf of the partnership: and if Bidder is an individual, his signature shall be paced above.

Street Address: _____

City & State: _____

Telephone: _____

Fax: _____

END OF DOCUMENT

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we _____, as Principal, and _____ _____, as Surety, an admitted Surety insurer pursuant to Code of Civil Procedure, Section 995.120, legally doing business in California at_____, are held and firmly bound unto the Perris Union High School District, hereinafter referred to as District, in the penal sum of TEN PERCENT (10%) OF THE TOTAL AMOUNT OF THE BID of the Principal submitted to the said District for the work described below for the payment of which sum is lawful money of the United States, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has submitted the accompanying bid dated _____, 20_____, for construction of:

Bid #022516 California Military Institute HVAC Upgrades

NOW THEREFORE, the Principal shall not withdraw said bid within 30 days after said opening; and the Principal, when given Notice of Intent to Award Contract, shall within seven (7) days after the prescribed forms are presented to him for signature, return executed copies of the Agreement to the District, in accordance with the bid as accepted and give bond with good and sufficient surety or sureties, as may be required, for the faithful performance and proper fulfillment of such contract and for the payment for labor and materials used for the performance of the contract, or in the event of the withdrawal of said bid within the period specified or the failure to enter into such contract and give such bonds within the time specified, the Principal shall pay the District the difference between the amount specified in said bid and the amount for which the District may procure the required work and/or supplies if the latter amount be in excess of the former, together with all costs incurred by the District in again calling for bids, then the above obligation shall be void and of no effect, otherwise to remain in full force and virtue.

Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract on 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 said contract or the call for bids, or to the work, or the specifications.

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

IN WITNESS WHEREOF the above-bound parties have executed this instrument under their several seals this _____ day of _____, 20_____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

(Corporate Seal)

_____

Principal

By

_____

Title

_____

(Corporate Seal)

_____

Surety

By

_____

Title

_____

(Attach Attorney-in-Fact Certificate)

DESIGNATION OF SUBCONTRACTORS

To Be Submitted With Bid

In compliance with the Subletting and Subcontracting Fair Practices Act (Public Contract Code commencing at Section 4100) and any amendments thereof, each bidder shall set forth below:

(a) The name and the location of the place of business of each subcontractor who will perform work or labor or render service to the prime contractor in or about the construction of the work or improvement, or a subcontractor licensed by the state of California who, under subcontract to the prime contractor, specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of one-half of one percent of the prime contractor's total bid or, in the case of bids or offers for the construction of streets or highways, including bridges, in excess of one-half of one percent of the prime contractor's total bid or ten thousand dollars ($10,000), whichever is greater.

(b) The portion of the work to be done by each subcontractor under this act.

The prime contractor shall list only one subcontractor for each such portion as is defined by the prime contractor in this bid.

If a prime contractor fails to specify a subcontractor or if a prime contractor specifies more than one subcontractor for the same portion of work to be performed under the contract in excess of one-half of one percent of the prime contractor's total bid, he shall be deemed to have agreed that he is fully qualified to perform that portion himself, and that he shall perform that portion himself.

No prime contractor whose bid is accepted shall:

(a) Substitute any subcontractor,

(b) Permit any subcontract to be voluntarily assigned or transferred or allow it to be performed by anyone other than the original subcontractor listed in the original bid or;

(c) Sublet or subcontract any portion of the work in excess of one-half of one percent of the prime contractor's total bid as to which his original bid did not designate a subcontractor, except as authorized in the Subletting and Subcontracting Fair Practices Act.

Subletting or subcontracting of any portion of the work in excess of one-half of one percent of the prime contractor's total bid as to which no subcontractor was designated in the original bid shall only be permitted in cases of public emergency or necessity, and then only after a finding reduced to writing as a public record of the authority awarding this contract setting forth the facts constituting the emergency or necessity.

A prime contractor violating any of the provisions of Section 4100 of the Public Contract Code shall be deemed to be in violation of this contract and the District may exercise the option, in its own discretion, of (1) canceling the contract or (2) assessing the prime contractor a penalty in an amount of not more than 10 percent of the amount of the subcontract involved.

DESIGNATION OF SUBCONTRACTORS

To Be Submitted With Bid

SUBCONTRACTORS LIST
All Subcontractors in excess of 1/2 of 1% of total bid must be listed.

SUBCONTRACTOR:		ITEM OF WORK:
LOCATION/ADDRESS:		
LICENSE NO. **CLASS:**	**EXPIRATION DATE:** / /	PHONE: ( )
SUBCONTRACTOR:		ITEM OF WORK:
LOCATION/ADDRESS:		
LICENSE NO. **CLASS:**	**EXPIRATION DATE:** / /	PHONE: ( )
SUBCONTRACTOR:		ITEM OF WORK:
LOCATION/ADDRESS:		
LICENSE NO. **CLASS:**	**EXPIRATION DATE:** / /	PHONE: ( )
SUBCONTRACTOR:		ITEM OF WORK:
LOCATION/ADDRESS:		
LICENSE NO. **CLASS:**	**EXPIRATION DATE:** / /	PHONE: ( )
SUBCONTRACTOR:		ITEM OF WORK:
LOCATION/ADDRESS:		
LICENSE NO. **CLASS:**	**EXPIRATION DATE:** / /	PHONE: ( )

PROPER NAME OF BIDDER

BY

NONCOLLUSION DECLARATION
TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

The undersigned declares:

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

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

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____ (date), at _____ (city), _____ (state).

Bidder Name (Person, Firm, Corp)	Authorized Representative Signature
Address	Representative's Name
City, State, Zip	Representative's Title

CERTIFICATION PAGE

1. SITE VISIT CERTIFICATION

I certify that I have visited the site of the proposed work and have fully acquainted myself with the conditions relating to construction and labor, and I fully understand the facilities, difficulties, and restrictions attending the execution of the work under the contract.

I fully indemnify Perris Union High School District, its officers, agents, employees, the Architect and any of its consultants from any damage, or omissions, related to conditions that could have been identified during my visit to the site.

2. EMPLOYMENT CERTIFICATION

I certify that I, the undersigned bidder, have not been convicted in the preceding five (5) years of the date established for receipt of bids, of violating a state or federal law respecting the employment of undocumented aliens.

3. DEBARRMENT CERTIFICATION

I certify that I, the undersigned bidder, will not contract with any debarred subcontractor and should any public money be paid to a debarred subcontractor on this project, same shall be returned to the awarding body.

4. CHILD AND FAMILY SUPPORT OBLIGATION CERTIFICATION

I certify that I, the undersigned bidder, shall fully comply with all the requirements of Chapter 8 (commencing with Section 5200) of Part 5 of Division 9 of the Family Code. Compliance shall include providing names of all new employees to the New Hire Registry maintained by the Employment Development Department.

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

_____
(Signature of Bidder)

_____
(Typed Name of Bidder)

SUBSCRIBED BEFORE ME on this _____day of _____, 20_____

_____
Notary Public

My Commission Expires: _____

INFORMATION REQUIRED OF BIDDER
General Information

The Bidder shall furnish the following information. Failure to comply with this requirement will render the proposal informal and may cause it to be rejected. Additional sheets may be attached if necessary. "You" or "Your", as used herein, refers to the Bidder's firm and any of its officers, directors, shareholders, parties, and principals.

1. Firm Name and Address:

_____

_____

2. Telephone:_____ Fax_____

3. Type of Firm (check one)

Individual_____ Partnership_____ Corporation_____ Joint Venture____

4. Contractor's License: Primary Classification _____

License No.:_____ Expiration Date: _____

Supplemental classification held, if any, and license number (s) and expiration date(s):

_____

No payment shall be made for work or material under the contract unless and until the Registrar of Contractors verifies to the District that the Contractor was properly licensed at the time the contract was awarded and Contractor continues to be so licensed throughout the term of the contract. Any Contractor not so licensed is subject to penalties under the law.

The District is required to verify license prior to awarding a bid. State law generally provides it is a misdemeanor to submit a bid to a public agency without having a license.

5. Have you ever been licensed under a different name or different license number?
If Yes, give name and license number.

6. Names and titles of all officers of the firm:

_____ _____

_____ _____

_____ _____

7. Number of years as a Contractor in construction work of this type:

8. Person who inspected site of the proposed work for your firm:

Name and Title:_____

Date of Inspection:_____

INFORMATION REQUIRED OF BIDDER
General Information

9. How many years of experience in school construction work has your organization had?

   (a) As a general contractor?_____

   (b) As a subcontractor? _____

10. Has your firm or any of its principals defaulted so as to cause a loss to a surety? _____
    If the answer is "Yes", give dates, names, and address of surety and details.

    _____

    _____

    _____

11. Have you been assessed liquidated damages for any project in the past three (3) years? _____
    If the answer is "Yes", please explain:

    _____

    _____

    _____

12. Have you been in litigation on a question relating to our performance on a contract during the past three (3) years?
    _____ If the answer is "Yes", please explain and provide case name and number:

    _____

    _____

13. Have you ever failed to complete a project in the last three (3) years? _____ If the answer is "Yes", please provide the owner's name and details:

    _____

    _____

    _____

14. List the names, addresses and telephone numbers of three Architects or Engineers whose jobs you have worked on in the past three (3) years:

    Name Address Telephone

    _____

    _____

    _____

INFORMATION REQUIRED OF BIDDER
General Information

15. Do you now or have you ever had any direct or indirect business, financial or other connection with any official, employee, or consultant of the District or Architect? If the answer is "Yes", please explain.

_____

_____

_____

INFORMATION REQUIRED OF BIDDER
List of References

The following information should contain person or entities familiar with the Bidder's Work:

1. Name of Agency: _____

   Address: _____

   Contact Person/Telephone: _____

   Type of Construction Project: _____

   Contract Amount: _____

2. Name of Agency: _____

   Address: _____

   Contact Person/Telephone: _____

   Type of Construction Project: _____

   Contract Amount: _____

3. Name of Agency: _____

   Address: _____

   Contact Person/Telephone: _____

   Type of Construction Project: _____

   Contract Amount: _____

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

Executed this _____day of _____20_____, at _____
.

_____ _____
Proper Name of Bidder Typed or Printed Name

By: _____ _____
Signature Title

IRAN CONTRACTING ACT CERTIFICATION
(Public Contract Code Section 2200 et seq.)

District Project Name: **Bid #022516 California Military Institute HVAC Upgrades**

Contractor Name: _____

I, the person who is identified below and who has signed this certification, hereby certify subject to penalty for perjury that: (i) I have inherent authority, or I have been duly authorized by the Contractor, to execute this certification on behalf of the Contractors; and (ii) the option checked below relating to the Contractor's status in regard to the Iran Contracting Act of 2010 (Public Contract Code Section 2200 et seq.) is true and correct:

☐ The Contractor is NOT:

(i) Identified on the current list of persons and entities engaging in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203; or

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

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

☐ The final GMP payable to the Contractor for the Project as of the date of this certification does not exceed $1,000,000.

Certifier Signature: _____

Printed Name: _____

Title: _____

Executed At: _____

Date Executed: _____

Please note: In accordance with Public Contract Code Section 2205, false certification of this form may result in civil penalties equal to the greater of $250,000 or twice the contract amount, termination of the contract and/or ineligibility to bid on contracts for three years.

CERTIFICATION REGARDING CONTRACTOR REGISTRATION

District: Perris Union High School District

Project: **Bid #022516 California Military Institute HVAC Upgrades**

Contractor: _____

The undersigned hereby certifies to the District, subject to penalty for perjury pursuant to the laws of the State of California, that the following is true and correct:

(i) I am a duly-authorized representative of the Contractor and, in that capacity, I have executed this certification on behalf of the Contractor.

(ii) The Contractor is aware and acknowledges that, on and after March 1, 2015, and except as authorized by Business and Professions Code Section 7029.1 and Public Contract Code Section 20103.5, no contractor may bid on a public works project unless the contractor is, and no subcontractor may be listed in any bid for a public works project unless the subcontractor is, currently registered with the DIR and qualified to perform public work pursuant to Labor Code Section 1725.5.

(iii) The Contractor is aware and acknowledges that, on and after April 1, 2015, no contractor or subcontractor may be awarded a contract for work on a public works project, or may perform any work on a public works project, unless the contractor or subcontractor is currently registered with the DIR and qualified to perform public work pursuant to Labor Code Section 1725.5.

(iv) The Contractor is aware and acknowledges that, notwithstanding anything to the contrary, if at any time during the performance of the Work, the Contractor or any of its Subcontractors is not duly registered pursuant to Labor Code Section 1725.5 (including, without limitation, if the registration expires or the DIR revokes the registration), the District may cancel the Contract and/or replace the Contractor or Subcontractor with a contractor or subcontractor that is duly registered pursuant to Labor Code Section 1725.5, and the Contractor and/or its surety shall be responsible for any and all associated costs incurred by the District.

(v) The Contractor and each Subcontractor who will perform any of the Work are duly registered with the DIR pursuant to Labor Code Section 1725.5.

(vi) Evidence (in the form described in the note below) that the Contractor and each Subcontractor are duly registered with the DIR pursuant to Labor Code Section 1725.5 is attached to this certification.

Representative Name: _____

Representative Title: _____

Representative Signature: _____

Date Signed: _____

Note: This certification must be accompanied by print-outs of the applicable screens on the DIR website evidencing that the Contractor and all Subcontractors are currently registered pursuant to Labor Code Section 1725.5.

GENERAL PROVISIONS

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PART 1
ACKNOWLEDGMENT, ORGANIZATION, AND INTERPRETATION OF GENERAL PROVISIONS

1.1 Contractor Acknowledgment of General Provisions. These General Provisions are an integral component of the Contract Documents. By entering into the Contract, the Contractor: (i) acknowledges that it had the opportunity prior to submitting its bid for the Work to review and seek clarification of any and all of these General Provisions from the District, Architect, and/or Project Manager; and (ii) acknowledges and agrees that the Contractor shall be deemed and construed to have read and that it fully understands these General Provisions. The Contractor shall not disclaim either knowledge of, or the meaning and effect of, any term or provision of these General Provisions and shall strictly abide by their meaning and intent. The Contractor further acknowledges that these General Provisions include requirements for including various provisions in the Contractor's contracts with its Subcontractors. **THE CONTRACTOR MUST PROVIDE A COPY OF THESE GENERAL PROVISIONS TO EACH SUBCONTRACTOR AND SHALL REQUIRE IN EACH OF ITS SUBCONTRACTS THAT THE SUBCONTRACTOR ALSO MUST READ AND UNDERSTAND THESE GENERAL PROVISIONS.**

1.2 Organization of General Provisions. These General Provisions are organized according to general subject matter. However, requirements applicable to any particular item, material, service, scope, *et cetera*, may be included in multiple provisions of these General Provisions. Therefore, unless expressly stated otherwise, the requirements of any one provision in these General Provisions shall not be deemed or construed to govern or apply exclusively over other provisions in these General Provisions applicable to the same item, material, service, scope, *et cetera*. The provisions of these General Provisions are also organized based on a numbering system in which: (i) Parts (e.g., Part 3) may be subdivided into Sections (e.g., Section 3.5); and (ii) Sections may be subdivided into Subsections (e.g., Subsection 3.5.1). Lists (i.e., enumerations of items) are set forth in these General Provisions using Romanette symbols (i.e., i, ii, iii, iv, *et cetera*).

1.3 Guides for Interpreting General Provisions. As used in these General Provisions, "shall" and "must" shall be deemed and construed as mandatory, and "may" shall be deemed and construed as permissive. If any pronoun, term or phrase in these General Provisions is stated in either the masculine or feminine sense (e.g., "materialman"), the pronoun, term or phrase, unless otherwise required by context, shall be interpreted as including both or either of such genders. Unless specified otherwise, any reference in these General Provisions to a number of "days," "months," or "years" shall mean, respectively, calendar days, months or years. Unless specified otherwise, any reference in these General Provisions to a number of "hours," "days," "weeks," "months" or "years" shall mean, respectively, consecutive hours, days, weeks, months or years. Language in these General Provisions to the effect that the Contractor or other person or entity is to provide or furnish something, or words to the same or similar effect, shall be deemed to mean that the thing must be "provided, complete in place," "furnished and installed," or otherwise incorporated into the Work and/or used as necessary to complete the Work and/or administer the Contract in accordance with the Contract Documents. For the convenience of the reader and in order to shorten the length of these General Provisions, capitalized terms are used in these General Provisions to designate defined terms. Each term or phrase that is not capitalized or defined shall be construed in accordance with the meaning commonly associated with such term or phrase within the State and region within which the Project is located.

1.4 Locations of Definitions of Capitalized Terms. For the convenience of the reader, the following table specifies the location in these General Provisions and other Contract Documents of the

definitions of certain capitalized terms used in these General Provisions. The following table may not include all such capitalized terms and, therefore, should not be considered to be a comprehensive list of all such defined terms.

Defined Term	***Location of Definition in General Provisions***	***Location of Definition in Other Contract Documents***
Abnormal Weather	Section 13.15	
Accident Report	Subsection 11.10.1	
Addenda	Section 4.5	
Architect*	Section 2.2	*Identified in Special Provisions
Architect Field Directive	Section 17.3	
Asbestos Remediation	Section 15.5	
Authorized Contractor Officer		Section 14, Instructions For Bidders
Authorized District Officer	Section 2.1	
Bulletin	Subsection 4.13.3	
Cal-OSHA	Section 11.4	
CCR		Section 2, Instructions For Bidders
Certificate of Insurance	Section 6.12	
Certification of Final Inspection	Section 18.3	
Certification of Payment	Subsection 21.13.3	
Change Order	Section 17.2	
Change Order Cost	Section 17.8	
Change Order Request	Section 17.8	
Claim	Section 24.1	
Clarification	Subsection 4.13.3	
Commencement Date		Section 4, Construction Services Agreement
Compensable Delay	Section 13.18	
Conduct Rules	Section 10.20	
Construction Change Directive	Subsection 17.1.3	

Defined Term	*Location of Definition in General Provisions*	*Location of Definition in Other Contract Documents*
Construction Progress Payment	Section 21.16	
Contract	Section 4.1	
Contract Documents	Section 4.1	
Contractor All-Risk Policy	Subsection 6.5.5	
Contractor Guarantee	Section 20.2	
Contract Price		Section 5, Construction Services Agreement
Contract Time		Section 4, Construction Services Agreement
County	Section 7.5	
Deferred Approval	Section 5.10	
District All-Risk Policy	Section 6.3	
District Board	Section 2.1	
District Indemnitee	Section 23.1	
Drawings	Subsection 4.3.1	
Emergency	Section 3.7	
Employer Liability Policy	Section 6.5.3	
EPA	Section 15.6	
FCD	Section 17.1.2	
Guarantee Period	Section 20.4	
Guarantee Work	Section 20.7	
HCP	Section 15.2	
Inspector of Record	Section 2.2	
Insurance Policy / Insurance Policies	Section 6.4	
Interpretation	Subsection 4.13.3	
Job Superintendent	Subsection 3.4.1	
LCP		Notice Inviting Bids

Defined Term	*Location of Definition in General Provisions*	*Location of Definition in Other Contract Documents*
Liability Policy	Section 6.5.1	
Master Construction Schedule	Subsection 13.3.1	
MSDS	Section 15.2	
Non-Compensable Delay	Section 13.17	
Notice of Actual Delay	Section 13.11	
Notice of Anticipated Delay	Section 13.10	
Notice of Award		Section 26, Instructions For Bidders
Notice of Completion	Section 18.9	
Notice of Intent to Terminate for Cause	Section 22.2	
Notice of Termination for Cause	Section 22.2	
Notice of Termination for Convenience	Section 22.6	
Notice to Proceed		Section 4, Construction Services Agreement
NPDES	Section 8.13	
OCIP	Section 6.2	
OSHA	Section 11.4	
Payment Bond	Section 7.2	
PCC Claims Procedures	Section 24.7	
Performance Bond	Section 7.2	
Pre-Construction Activities	Section 13.2	
Preliminary Materials List	Section 5.7	
Prevailing Wage Laws	Section 12.1	
Professional Liability Policy	Section 6.5.4	
Progress Payment Request	Subsection 21.8.1	
Progress Payment Review Meeting	Section 21.7	
Project		Notice Inviting Bids
Project Acceptance Date	Section 18.9	

Defined Term	*Location of Definition in General Provisions*	*Location of Definition in Other Contract Documents*
Project Manager*	Section 2.2	* Identified in Special Provisions
Project Site		Section 5, Instructions For Bidders
Rain Day	Section 13.4	
Record Drawings and Specifications	Subsection 3.9.1	
Record Drawings Change Log	Subsection 3.9.3	
Records of the Work	Section 3.11	
Recovery Schedule	Section 13.8	
Regular Working Hours		Section 15, Special Provisions
Remaining Work	Section 18.5	
Request for Proposal / RFP	Section 17.7	
Retention	Section 21.14	
RFI	Subsection 4.13.1	
Safety Officer	Subsection 11.3.1	
Safety Program	Section 11.2	
Sample	Section 5.9	
Schedule of Values	Section 21.2	
Shop Drawing	Section 5.8	
Sole-Source Item		Section 8, Special Provisions
Specifications	Subsection 4.4.1	
Specified Item	Section 14.4	
State	Section 3.12	
Subcontract	Subsection 3.5.1	
Subcontractor	Subsection 3.5.1	
Substantial Completion Date	Section 19.1	
Surety Bonds	Section 7.3	
SWPPP	Section 8.13	

Defined Term	*Location of Definition in General Provisions*	*Location of Definition in Other Contract Documents*
Trench Safety Plan	Section 11.7	
Vehicle Liability Policy	Section 6.5.2	
Work		Section 2, Construction Services Agreement
Work by Others		Section 1, Instructions For Bidders
Workers Compensation Policy	Section 6.5.3	

(The remainder of this page intentionally left blank.)

PART 2
DISTRICT ADMINISTRATION OF THE CONTRACT

2.1 Status of Authorized District Officers. The staff member(s) and/or officer(s) of the District who are authorized to represent the District in connection with the Contract and the Project are identified in the Special Provisions (each an "Authorized District Officer"). The District may at any time change any Authorized District Officer, and the District will provide notice of any such change to the Contractor. The Contractor must not rely on any notice, order or other communication from the District that is not signed, given or directed by an Authorized District Officer, and even then, the Contractor must be aware of the limitations on authority of any Authorized District Officer as set forth in these General Provisions. The governing board of the District ("District Board") may have delegated to one or more Authorized District Officers the authority to approve changes in the Work costing up to a specific dollar amount and/or an amount not in excess of the limitations set forth in Public Contract Code Section 20118.4. The Contractor shall be responsible for verifying whether the District Board has delegated any such approval authority, as well as any limitations on such approval authority. **EXCEPT AS EXPRESSLY PROVIDED IN THESE GENERAL PROVISIONS WITH RESPECT TO ARCHITECT FIELD DIRECTIVES, NO DISTRICT OFFICER, STAFF MEMBER, CONSULTANT, CONTRACTOR OR OTHER PERSON (REGARDLESS OF WHETHER SUCH PERSON IS AN AUTHORIZED DISTRICT OFFICER) HAS THE ABILITY OR AUTHORITY TO ORDER ANY CHANGE IN THE WORK OR ANY OF THE DRAWINGS, SPECIFICATIONS OR OTHER CONTRACT DOCUMENTS ABSENT ACTION BY THE DISTRICT BOARD TO APPROVE THE CHANGE, WHETHER DIRECTLY OR BY DELEGATION OF AUTHORITY.**

2.2 Status of District Contract Representatives. In connection with the Project, the District has contracted, or will contract, for the services of: (i) an architect, engineer, or other design professional responsible for designing and obtaining approvals for the Project, interpreting the Drawings and Specifications for the Project, and performing general observation of the Work and any Work by Others ("Architect"), and the Architect is identified in the Special Provisions; (ii) a professional management consultant responsible for administering the Contract on behalf of the District and for monitoring and facilitating completion of the Work, any Work by Others, and the Project ("Project Manager"), and the Project Manager is identified in the Special Provisions; and (iii) a certified inspector responsible for general observation of the Work and any Work by Others ("Inspector of Record"). The District may, from time to time, contract with other consultants who will provide services in connection with the Work and/or the Project, including, without limitation, any special inspectors required for specific aspects of the Work, such as masonry, welding and painting inspectors. The Architect, Project Manager, Inspector of Record and any other District consultants shall be representatives of the District for purposes of some or all of the planning, design, bidding, construction and close-out of the Project. The District may terminate its contract with any District consultant and may enter into one or more contracts for services in substitution of and/or in addition to those terminated.

2.3 General Authority of District Contract Representatives. The Architect, Project Manager and Inspector of Record shall have authority to act on behalf of the District to the extent provided in the Contract Documents or as otherwise determined by the District. The Contractor shall be responsible for understanding the scope of authority possessed by each of the Architect, Project Manager and Inspector of Record in connection with the Work and the Project. If, after good-faith and reasonable review of the Contract Documents, the Contractor needs clarification of the scope of authority of any District contract representative, the Contractor may submit a written request for clarification to the Project Manager, who will forward the request to the District for response. The Contractor and each Subcontractor, materialman and other person or entity that furnishes any labor, materials, services, goods or other things in connection

with the Work shall, within the time specified, comply with all instructions, directions, and other requirements of the Architect, Project Manager, Inspector of Record and other consultant that are within the respective scopes of authority of such District representatives.

2.4 Avoiding Conflicts of Interests. For all purposes of the Contract, each of the Architect, Project Manager, Inspector of Record, and any special inspectors and other District contract representatives, and each of their employees, consultants and sub-consultants, is solely and exclusively a representative of the District and is not and may not be a partner, officer, employee, agent or representative of the Contractor or any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things pursuant to the Contract. If the Contractor or any Subcontractor, materialman, or other person or entity that furnishes labor, materials, services, goods or other things in connection with the Work sends any correspondence (e.g., letter, memorandum, facsimile, e-mail, *et cetera*) to any such District contract representative, the sender must provide a complete copy of the correspondence and all enclosures, attachments, exhibits, *et cetera*, to the District. The Contractor must not solicit or offer any act, compensation or other consideration of any type or form, from or to any such District contract representative, or act in any other manner that would result in, or create the appearance of, a conflict of interest for any such District contract representative. The Contractor also must not solicit or offer any act, compensation or other consideration of any type or form, from or to any District officer, employee, or agent, or act in any other manner that would result in, or create the appearance of, a conflict of interest for any such District officer, employee or agent.

2.5 Services and General Authority of Architect. The Architect, with the assistance of the Project Manager, will provide services in accordance with the agreement between the District and the Architect, including, without limitation: (i) administering the Contract Documents; (ii) observing the Work at intervals sufficient to become generally familiar with the progress and quality of the Work; (iii) determining if the Work is being performed in accordance with the Contract Documents; (iv) advising the District regarding compliance with the Contract Documents; and (v) interpreting and deciding matters related to performance of the Work and requirements of the Contract Documents. The Architect's decisions as to matters within the Architect's scope of authority, including, without limitation, matters relating to aesthetic effect, shall be final for the purposes of the Contractor proceeding with the Work.

2.6 Services and General Authority of Project Manager. The Project Manager, with the assistance of the Architect, will provide services in accordance with the agreement between the District and the Project Manager, including, without limitation: (i) providing administrative, management and related services necessary to coordinate the Work of the Contractor with the work of any other contractors and with the activities and responsibilities of the Architect, the Project Manager and the District, in order to ensure completion of the Project in accordance with the District's objectives for cost, time and quality; (ii) scheduling and conducting pre-construction, construction, and progress meetings to discuss such matters as procedures, progress problems and scheduling; (iii) determining whether the Work of the Contractor is being performed in accordance with the requirements of the Contract Documents and endeavoring to guard against defects and deficiencies in the Work; (iv) advising the District and the Architect with respect to Work that does not or may not conform to requirements of the Contract Documents; (v) making recommendations to the Architect regarding any special inspection or testing of any Work that does not or may not conform to the Contract Documents; (vi) consulting with the Architect and District if the Contractor requests interpretations of the meaning and intent of the Drawings and Specifications, and assisting in the resolution of questions that may arise; (vii) receiving documentation from the Contractor and its Subcontractors as may be required pursuant to the Contract Documents; (viii) establishing and implementing procedures for

expediting the processing, review and approval of shop drawings, product data sheets, samples and other submittals; and (ix) preparing, maintaining and monitoring the Project schedule and all critical path items.

2.7 Services and General Authority of Inspector of Record. The Inspector of Record will be responsible for continuously observing the Work in accordance with the requirements of Title 24 of the CCR. The Contractor shall not perform any portion of the Work absent knowledge by the Inspector of Record that the Work is to occur, and the Contractor shall not perform any of the Work that is to occur on the Project Site if the Inspector of Record is not present on the Project Site. The Contractor may not perform any of the Work on federal or State holidays observed by the Inspector of Record, regardless of whether the Contractor or its Subcontractors observe such federal or State holidays. The Contractor shall, on an ongoing basis, keep the Inspector of Record fully informed regarding the progress and manner of the Work and the type and character of materials and equipment incorporated into the Work. The Contractor shall provide written notice to the Inspector of Record not later than forty-eight hours in advance of each special or other inspection required in connection with the Work.

2.8 General Authority to Reject Non-Conforming Work. Each of the Architect, Project Manager and Inspector of Record has the authority to reject Work that does not conform to any requirement of the Contract Documents. If any of the Architect, Project Manager or Inspector of Record identifies Work that potentially does not or will not conform to any requirement of the Contract Documents, or otherwise determines that it is necessary or advisable in order to ensure compliance with requirements of the Contract Documents, they may recommend to the District that it require additional inspection or testing of Work, whether such Work is then fabricated, installed or completed. The costs of any such additional inspection or testing shall be paid as provided in Section 8.21 of these General Provisions. In no event shall the District, Architect, Project Manager or Inspector of Record be liable to the Contractor, or to any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work, on account of any failure by the Architect, Project Manager or Inspector of Record to identify and/or reject any Work that does not or will not conform to requirements of the Contract Documents, and no such failure shall be deemed or construed to relieve the Contractor from its obligation to complete the Work in accordance with the Contract Documents.

2.9 General Authority to Stop or Suspend Work. Each of the District, Architect, Construction Manger and Inspector of Record has the authority to stop or suspend some or all of the Work if: (i) they determine in their reasonable judgment that conditions are unsuitable for proceeding with the Work, including, without limitation, if harm or damage to persons or property reasonably may result if the Work were to proceed; (ii) the Contractor fails to correct defective Work as directed; or (iii) the Contractor fails to carry out the Work in a manner that ensures it will be completed in accordance with the Contract Documents. The Project Manager also has the authority to suspend the Work, in whole or in part, for such periods as the Project Manager may deem necessary if: (i) necessary to coordinate the Work with the work of the District or separate contractors; or (ii) the Contractor fails to supply a sufficient amount of skilled labor or suitable materials or equipment for some or all of the Work. The Contractor shall immediately comply with, and shall cause each Subcontractor to immediately comply with, each order by the District, Architect, Project Manager and/or Inspector of Record to stop or suspend the Work. The Project Manager shall issue any and all orders to resume stopped or suspended Work, and the Contractor shall not permit the stopped or suspended portion of the Work to resume until so ordered. In no event shall the District, Architect, Project Manager or Inspector of Record be liable to the Contractor, or to any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work, on account of any failure by the District, Architect, Project Manager or Inspector of Record to identify

situations in which the Work arguably should or could have been stopped or suspended, and no such failure shall be deemed or construed to relieve the Contractor from its obligation to complete the Work in accordance with the Contract Documents.

2.10 Contractor Must Ensure Access to the Work. The District, Architect, Project Manager and Inspector of Record shall at all times have unrestricted access to any and all portions of the Work, whether completed or in progress, and whether located on or off the Project Site. The Contractor must ensure that: (i) such unrestricted access is available at all times; (ii) safe and proper facilities are available as necessary to permit such access; and (iii) the activities and operations of the Contractor and each Subcontractor are conducted in a manner that permits safe and proper access.

2.11 Contractor Must Provide Information Upon Request. Upon request, the Contractor shall promptly furnish to the District, Architect, Project Manager and/or Inspector of Record such information as may be necessary for any of them to fully and adequately perform their duties in connection with the Project. The amount of time that the Contractor takes to provide requested information shall be commensurate with the type and scope of information requested, but in each case shall not exceed a reasonable amount of time or such time as may result in any delay to the critical path of the Work or the Project.

2.12 Communications from Contractor. Except as otherwise provided in the Contract Documents, after award of the Contract to the Contractor, if the Contractor, or any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work, desires to communicate (including, without limitation, providing requested information) with the District, the Architect, or any of the Architect's consultants, the Contractor must submit such communication in writing to the Project Manager, who will forward the communication to the District and other appropriate party or parties. Notwithstanding the foregoing, if the Contractor determines that special circumstances warrant direct communications with the District, the Contractor may submit such communication in writing directly to the District.

2.13 Communications to and through Contractor. As they determine necessary or convenient, the District, the Architect, any of the Architect's consultants, and the Project Manager may communicate verbally or in writing with the Contractor. With respect to normal day-to-day administration of the Contract, if the District, the Architect or any of the Architect's consultants desire to communicate with any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work, the Project Manager will submit such communication in writing to the Contractor, who shall forward the communication to the appropriate Subcontractor, materialman, or other person or entity. Any communication intended for a Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work shall be deemed given and effective upon delivery to the Contractor. Notwithstanding the foregoing, if the District determines that any direct communication with any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work is necessary or convenient, the District may cause such communication to be submitted in writing directly to such Subcontractor, materialman, or other person or entity, and will send a copy of such communication to the Contractor. Nothing in this Section 2.13 shall be deemed or construed to prohibit the Project Manager, the Inspector of Record or any special inspector from directly communicating with any employee or other representative of any Subcontractor, materialman, or other person or entity that furnishes any labor,

materials, services, goods or other things in connection with the Work, who is or that is present at the Project Site or other location where any portion of the Work is to be performed.

2.14 Contractor Retains Responsibility for Work. Except as expressly provided in the Contract Documents, the District, Architect, Project Manager and/or Inspector of Record shall have no control over and shall not be responsible for: (i) the construction means, methods, techniques, and procedures employed by the Contractor in connection with the Work; (ii) the fabrication, procurement, shipment, delivery, receipt or installation of any materials, equipment, work or services incorporated into the Work; (iii) safety precautions and/or safety programs required in connection with the Work; (iv) the failure of the Contractor or any Subcontractor to carry out Work in accordance with the Contract Documents; or (v) acts or omissions of the Contractor or any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work. Neither performance by the Architect, Project Manager and/or Inspector of Record of their respective duties in connection with the Project, nor approval or disapproval by the Architect, Project Manager and/or Inspector of Record of any portion of the Work, shall be deemed or construed to: (i) limit the Contractor's responsibility for overseeing and controlling all aspects of the Work; (ii) relieve the Contractor of the responsibility to ensure full compliance with all requirements of the Contract Documents; or (iii) relieve the Contractor from responsibility for correction of subsequently discovered defects.

2.15 Contractor Responsibility for Additional Professional Services. If, due to any request, act, failure or default of the Contractor in connection with the Work or the performance pursuant to the Contract Documents by or on behalf of the Contractor, it is necessary for the District to provide or obtain professional services in addition to what otherwise would be required in connection with the administration of the Contract, the District shall be entitled to reimbursement from the Contractor for any and all costs of such additional services. The District may deduct such costs from any amounts otherwise due to the Contractor in accordance with the Contract Documents or, if such amounts are insufficient, the Contractor shall pay the difference to the District. The District's right of reimbursement pursuant to this Section is independent from and in addition to, and shall not be deemed or construed as a waiver or release of, any other rights or remedies the District may have pursuant to the Contract Documents or applicable law, including, without limitation, the right of the District to assess liquidated damages as permitted by the Contract Documents. By way of example, and not as a limitation, the causes that may lead to the necessity for the District to provide or obtain additional professional services may include: (i) defects or deficiencies in the Work; (ii) failure of the Contractor to comply with any requirement of the Contract Documents; (iii) evaluation, processing and acts taken in furtherance of requests for substitutions of products, materials, equipment; (iv) evaluation, processing and acts taken in furtherance of requests for substitution of Subcontractors; (v) evaluation, processing and acts taken in connection with Claims submitted by the Contractor related to Work not authorized by Change Order, Construction Change Directive or Architect Field Directive; (vi) failure of the Contractor to prosecute and complete the Work in a timely manner consistent with the requirements of the Contract Documents; (vii) testing, adjusting, balancing and start-up of equipment in excess of the amounts customarily associated with such equipment; (viii) review of any submittal more than twice (i.e., an initial and follow-up review) as described in Part 5 herein.

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PART 3
CONTRACTOR ADMINISTRATION OF THE CONTRACT

3.1 Status of Contractor. For all purposes of the Contract, the Contractor shall be deemed and construed to be an independent contractor, not an officer, employee, partner, consultant, agent or other representative of the District. In addition, each Subcontractor, materialman, and other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work shall be deemed and construed to be solely and exclusively a representative of the Contractor, not an officer, employee, partner, consultant, agent or other representative of the District. Therefore, the District shall in no event be responsible or liable for any acts, omissions, liabilities or other obligations of the Contractor or any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work. Except as expressly authorized in writing by the District or expressly permitted by the Contract Documents, neither the Contractor nor any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work shall act as an agent or other representative of the District, or cause, suffer or permit anyone at any time to have or continue in any such apparent belief.

3.2 Contractor Solely Responsible for Work. Except as expressly provided in the Contract Documents, the Contractor shall be solely responsible and liable for: (i) the construction means, methods, techniques, and procedures employed by the Contractor in connection with the Work; (ii) as applicable, the fabrication, procurement, quality, quantity, shipment, delivery, receipt and installation of any materials, equipment, work or services incorporated into the Work; (iii) safety precautions and/or safety programs required in connection with the Work; (iv) the failure of the Contractor or any Subcontractor to carry out Work in accordance with the Contract Documents; and (v) acts or omissions of the Contractor or any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work. Without limiting the foregoing, the 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 performance of the Work, and all Work shall be solely at the Contractor's risk with the exception of damage to the Work in excess of five percent of the Contract Price caused by any tidal wave or earthquake in excess of 3.5 on the Richter Scale (which exception shall apply only if the damaged portion of the Work had been constructed or otherwise performed in accordance with the Contract Documents). The Contractor shall not be deemed or construed to be relieved, to any extent, from any responsibility for performance of any obligation pursuant to the Contract Documents because such obligation is being or will be performed by any Subcontractor.

3.3 General Responsibilities of Contractor. Without limiting or conditioning any responsibilities the Contractor has pursuant to the Contract Documents, and except as expressly provided in the Contract Documents, the Contractor shall:

(i) Employ or otherwise maintain on-site and off-site staff sufficient to appropriately administer the Contract;

(ii) Procure all materials, equipment, services and other things as necessary to complete the Work within the time, and in accordance with all other requirements of, the Contract Documents;

(iii) Continuously provide such force of skilled and fit workers as necessary to complete the Work within the time, and in accordance with all other requirements of, the Contract Documents;

(iv) Continuously supervise and direct the Work using the Contractor's best skill and attention;

(v) Perform no Work absent knowledge by the Inspector of Record that the Work is to occur;

(vi) Perform the Work in conformance with all requirements of the Contract Documents and any shop drawings, product data sheets, samples, *et cetera*, that are approved in accordance with the Contract Documents;

(vii) Perform the Work in accordance with all applicable laws, regulations, rules, ordinances, and other governmental and quasi-governmental requirements, including, without limitation, applicable building codes;

(viii) Control and be solely responsible for scheduling and sequencing the various portions and elements of the Work;

(ix) Control and be solely responsible for the means, methods, techniques and procedures for completing the Work;

(x) Coordinate and sequence the Work with any and all Work by Others in order to avoid any delays in either the Work or such Work by Others, as well as any delays in completing the Project;

(xi) Control and be responsible for all quality control in connection with the Work; and

(xii) Immediately correct Work that does not conform to the Drawings, Specifications or other Contract Documents.

3.4 Requirements for Job Superintendent.

3.4.1 No Work if Job Superintendent Not Present. At all times during which any portion of the Work is being performed, the Contractor shall have a superintendent for purposes of the Work ("Job Superintendent") present on the Project Site. No portion of the Work that is to occur on the Project Site may commence or continue to be performed if the Job Superintendent is not present at the Project Site, including, without limitation, at any time the Contractor is seeking approval of a replacement Job Superintendent.

3.4.2 Selection and Replacement of Job Superintendent. Prior to commencing any portion of the Work, the Contractor shall provide to the District, in writing, the name and qualifications of the person who will serve as the Job Superintendent. The District, in its reasonable discretion, may approve or disapprove of any Job Superintendent or may require that the Contractor replace any Job Superintendent. The Contractor also may request that the District permit the Contractor to replace any Job Superintendent. The Contractor shall not replace a Job Superintendent unless: (i) the District requires replacement of a Job Superintendent; (ii) the District consents to a request by the Contractor to replace a Job Superintendent; or (iii) a Job Superintendent leaves or is terminated from his or her employment with the Contractor. If it becomes necessary to replace a Job Superintendent, the Contractor shall provide in writing to the District the name and qualifications of a proposed replacement, who shall be subject to District approval as provided herein.

3.4.3 Job Superintendent Must be Exclusive to the Work. The Contractor must employ the Job Superintendent as a full-time employee. During the course of the Work, the Contractor shall dedicate the Job Superintendent on a full-time and exclusive basis to the Work, and the Job Superintendent shall not provide services in connection with any other work or project.

3.4.4 Responsibilities and Authority of Job Superintendent. The Job Superintendent shall be the Contractor's representative for all purposes of the Work, and shall oversee, direct, and be responsible for the Contractor's operations on the Project Site and the performance of the Work. The Job Superintendent shall receive and accept all directives and other communications given to the Contractor by the District, Architect, Project Manager or Inspector of Record, which communications shall be binding on the Contractor as if given directly to the Contractor. During the course of the Work, only the Job Superintendent shall be permitted to submit any RFI, regardless of whether the request originated with the Contractor or any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work. Each and every act and decision of the Job Superintendent shall be deemed and construed to be an act and decision of the Contractor and shall bind the Contractor. Prior to commencing any portion of the Work, the Contractor must take whatever action(s) as may be necessary to authorize the Job Superintendent to the extent provided in this Subsection 3.4.4.

3.5 Requirements for Subcontractors.

3.5.1 Written Subcontracts Required. For purposes of the Contract, each person and entity that will perform, pursuant to direct or indirect agreement with the Contractor (i.e., of any tier), any portion of the Work or supply, manufacture or fabricate any materials, equipment, and/or other things to be specially designed, made and/or worked in connection with the Work is referred to in these General Provisions as a "Subcontractor." The Contractor shall enter into appropriate, written contracts with each Subcontractor that will furnish any such labor, materials, services or other things through direct agreement with the Contractor (each a "Subcontract"). Each Subcontract shall: (i) bind the Subcontractor to the requirements of the Contract Documents to the extent of the Work to be performed by such Subcontractor; (ii) provide that nothing in the Subcontract shall be deemed or construed to constitute a limitation or waiver of any right of the District pursuant to the Contract Documents; (iii) provide that the District is an intended third-party beneficiary of the Subcontract; and (iv) provide that, upon termination of the Contractor's right to perform the Work, the District may, in its sole discretion, assume the Subcontract in order to continue the Work to be performed by such Subcontractor. Prior to entering into a Subcontract, the Contractor shall provide to the Subcontractor a copy of at least the portion of the Contract Documents to which the Subcontractor will be bound. Within five days of entering into any Subcontract, the Contractor must provide to the District a copy of the Subcontract, including, without limitation, any exhibits and/or attachments thereto.

3.5.2 Subcontractors Have No Contractual Privity with District. Unless the District assumes a particular Subcontract after terminating the Contractor's right to perform the Work, nothing in the Contract Documents or any Subcontract shall be deemed or construed to create any contractual relationship between the District and any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work. The District shall have no obligation to ensure the payment of money to any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work, except as may be required by law and except for Subcontracts assumed by the District as described above in this Section 3.5. The Contractor is and shall remain fully responsible and liable to the District for all acts and omissions of any and all Subcontractors, materialmen, and other persons or entities that furnish any labor,

materials, services, goods or other things in connection with the Work, and their respective contractors, employees, agents and other representatives.

3.5.3 Subcontractors Must be Appropriately Licensed. Each Subcontractor that will perform any portion of the Work, to the extent required by law, must be duly and appropriately licensed by the Contractors State License Board prior to commencing such portion of the Work.

3.5.4 District Approval of Subcontractors. The District's consent to or approval of any Subcontractor (regardless of whether resulting from a request by Contractor for consent to substitution of a Subcontractor) shall in no event be deemed or construed to constitute a waiver or release of the Contractor's obligations pursuant to the Contract Documents. The Contractor shall not permit any portion of the Work to be performed by any person or entity in substitution of a Subcontractor originally listed by the Contractor unless the Contractor first obtains the District's consent to substitution in accordance with Public Contract Code Section 4100 *et seq*. In no event shall the District's consent to the substitution of a Subcontractor be deemed or construed to constitute a basis for any increase in the Contract Price or extension of the Contract Time.

3.6 Prohibition Against Unlawful Discrimination. In connection with the Contract and the performance of the Work, including, without limitation, in regard to their employment practices, the Contractor and each Subcontractor of every tier must comply with, and must not discriminate or provide preferential treatment in violation of, any and all applicable federal, State and other anti-discrimination laws, rules, regulations and requirements, as amended from time to time, including, but not limited to:

(i) The Fair Employment and Housing Act (Cal. Gov. Code Section 12900 *et seq.*);

(ii) The Unruh Civil Rights Act (Civil Code Section 51 *et seq.*);

(iii) California Government Code Section 11135 *et seq.*;

(iv) California Labor Code Section 1101 *et seq.*;

(v) California Labor Code Section 1735;

(vi) The Federal Civil Rights Act of 1964 (42 U.S.C. Section 2000e *et seq.*);

(vii) The Americans With Disabilities Act of 1990 (42 U.S.C. Section 12101 *et seq.*);

(viii) The Age Discrimination in Employment Act (29 U.S.C. Section 621 *et seq.*);

(ix) The Rehabilitation Act of 1973 (29 U.S.C. Section 701 *et seq.*); and

(x) Presidential Executive Order 11246.

3.7 Contractor Must Provide for Own Communications. The Contractor and each Subcontractor, materialman, and other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work shall provide their own means of communication, including, without limitation, any telephones, facsimile machines, radio communications devices, satellite connections,

internet connections, *et cetera*. Except in the event of an Emergency, in no event may the Contractor, or any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work, use any communication systems or facilities of the District, Architect, Project Manager and/or Inspector of Record. For purposes of these General Provisions, an "Emergency" is defined as a sudden, unexpected occurrence that creates a clear and imminent danger and that requires immediate action to prevent or mitigate any injury to any person (including death) or any damage to, or loss of, property or essential public services.

3.8 Contractor Must Maintain Reference Materials at Project Site. The Contractor shall maintain in good order at the Project Site: (i) one copy each of the current versions of Title 19 (Public Safety), Title 21 (Public Works), and Title 24 (Building Standards Code) of the CCR; (ii) the Record Drawings and Specifications, the Record Drawings Change Log, and copies of all Addenda, Bulletins, Interpretations, Clarifications, Change Orders, Architect Field Directives, Construction Change Directives, and other documents that modify, illustrate or explain the Contract; and (iii) one copy each of all approved shop drawings, product data sheets, samples, and similar submittals of the Contractor. The Contractor must continuously update or otherwise maintain current versions of such reference materials. Upon request, the Contractor must make any or all such reference materials available to the District, Architect, Project Manager and/or Inspector of Record.

3.9 Contractor Must Prepare Record Drawings and Specifications.

3.9.1 Changes to be Illustrated. During the course of performing the Work, and subject to any instructions or directions from the Architect, the Contractor must carefully and accurately illustrate, locate, dimension, note or otherwise describe on one full-size set of the Drawings and Specifications ("Record Drawings and Specifications") any and all deviations, corrections, deletions, additions, enhancements, expansions and/or clarifications of, from, or to the Work initially prescribed or shown, including, without limitation, any and all: (i) Work performed or completed differently than as initially shown or required; (ii) changes ordered pursuant to Architect Field Directives and/or Change Orders; (iii) Work performed in accordance with any Deferred Approvals; (iv) revisions to the Drawings and Specifications authorized during the course of the Work; (v) authorized substitutions of Specified Items; (vi) materials and/or products selected or approved for incorporation into the Work, including, without limitation, if the Specifications permit the Contractor to select among two or more brands or types of materials or equipment; (vii) final location of all electrical and mechanical equipment, utility lines, ducts, outlets, structural members, walls, partitions, and other significant elements of the Work; and (viii) all existing improvements, including, without limitation, any existing substructures, encountered during the performance of the Work that were not demolished or otherwise removed or relocated. No portion of the Work shall be permanently sealed or covered until all required information relating to such portion of the Work has been recorded for purposes of preparing the Record Drawings and Specifications.

3.9.2 Method of Illustrating. All changes illustrated on the Record Drawings and Specifications must be prepared by an experienced and qualified design professional or draftsperson. All changes must be illustrated in red ink (or other method approved by the Architect) and must employ dimensioning techniques and other drafting standards that are consistent with those used in the Contract Documents. If the Drawings and Specifications are not of sufficient size, scale or detail to appropriately illustrate the as-built Work, the Contractor must furnish its own drawings for incorporation of details and dimensions into the Record Drawings and Specifications. If shop drawings are used to illustrate portions of the as-built Work, the applicable portions of the Record Drawings and Specifications must be marked to reference such shop drawings. Changes, supplemental information and notes must be recorded in blank

areas of the Record Drawings and Specifications, such as page margins or the backs of opposite pages, or on separate sheets of paper inserted into the Record Drawings and Specifications. As-built changes to text must include lining out any superseded text so that it is still legible and can be compared to the inserted text. The cover sheet for each submittal of updated or revised Record Drawings and Specifications and/or Record Drawings Change Log must identify the person who illustrated the changes or revisions, and the date such changes or revisions were made; and such information shall also be included on each applicable sheet of the Record Drawings and Specifications and Record Drawings Change Log. The Architect or Project Manager may provide a standard certification block for use by the Contractor in submitting updates to the Record Drawings and Specifications and/or Record Drawings Change Log.

3.9.3 Timing and Approval of Updates. The Contractor must: (i) promptly, but in no event less than once per week, update the Record Drawings and Specifications to reflect any and all deviations, corrections, deletions, additions, enhancements, expansions, clarifications and other changes made since the previous update; and (ii) maintain an updated written log noting, in chronological order, each change made to the Record Drawings and Specifications, the person who made such change, and the date such change was made ("Record Drawings Change Log"). The Contractor must submit for approval, in triplicate, at the applicable Progress Payment Review Meeting, all changes to Record Drawings and Specifications and all entries to the Record Drawings Change Log made since the Contractor submitted the immediately preceding Progress Payment Request. Each update of the Record Drawings and Specifications and the Record Drawings Change Log is subject to approval by the Architect, the Project Manager and the Inspector of Record. If any revisions to any updated Record Drawings and Specifications or Record Drawings Change Log are required, the Contractor must promptly make such revisions and identify on the cover sheet for the revisions the person who made the revisions and the date such revisions were completed. The approval of the updated Record Drawings and Specifications and Record Drawings Change Log, and certification by the Contractor that the updated Record Drawings and Specifications fully and accurately reflect the Work as actually completed and in progress as of the end of the period covered by the associated Progress Payment Request, shall be condition precedents to payment to the Contractor pursuant to such Progress Payment Request.

3.9.4 Responsibility for Accuracy. The purpose of the Record Drawings and Specifications is to constitute an exact "as-built" record of the Work and, at all times after completion of the Work, the Contractor shall be responsible and liable for any and all inaccuracies in the Record Drawings and Specifications attributable to any failure by the Contractor to comply with the requirements of this Section 3.9. In connection with its oversight responsibilities for the Project, the Project Manager may require reasonable different or modified procedures for compliance with this Section 3.9.

3.10 Contractor Must Implement Document Control System. The Contractor must establish and implement an electronic document-control system for all documents prepared, received or obtained in connection with the Work, including, without limitation, all internal and external correspondence, project manuals and other documents, Drawings, Specifications, Change Orders, Construction Change Directives, Architect Field Directives, shop drawings, product data sheets, submittals, approvals, RFIs, Bulletins, Interpretations, Clarifications, responses to RFIs, invoices, payment receipts, conditional waivers, unconditional waivers, punch-lists, *et cetera*.

3.11 Contractor Must Maintain Records of the Work. The Contractor shall prepare, update and maintain on file, in its principal office, records of the Work containing all significant documentation related to the Work ("Records of the Work"), including, without limitation, copies of each Contract Document, Change

Order, Architect Field Directive, Construction Change Directive, Shop Drawing, product data sheet, Sample, submittal, approval, RFI, Bulletin, Interpretation, Clarification, invoice, payment receipt, conditional waiver, unconditional waiver, punch-list, et cetera. The Contractor shall organize and maintain the Records of the Work in a logical manner, based on subject matter and/or portion of the Work and chronologically. The Contractor shall require in each Subcontract that the Subcontractor prepare, update and maintain on file in its principal offices, such Records of the Work as are consistent with the requirements of this Section 3.11.

3.12 State Review and Audit of Records of the Work. In accordance with Government Code Section 8546.7, the State of California ("State") has the right to examine, review, audit and/or copy the Records of the Work during the three-year period following final payment to the Contractor pursuant to the Contract. In addition, the District, DSA, SAB and OPSC each hereby has the right to examine, review, audit and/or copy the Records of the Work during the four-year period following final payment to the Contractor pursuant to the Contract. Therefore, the Contractor shall preserve and retain all such Records of the Work for a period of four years commencing upon final payment to the Contractor pursuant to the Contract or, if an examination, review or audit is commenced but not completed within such four-year period, until such examination, review or audit has been completed. The Contractor, upon request, shall make the Records of the Work available for the purposes described in this Section 3.12 at all reasonable times during the period the Contractor is required to preserve and maintain the Records of the Work. In each Subcontract, the Contractor shall require that the Subcontractor preserve and retain its Records of the Work, and make those Records of the Work available for examination, review, audit and/or copying, to the same extent as is required of the Contractor pursuant to this Section 3.12.

3.13 Contractor Responsible for Subcontractor Compliance. Each Subcontractor and other person or entity on, at or in the vicinity of the Project Site on account of the Work must comply with all applicable provisions of these General Provisions (including, without limitation, standards of behavior), notwithstanding that: (i) various obligations set forth in these General Provisions are characterized as the Contractor's obligations; or (ii) the Contractor is expressly responsible in accordance with various provisions of these General Provisions for including certain obligations in its agreements with Subcontractors and others. The Contractor must ensure that each Subcontractor is aware of and understands: (i) the respective authority of the District, Architect, Project Manager and Inspector of Record pursuant to the Contract Documents; and (ii) all general requirements set forth in these General Provisions and other Contract Documents that are applicable to the Subcontractor. In no event shall the failure of any such Subcontractor to have any such awareness and/or understanding be deemed or construed to constitute a basis or excusable cause for any extension of the Contract Time or increase in the Contract Price. The Contractor shall be responsible and liable for any and all costs and/or delays arising from any failure by the Contractor to comply with the foregoing obligations.

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PART 4
THE CONTRACT AND CONTRACT DOCUMENTS

4.1 Scope and Coverage of Contract. The "Contract" and "Contract Documents" are hereby defined as all documents that establish the entire understanding and agreement between the District and the Contractor, regardless of when prepared or entered into, including, without limitation, the documents described in Section 3 of the Construction Services Agreement. The Contract represents the entire and integrated agreement between the District and the Contractor and supersedes any and all prior negotiations, representations, or agreements, whether written or oral. The Contract may be amended only in writing authorized by the District or as otherwise provided in the Contract Documents. The Contract Documents at any particular time shall be construed to include any then duly-authorized Change Orders, Architect Field Directives and other amendments to the Contract Documents. The Contract Documents shall not be deemed or construed to create a contractual relationship with or between any parties other than the District and the Contractor.

4.2 Construing the Contract Documents. The Contract Documents are intended to be complementary and, as described herein, inclusive of the Work to be completed by the Contractor. The Contract Documents are to be construed collectively as a whole; therefore, any item of Work required by any one or more of the Contract Documents, but not required by others, shall be provided by Contractor as if specifically required by each of the Contract Documents. However, if there is an inconsistency in the requirements of the Contract Documents, then: (i) the Construction Services Agreement shall be deemed and construed to govern over the Special Provisions; (ii) the Special Provisions shall be deemed and construed to govern over these General Provisions; (iii) these General Provisions shall be deemed and construed to govern over the Drawings and Specifications; (iv) the Specifications shall be deemed and construed to govern over the Drawings as to materials, workmanship, and installation procedures; and (v) a requirement in the Specifications that is more stringent, requires a higher quality and/or requires a greater quantity shall be deemed and construed to govern over other requirements in the Specifications.

4.3 Interpretation of Drawings.

4.3.1 Purpose and Scope. The Architect has prepared and/or approved graphic and pictorial illustrations in connection with the Project that show the design, location, and scope of certain portions of the Work and the Project, generally including plans, elevations, sections, details, schedules, and diagrams ("Drawings"). As applicable to the Work, the Drawings are intended to generally illustrate in a graphical manner certain portions of the Work to be performed by Contractor. The Drawings do not illustrate all of the Work that is to be performed by the Contractor. Although the Drawings are intended to illustrate portions of the Work that cannot readily or adequately be described in the Specifications, the Drawings may illustrate requirements that could have been described in the Specifications.

4.3.2 Scaled and Numerical Dimensions. Drawings illustrating a portion of the Work that are larger in scale than other Drawings illustrating that portion of the work shall govern over the smaller scale Drawings. However, in no event shall the Contractor perform, or permit to be performed, any of the Work based on scaled Drawings, and the Contractor shall perform the Work based only on any specified numerical dimensions. If a numerical dimension is not specified in the Contract Documents, the Contractor shall request such numerical dimension in writing to the Architect. Within a reasonable time after request, and to the extent necessary and appropriate, the Architect will issue an Architect Field Directive or other written directive to the Contractor setting forth the requested numerical dimension.

4.3.3 Notes and Schedules. Subject to any described limitations, any general notes set forth in the Drawings shall: (i) apply to all other portions of the Drawings; and (ii) any schedules set forth in the Drawings shall be interpreted as complementary with notes and other portions of the Drawings.

4.3.4 Typical Details. Subject to any described limitations, any details of any items or parts of the Work set forth in the Drawings shall be interpreted as typical for the Work and, if other items or parts of the Work of essentially the same construction are shown in outline only, the typical detail shall apply to such outlined Work.

4.3.5 Approximations. Any information illustrated or otherwise set forth in the Drawings relating to soils, groundwater or other surface or subsurface conditions, or to surface or subsurface elevations, shall be interpreted as approximate only, and the Contractor shall be responsible for inspecting and verifying the actual conditions of the Project Site.

4.4 Interpretation of Specifications.

4.4.1 Purpose and Scope. The Architect has prepared and/or approved written requirements for materials, equipment, construction systems, quality, workmanship, services and other things to be furnished in connection with the Work and the Project ("Specifications"). The Specifications are intended to generally describe the Work to be performed by Contractor. The Specifications do not describe all of the Work that is to be performed by the Contractor. Although the Specifications are intended to describe requirements that cannot readily or adequately be illustrated on the Drawings, including, without limitation, the types, qualities, and methods of installation of the various materials and equipment required for the Work, the Specifications may describe requirements that could have been illustrated on the Drawings.

4.4.2 Discretionary Determinations. Except as expressly provided otherwise, if the Specifications indicate that a discretionary determination is required (e.g., "to be selected," "as directed," "as required," *et cetera*), the Contractor shall seek a determination from the Architect.

4.4.3 Industry or Governmental Standards and Specifications. Except as expressly provided otherwise, any reference to a standard or specification established or published by any society, institute, association, or governmental authority shall be deemed and construed to be a reference to such organization's standard or specification in effect as of the date the District awards the Contract to the Contractor. If any such standard or specification is subsequently modified, the Contractor may seek the Architect's approval to perform the Work in accordance with the modified standard or specification. Each standard and specification referenced in the Specifications is hereby incorporated as a part of the Specifications, and, subject to any specified limitations, the Contract Documents shall be interpreted as if the standard or specification was set forth, in full, in the Specifications.

4.4.4 Fragmented or Truncated Wording. As a means of limiting the length of the Specifications while still conveying sufficient information, provisions of the Specifications may be written in a fragmented or truncated format, including, without limitation, use of incomplete phrases or sentences. In each such case, to the extent necessary, the full meaning of the fragmented or truncated wording shall be inferred from context. The omission of any word, phrase, pronoun, *et cetera* in any provision of a Specification shall not be deemed or construed to limit or affect the interpretation of other provisions in the same or any other Specification in which the word, phrase, pronoun, *et cetera* is not omitted.

4.4.5 Titles and Captions. The titles and captions set forth in the Specifications are included for convenience of the reader only and shall not be deemed or construed to establish, define or limit the content or meaning of the Specifications, including, without limitation, which trades must comply with any particular Specification.

4.4.6 Singular and Plural Senses. Unless context requires otherwise, words, terms or phrases used in the Specifications in the singular sense shall be deemed and construed to include the plural sense, and visa versa (e.g., use of the phrase "any Specification" shall be interpreted also as "any Specifications").

4.4.7 Gender. If any word, term or phrase in the Specifications is stated in either the masculine or feminine sense, the word, term or phrase, unless otherwise required by context, shall be interpreted as including both or either of such genders (e.g., use of the phrase "his work" shall be interpreted to include also "her work").

4.5 Addenda. Prior to award of the Contract to the Contractor, the Architect may have issued one or more written addenda to direct changes in, provide additional detail for, or otherwise explain the Work as described in or required by the Drawings, Specifications or other Contract Documents ("Addenda"). All Addenda shall be deemed and construed to be part of the Contract Documents. To the extent applicable to the same portion or element of the Work, Addenda shall govern over all other Contract Documents and, unless specified otherwise, subsequent Addenda shall govern over prior Addenda.

4.6 Deferred Approvals. If the Contract Documents include any Drawings or other requirements for any materials, equipment, processes or other items of any nature that are specified as requiring or being subject to Deferred Approval, the Drawings and other requirements are intended for purposes of illustration and information only, and, unless stated otherwise in the Contract Documents, the Contractor shall be responsible for the design and approval of each item requiring Deferred Approval as provided in Section 5.10 of these General Provisions.

4.7 Work to be Inferred from Contract Documents. The Drawings, Specifications and other Contract Documents may not specifically illustrate or describe every item of Work required to complete the Contractor's scope of work and to deliver to the District a complete Project. The Contract Documents are intended to sufficiently describe the Work required so that the Contractor may determine the materials, labor, services and other things of any nature required for the proper execution and completion of the Work, including, without limitation, any requirements for materials, labor, services or other things that should be inferred from the Contract Documents. Therefore, in addition to completing all Work as expressly illustrated or described in the Contract Documents, the Contractor shall be responsible for providing all materials, labor, services, and other things of any nature necessary to complete the Work as may be inferred from the Contract Documents so that, in conjunction with any Work by Others, the District receives a fully complete and operational Project as intended.

4.8 Geotechnical and Soils Reports.

4.8.1 Not Part of Contract Documents. The District or Architect may determine that obtaining geotechnical services and/or a soils report is required or advisable in connection with the Project. In such event, the District, at its expense, may provide copies of the geotechnical and/or soils reports to the Contractor. However, if the District provides any such report to the Contractor, the report in no event shall be deemed or construed to be part of the Contract Documents, and such report shall be deemed and

construed as being provided solely for the convenience of, and as supplementary information to, the Contractor. The information included in any such report shall be deemed and construed as approximate only, and the Contractor shall be responsible for inspecting and verifying the actual conditions of the Project Site.

4.8.2 Specifications Govern. Geotechnical and/or soils reports provided by the District in connection with the Project may include information and recommendations related to soils, groundwater and/or other surface and subsurface conditions of the Project Site. However, because such geotechnical and/or soils reports are for information purposes, not part of the Contract Documents, the Contractor shall perform all earthwork and soils-related portions of the Work in conformance with the Drawings, Specifications and other Contract Documents, not as recommended in such reports.

4.8.3 No Warranty of Information. The District shall not be deemed or construed to have made any representation or warranty as to the information or recommendations set forth in any geotechnical and/or soils reports provided by the District in connection with the Project, or as to the soils, groundwater, or other surface and subsurface conditions of the Project Site. The Contractor shall be responsible for inspecting and verifying the actual conditions of the Project Site and, in connection with the Work, shall be deemed and construed to have conducted an independent investigation of the surface and subsurface conditions of the Project Site.

4.9 Contractor to Know and Understand Applicable Law. The Contractor is hereby required to, and shall be deemed for all purposes of the Contract to, be aware of, know and understand all laws, ordinances, codes, rules, regulations and other governmental requirements applicable to public works projects generally and applicable to the Work specifically. Therefore, each and every provision of law required by law, ordinance, rule, regulation or other applicable governmental requirement to be set forth in the Contract Documents that, for any reason, is omitted from, or is incorrectly set forth in, the Contract Documents, shall be deemed to be properly set forth in the Contract Documents, and the Contract shall be construed and enforced as though such omitted or incorrect provision were properly and correctly set forth in the Contract Documents.

4.10 Pre-Construction Review of Contract Documents. Prior to when required to initially proceed with the Work, the Contractor shall complete a careful and detailed review of all Contract Documents in order to: (i) determine and confirm all materials, labor, services and other things of any nature required to fully complete the Work in accordance with the Contract Documents; (ii) determine whether the Contractor perceives any errors, inconsistencies, conflicts, ambiguities, omissions, or lack of sufficient detail or explanation in the Drawings, Specifications or other Contract Documents; (iii) determine whether the requirements of the Drawings, Specifications and other Contract Documents conform with all laws, ordinances, codes, rules, regulations and other governmental requirements applicable to the Work, including, without limitation, Title 21 and Title 24 of the CCR, applicable building codes, and utility-company requirements. Neither the requirements of this Section 4.10, nor any delay by the Contractor in complying with such requirements, shall be deemed to relieve the Contractor from complying with requirements for commencing and/or completing the Work, and Contractor shall schedule and complete its Pre-Construction Activities to accommodate the review required pursuant to this Section 4.10.

4.11 Notice After Pre-Construction Review. If, as a result of its review pursuant to Section 4.10 of these General Provisions, the Contractor perceives: (i) any error, inconsistency, conflict, ambiguity, omission, or lack of sufficient detail or explanation in the Drawings, Specifications or other Contract

Documents; or (ii) that any of the Drawings, Specifications or other Contract Documents do not conform in all respects with all laws, ordinances, codes, rules, regulations and other governmental requirements applicable to the Work; then, prior to commencing any portion of the Work, the Contractor shall provide written notice thereof to the District, Architect, and Project Manager. Within a reasonable time after notice, and to the extent necessary and appropriate, the Architect will issue an Architect Field Directive or other written directive to the Contractor setting forth a correction or clarification of the matters specified in the notice.

4.12 Ongoing Review of Contract Documents. The Contractor shall maintain on an ongoing basis such knowledge and understanding of the Contract Documents as necessary for full and timely compliance therewith. At any time during the course of the Work, if the Contractor perceives any error, inconsistency, conflict, ambiguity, omission, or lack of sufficient detail or explanation in the Drawings, Specifications or other Contract Documents, or any non-conformance of the Drawings, Specifications or other Contract Documents with all laws, ordinances, codes, rules, regulations and other governmental requirements applicable to the Work, then the Contractor shall provide written notice to the District, Architect, and Project Manager. The Contractor shall provide such notice promptly after discovering any problem with the Contract Documents, so that the matter may be addressed without any resulting delay in the Work or Work by Others. Within a reasonable time after receipt of such notice, and to the extent necessary and appropriate, the Architect will issue an Architect Field Directive or other written directive to the Contractor setting forth a correction or clarification of the matters specified in the notice.

4.13 Requests for Information Regarding the Work or the Contract Documents.

4.13.1 Submittal to Architect. The Contractor may submit to the Architect a written request for information regarding the Work or the Contract Documents (each an "RFI") at any time the Contractor reasonably: (i) does not understand any requirement of the Contract Documents relating to the performance of the Work; (ii) is not sure or believes that the Contract Documents do not sufficiently detail or describe a portion of the Work; or (iii) otherwise believes that information or an interpretation of the Contract Documents is necessary to permit the Contractor to proceed with the Work. The Contractor must provide copies of each RFI to the Project Manager and the Inspector of Record. The Contractor must submit an RFI sufficiently in advance as will avoid and/or prevent any delays in the Work or any Work by Others. Therefore, the Contractor must review and understand the requirements for each of the various portions of the Work sufficiently in advance of undertaking such portions of the Work so that, if necessary, the Contractor can timely submit an RFI. Each RFI must: (i) be in writing on the "Request for Information" form included in the Required Project Forms; (ii) sufficiently identify the specific portion of the Contract Documents that is the subject of the RFI, including, without limitation, Drawing and detail number, Specification section, page number, *et cetera*; (iii) describe in reasonable detail what the Contractor does not understand, what the Contractor believes is not sufficiently detailed or provided for, or other matter that is the subject of the RFI; and (iv) describe the Contractor's interpretation or suggested resolution of the matter that is the subject of the RFI.

4.13.2 Each RFI Must be Submitted Timely and in Good Faith. The Contractor must submit each RFI in good faith, and must not abuse the RFI process, including, without limitation, by requesting that the Architect provide information that is equally available to the Architect and the Contractor. The Contractor shall be responsible and liable for any and all costs and/or delays, including, without limitation, costs of additional professional services incurred by the District, arising from any failure by the Contractor to comply with the requirements of Subsection 4.13.1 of these General Provisions.

4.13.3 Architect Review and Response to RFI. The Architect may return an RFI to the Contractor for clarification or additional information if the RFI does not set forth information reasonably sufficient for the Architect to fully understand the Contractor's question or issue. The Architect will respond in writing to each sufficiently-detailed RFI within ten days or such other reasonable time as will be dependent on the number of then-pending RFIs, the complexity of the issues raised by any RFIs, the relative importance or priority of the RFIs, *et cetera*. Although the name or title of the responses to RFIs may vary, the Architect's response may be in the form of a bulletin describing information relative to the Work (each a "Bulletin"), an interpretation of the meaning of a specific requirement applicable to the Work (each an "Interpretation"), or a clarification of a specific requirement applicable to the Work (each a "Clarification"). (Note also that the Architect may issue Bulletins, Interpretations and Clarifications in circumstances other than in response to RFIs.) The Architect will provide copies of the response to an RFI to the District, the Project Manager and the Inspector of Record. If the response by the Architect indicates that a change in the Work is required, such change shall be implemented by means of Change Order if the Architect determines that an adjustment to the Contract Time and/or Contract Price is required, or by means of an Architect Field Directive if no such adjustment is required. **IF THE CONTRACTOR REASONABLY BELIEVES THAT THE IMPLEMENTATION OF ANY BULLETIN, INTERPRETATION, OR CLARIFICATION WILL REQUIRE AN ADJUSTMENT OR FURTHER ADJUSTMENT TO THE CONTRACT TIME AND/OR CONTRACT PRICE THAT IS NOT REFLECTED IN A CORRESPONDING CHANGE ORDER, THE CONTRACTOR MAY PROVIDE NOTICE AS PROVIDED IN SECTION 17.5 OF THESE GENERAL PROVISIONS.**

4.14 Costs of Erroneous or Non-Conforming Work. If, at any time during the course of the Work, the Contractor or any Subcontractor performs, or permits the performance of, any portion of the Work that is affected by or relates to any provision of the Contract Documents that the Contractor knows or reasonably should have known: (i) is erroneous, inconsistent, conflicting, ambiguous, omitted, or not sufficiently detailed or explained (including, without limitation, and notwithstanding any approval by the Architect, any materials, equipment, processes or other items for which the designs or Specifications were submitted by or on behalf of the Contractor); or (ii) does not conform with any applicable law, ordinance, code, rule, regulation or other governmental requirement; then the Contractor shall bear any and all costs arising therefrom including, without limitation, the cost of correction, without increase or adjustment to the Contract Price or the time for performance, if: (i) the work was performed without the Contractor having first notified and sought written directive(s) from the District, Architect, and Project Manager as described in Sections 4.11 and/or 4.12 of these General Provisions; or (ii) the work was performed contrary in any manner to the instructions, Addenda or other written directive(s) of the Architect, Project Manager or District.

4.15 Ownership and Rights to Contract Documents. For all purposes related to the Contract, the Drawings, Specifications and other Contract Documents are deemed to be and shall remain the property of the District. Except for the District and, as may be provided by its agreement with the District, the Architect, no person or entity (including, without limitation, the Contractor and anyone performing any work or services pursuant to the Contract on behalf of the Contractor) may own or claim a copyright in the Drawings, Specifications or other Contract Documents.

4.16 Use of Contract Documents. The Contractor and each Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work may use the Drawings, Specifications and other Contract Documents only to the extent necessary for the proper execution of the Work, including, without limitation, applications and submittals to governmental agencies in connection with seeking approvals for some or all of the Work. Neither the Contractor, nor any other person or entity other than the District, may use the Drawings, Specifications or other Contract

Documents for any purpose other than in connection with the Work, including, without limitation, any work on the Project that is outside the scope of the Work.

4.17 Return of Contract Documents to District. The Contractor shall ensure that any and all copies of the Drawings, Specifications and other Contract Documents provided to the Contractor, or to any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work, are maintained in a reasonable and useable condition. Upon final completion and acceptance of the Project in accordance with Section 18.9 of these General Provisions, the Contractor must return to the District all such copies of the Drawings, Specifications and other Contract Documents, except that the Contractor may retain one complete set of the Drawings, Specifications and other Contract Documents for the Contractor's records.

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PART 5
SHOP DRAWINGS, DEFERRED APPROVALS AND OTHER SUBMITTALS

5.1 General Requirements for Submittals. The Contractor is responsible for submitting to the Architect any and all Shop Drawings, Samples, Deferred Approvals, and other submittals required pursuant to the Contract Documents, including, without limitation, any submittals prepared or otherwise provided by or on behalf of any Subcontractor. A Subcontractor may provide a submittal directly to the Architect only upon written consent of the Architect obtained by the Contractor, but the Contractor shall retain responsibility for full compliance with the requirements of this Part 5. The Contractor must submit each submittal accompanied by a separate transmittal letter for each submittal item or group of items for which a submittal is required pursuant to the Contract Documents. Each submittal, and the transmittal letter and other information submitted with the submittal, must be legible in all respects. All Shop Drawings, Samples, Deferred Approvals, and other submittals required pursuant to the Contract Documents shall be deemed and construed to become property of the District upon submittal to the Architect pursuant to this Part 5. The Contractor may not use the submittal process, as set forth in this Part 5, in lieu of complying with the procedures for substitution set forth in Part 14 of these General Provisions, to request substitution of any equipment, material or other item, or any service or process, required pursuant to the Contract Documents.

5.2 Requirements for Timely Submittals. The Contractor shall be responsible for determining when it must submit each Shop Drawing, Sample, Deferred Approval or other submittal required pursuant to the Contract Documents, including consideration of time required for review and approval by the Architect. The Contractor shall initiate such contacts with the Architect as necessary for the Contractor to determine the amount of time required for approval of each submittal. The Contractor must ensure that any and all Shop Drawings, Samples and other submittals required pursuant to the Contract Documents have been submitted to the Architect within: (i) the time(s) specified in the Contract Documents (including, without limitation, the Master Construction Schedule) or otherwise by the Architect; (ii) within thirty-five days of the date of the Notice of Award if the Contract Documents or Architect do not specify a time for submittal; or (iii) such earlier time(s) as the Contractor determines necessary to avoid any delay in the progress of the Work or any Work by Others. The Contractor shall be fully responsible and liable for any delay in completion of the Work and/or the Project arising from any failure by the Contractor to timely submit any required submittal(s) to the Architect, and the District shall not grant any extension of time for performance of the Work on account of any such failure by the Contractor.

5.3 Requirements for Identifying Submittals. In addition to any other mandatory or permissive information, the Contractor must specify on each submittal and associated transmittal letter: (i) the names of the Contractor and any Subcontractor that will be responsible, in whole or in part, for performing the Work described or illustrated in the submittal; (ii) the name and/or number assigned for purposes of identifying the Project; (iii) the date the submittal and each revision thereof has been conveyed to the Architect; and (iv) the section of the Specifications or other portion of the Contract Documents that requires the submittal. If it is not physically possible for the Contractor to specify the foregoing information directly on the submittal (e.g., on a Sample), the Contractor shall attach a tag or label to the submittal that contains such information. If the Architect returns a submittal to the Contractor for revision, the Contractor must specify on each such revision the numeric or alpha-numeric identifier assigned to that submittal.

5.4 Required Quantities of Submittal Materials. Each submittal that includes any Shop Drawing must include: (i) one reproducible sepia and five prints of each Shop Drawing; and (ii) two reproducible copies of all other accompanying materials and information. Each submittal that includes any

Sample must include: (i) two identical copies of the Sample; and (ii) two reproducible copies of all other accompanying materials and information. Each submittal of any Deferred Approval must include: (i) one reproducible sepia and five prints of each drawing included in the Deferred Approval; and (ii) two reproducible copies of all other accompanying materials and information. With respect to any other submittals required pursuant to the Contract Documents, if the quantity of materials to be submitted is not specified, the Contractor shall submit the number of copies of the materials as directed by the Architect.

5.5 Contractor Must Identify Deviations from Contract Requirements. If a Shop Drawing, Sample, Deferred Approval or other submittal required pursuant to the Contract Documents does not conform in every respect with all requirements of the Specifications and other Contract Documents (including, without limitation, any qualification of, modification of, or other deviation from such requirements), such deviation must be expressly identified and explained in detail in the submittal, noted in the accompanying transmittal letter, and, as applicable, identified by "clouding" on the submittal.

5.6 Contractor Must Review and Verify All Submittals. Prior to submittal to the Architect, the Contractor must review each Shop Drawing, Sample, Deferred Approval or other submittal required pursuant to the Contract Documents and verify that: (i) all materials, measurements, standards, requirements, and other information constituting, or set forth in, the submittal are consistent with, and satisfy all requirements of, the Contract Documents (or expressly describe in detail any deviations from such requirements); (ii) the Work described or illustrated in or by the submittal is fully coordinated and consistent with all other portions of the Work and any Work by Others; and (iii) the Work described or illustrated in or by the submittal can be performed within the time(s) required pursuant to the Contract Documents. The Contractor must represent and warrant that it has undertaken and completed such review and verification by including written or stamped language to that effect, approved or provided by the Architect, and signed and dated by the Contractor, on each Shop Drawing, Sample, Deferred Approval and other submittal required pursuant to the Contract Documents (or an accompanying transmittal letter, if not physically possible to write or stamp, sign and date a submittal).

5.7 Contractor Must Provide Preliminary Materials Lists. Within ten days of the date of the Notice of Award or prior to the Commencement Date, whichever is sooner, the Contractor must submit to the Architect, for approval, preliminary lists of the equipment, products and materials proposed to be incorporated into the Project (each a "Preliminary Materials List"). The Contractor must submit a separate Preliminary Materials List for the Contractor and each Subcontractor, based on their respective portions of the Work. The Contractor need submit only one copy of each Preliminary Materials List, but each must be capable of being reproduced (copied) without significant decrease in legibility. Prior to submitting a Preliminary Materials List for a Subcontractor to the Architect, the Contractor shall have reviewed and confirmed that the items specified in the Preliminary Materials List encompass all equipment, products and materials within the scope of that Subcontractor's portion of the Work. The approval by the Architect of any Preliminary Materials List is one step in the submittal process for the Project and shall not be deemed or construed to be in lieu of requirements in the Contract Documents for submittal of Shop Drawings, Samples, Deferred Approvals and/or other information. The Contractor must reserve space on each Preliminary Materials List for the Architect's and the Contractor's stamps and/or signatures indicating approval of the Preliminary Materials List.

5.8 Requirements for Shop Drawings. As required pursuant to the Contract Documents, the Contractor must submit to the Architect any and all drawings and other information necessary to illustrate, expand upon, and otherwise explain in detail such portions of the Work as are generally described in the

Drawings and Specifications and that are to be manufactured or fabricated (e.g., equipment, structural steel, *et cetera*) and incorporated into the Project (each a "Shop Drawing"). The Shop Drawings must explain the manufacture, fabrication, structure, standards, dimensions, layout and/or installation of such portions of the Work (including, without limitation, compliance with or variance from requirements of the Drawings and Specifications) in such manner and in such detail as will permit approval by the Architect and understanding by those performing the Work as to how the portions of the Work detailed in the Shop Drawings will coordinate and fit with other portions of the Work and with any Work by Others. The Contractor must accompany each Shop Drawing with, as applicable, any and all manufacturer drawings, instructions, catalog cut-sheets, performance data, and other descriptive information as required for the Architect to determine that the Work described in the Shop Drawing will satisfy the requirements of the Contract Documents. The Contractor must reserve space on each Shop Drawing for the Architect's and the Contractor's stamps and/or signatures indicating approval of the Shop Drawing.

5.9 Requirements for Samples. As required pursuant to the Contract Documents or otherwise reasonably required by the Architect, the Contractor must submit to the Architect, for approval, any and all physical samples of materials, devices, instruments and/or equipment, or portions thereof, as are generally described in the Drawings and Specifications and that are to be incorporated into the Project (each a "Sample"). The Samples must physically demonstrate the type, quality, texture, finish, color and/or other characteristic(s) of the item for which the Sample is required, in such manner and in such detail as will permit approval by the Architect and understanding by those performing the Work as to how such item, upon completion of the Project, should appear, function, coordinate and/or fit with other items making up the Project. If the Contract Documents require that a Sample illustrate or demonstrate a range of any particular characteristic(s) of any material or product, the range must be sufficiently broad to fairly and fully represent reasonable and possible variations of such characteristic(s). The Contractor must accompany each Sample with, as applicable, any and all manufacturer labels, instructions, catalog cut-sheets, performance data, and other descriptive information as required for the Architect to determine that the characteristic illustrated or demonstrated by the Sample will satisfy or otherwise conform with the requirements of the Contract Documents and the Architect's aesthetic and other decisions. The Contractor must reserve space on the tag or label attached to the Sample, and on the associated transmittal letter, for the Architect's and the Contractor's stamps and/or signatures indicating approval of the Sample.

5.10 Requirements for Deferred Approvals. The Drawings and Specifications may specify that certain portions of the design of the Work (e.g., fire-sprinkler systems, bleachers, elevator, skylights, *et cetera*) and approval thereof by the Architect, DSA, or others has been deferred (each a "Deferred Approval"). Deferred Approvals may be required for items that the Architect could not specify in full detail prior to a specific manufacturer and/or product being identified and approved in accordance with the Contract Documents, or for other reasons. With respect to each Deferred Approval for which it is responsible, the Contractor must prepare and submit the Deferred Approval in accordance with the directions of the Architect and requirements of the Contract Documents, including, without limitation, any performance specifications and/or loading criteria for the item(s) within the scope of the Deferred Approval. Each Deferred Approval must comply with all applicable requirements of Title 21 (including, without limitation, Section 17) of the CCR and Title 24 (including, without limitation, Section 4-317 of Part 1) of the CCR. The Contractor must reserve space on each drawing and associated specifications included in a Deferred Approval for the DSA's, Architect's and Contractor's stamps and/or signatures indicating approval of the Deferred Approval. In obtaining such Deferred Approvals, the Contractor shall ensure that all applications, designs, drawings, specifications, submittal, *et cetera* comply with all applicable laws, ordinances, codes, rules, regulations and other governmental requirements, including, without limitation,

requirements of the DSA and the State Fire Marshall. Unless stated otherwise in the Contract Documents, the Contractor shall be responsible for paying all fees, costs and other expenses necessary to obtain such Deferred Approvals. Neither the requirements of this Section 5.10, nor any delay by the Contractor in complying with such requirements, shall be deemed to relieve the Contractor from complying with requirements for commencing and/or timely completing the Work, and Contractor shall schedule and complete its activities to accommodate the requirements of this Section 5.10. The Contractor shall not be granted an extension of time, and may be assessed liquidated damages, if the Contractor is responsible for any failure to obtain any required Deferred Approval and such failure results in a delay in the critical-path of the Work or any Work by Others.

5.11 Scope of Submittal Review and Approval. The Architect shall review all Shop Drawings, Samples and other submittals required pursuant to the Contract Documents and, as applicable, require additional information, require correction and resubmittal, and/or approve the submittals. In its sole discretion, the District may require that the Project Manager also review and approve all submittals. The scope of review and approval by the Architect (and, if applicable, the Project Manager) shall be limited to: (i) matters of aesthetics; (ii) as required, determining that designs were prepared by appropriately licensed design professionals; (iii) determining general conformance with the design concept(s) for the Work and the Project; (iv) determining general conformance with requirements of the Contract Documents; and (v) other matters as required by law. In no event shall the review and/or approval of any submittal be deemed or construed to: (i) constitute verification or approval of any specific dimensions, field conditions or quantities; (ii) constitute a comprehensive analysis and verification that the submittal is free of all errors and deficiencies; (iii) relieve the Contractor from responsibility for any deviation in the submittal from the requirements of the Contract Documents that was not expressly stated in the submittal as being a deviation from such requirements; (iv) relieve the Contractor from responsibility for any error or deficiency in the submittal not within the scope of review and approval; (v) relieve the Contractor from responsibility for any deficiency in the Work, any failure to coordinate or ensure that the item(s) fit with other portions of the Work or any Work by Others, or any other failure to perform the Work in accordance with the Contract Documents; or (vi) relieve the Contractor from any responsibility for violation of any patent or other right of any person or entity.

5.12 Contractor Must Correct and Resubmit Rejected Submittals. If the Architect determines that any submittal is incomplete, contains any material error or other deficiency, or has been only superficially reviewed by the Contractor, the Architect may return the submittal to the Contractor with a notation describing the needed correction(s) and the time within which the submittal must be corrected and resubmitted to the Architect. The Contractor must make all corrections required by the Architect and must resubmit the revised submittal to the Architect within the time specified by the Architect. The Contractor must specifically highlight and/or direct the Architect's attention (e.g., in writing, by "clouding," *et cetera*) to all revisions made to the submittal since it was last returned to the Contractor by the Architect, in such manner as will permit the Architect to easily discern revisions to the submittal. If the Contractor revises and resubmits a submittal, but has failed to properly, appropriately or reasonably make any correction(s) to the submittal as directed by the Architect, or if the revisions to the submittal have revealed or contain additional errors or deficiencies, with the result that the Architect requires further correction of the submittal (i.e., after an initial review and one follow-up review), the reasonable cost of the professional services for the additional review(s) of the submittal shall be charged to the Contractor and/or deducted from amounts otherwise payable to the Contractor pursuant to the Contract.

5.13 No Work or Deliveries Permitted Absent Approved Submittals. In no event may the Contractor commence any portion of the Work that requires any Shop Drawing, Sample or other submittal pursuant to the Contract Documents, unless and until the Architect has reviewed and approved the submittal in accordance with this Part 5. In addition, if DSA approval is required for any submittal, the Contractor may not commence the portion of the Work requiring the submittal unless and until: (i) the Architect has obtained the required DSA approval; or (ii) the Architect directs the Contractor, in writing, to commence such portion of the Work. The Contractor must ensure that all such portions of the Work are performed and completed in accordance with all Shop Drawings, Samples, Deferred Approvals and other submittals required pursuant to, and approved by the Architect in accordance with, the Contract Documents. The District, the Architect, the Project Manager and/or the Inspector of Record may reject any Work performed, and/or any materials, products or other things delivered to the Project Site and/or incorporated into the Work or the Project, in violation of the requirements of this Section 5.13.

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PART 6
INSURANCE REQUIREMENTS

6.1 Insurance a Condition Precedent to Commencing the Work. Timely compliance by the Contractor with all applicable requirements of this Part 6 shall be deemed and construed as a condition precedent to the Contractor commencing any portion of the Work. However, in no event shall the Contractor's compliance, failure to comply, or failure to timely comply, with the requirements of this Part 6 be deemed or construed to relieve the Contractor of any of its responsibilities pursuant to the Contract Documents, including, without limitation, the requirement to commence the Work on the Commencement Date. The Contractor shall be responsible for all damages and costs incurred by the District arising from any failure by the Contractor to comply or to timely comply with the requirements of this Part 6.

6.2 Optional Owner-Controlled Insurance Program. If the Special Provisions so provide, the District will implement an "Owner Controlled Insurance Program" ("OCIP") for the Project, and the Contract Documents will include requirements for the Contractor to provide qualifying and enrollment information. In the event an OCIP will apply to the Project, the Contractor must at all times comply with all applicable OCIP requirements set forth in the Special Provisions and any applicable Supplementary Special Provisions. In the event an OCIP will apply to the Project, the Contractor shall not be required to procure the Insurance Policies pursuant to Section 6.5 of these General Provisions; provided, however, that: (i) except as provided in Section 6.3 of these General Provisions, the Contractor still must procure the Contractor All-Risk Policy; and (ii) notwithstanding the foregoing, the Contractor must procure all of the Insurance Policies pursuant to Section 6.5 of these General Provisions if the OCIP does not take effect, the OCIP does not become applicable to the Project, the OCIP is terminated after taking effect, or the Contractor or a sufficient number of its Subcontractors do not qualify for enrollment and/or participation in the OCIP.

6.3 Optional District All-Risk Insurance. If the Special Provisions so provide, the District will obtain, and will maintain in force at all times prior to the Project Acceptance Date, a policy of builder's all-risk insurance with such coverages, deductibles, and endorsements as the District, in its reasonable discretion, determines appropriate ("District All-Risk Policy"). If the District will have the District All-Risk Policy in effect, the Contractor shall not be required to procure the Contractor All-Risk Policy described in Subsection 6.5.5 of these General Provisions. The District All-Risk Policy will name as additional insureds the District, Contractor, Subcontractors, other contractors working on the Project, and others as the District, in its reasonable discretion, determines appropriate. The District and the Contractor hereby waive all subrogation rights against each other and all other persons and/or entities covered by the District All-Risk Policy, but only to the extent of coverage provided by the District All-Risk Policy. The District All-Risk Policy shall also waive the insurer's rights of subrogation against such persons and/or entities. A waiver of subrogation shall be effective with respect to each such person or entity regardless of whether the person or entity: (i) has a right to indemnification; (ii) has an obligation to indemnify any other person or entity; (iii) paid any premium for the District All-Risk Policy; or (iv) has an insurable interest in the property. The Contractor must comply with all requirements of the District All-Risk Policy applicable to the performance of the Work. If the Contractor incurs any loss in excess of an applicable deductible, the Contractor must provide written notice to the Project Manager within twenty-four hours after discovering the loss. If a deductible applies, the Contractor shall be responsible for all losses up to the deductible amount set forth in the Special Provisions.

6.4 Insurance Requirements Absent an OCIP. The Contractor must obtain and have in effect each and every policy of insurance required pursuant to Section 6.5 of these General Provisions (each an "Insurance Policy" and, collectively, the "Insurance Policies") within: (i) seven days after the date of the

Notice to Proceed or prior to the Commencement Date, whichever is sooner, if the Special Provisions indicate that the District will not implement the OCIP; or (ii) seven days after receipt of notice from the District or the OCIP administrator that, as applicable, the OCIP will not take effect, the OCIP will not be applicable to the Project, the OCIP is being terminated, or the Contractor or a sufficient number of its Subcontractors do not qualify for enrollment and/or participation in the OCIP. The Contractor must maintain each such Insurance Policy in full force and effect at all times prior to (and, as provided herein with respect to certain insurance coverage, for the required period after) the Project Acceptance Date.

6.5 Minimum Types and Amounts of Insurance Coverage.

6.5.1 Commercial General Liability Insurance. The Contractor shall obtain and maintain a policy of broad-form commercial general liability insurance, written on an "occurrence" basis ("modified occurrence" and "claims-made" are not acceptable), with a combined single limit of not less than the amount specified in the Special Provisions, providing coverage for all activities related to or undertaken in connection with the Work ("Liability Policy"). If an aggregate limit applies to the Liability Policy, not less than the amount specified in the Special Provisions as the applicable portion of such aggregate must apply specifically and exclusively to the Work and the Project. Unless expressly agreed by the District in writing, the Liability Policy must include, as a minimum, coverage for: (i) bodily injury, disease, sickness and death; (ii) property damage (broad form); (iii) personal injury/advertising injury; (iv) premises/operations liability; (v) products/completed-operations liability; (vi) explosion, collapse and underground (UCX) (i.e., exclusion deleted); (vii) sudden or accidental discharge of contaminants or pollutants; (viii) contractual liability assumed by the Contractor pursuant to the Contract Documents; and (ix) independent contractor's liability. The Contractor must keep the Liability Policy in full force and effect for at least one year after the date of final payment to the Contractor pursuant Section 21.17 of these General Provisions or the Project Acceptance Date, whichever occurs later, to ensure that coverage for products-completed operations remains in effect for at least such one-year period.

6.5.2 Vehicle Liability Insurance. The Contractor shall obtain and maintain a policy of business vehicle liability insurance with a combined single limit, per occurrence, of not less than the amount specified in the Special Provisions ("Vehicle Liability Policy"). If an aggregate limit applies to the Vehicle Liability Policy, not less than the amount specified in the Special Provisions as the applicable portion of such aggregate must apply specifically and exclusively to the Work and the Project. The Vehicle Liability Policy must include coverage for owned, hired and non-owned vehicles.

6.5.3 Workers' Compensation Insurance. The Contractor shall obtain and maintain a policy of workers' compensation insurance in accordance with Section 3700 *et seq*. of the Labor Code and other applicable laws, regulations and requirements ("Workers Compensation Policy") and a policy of employers' liability insurance with limits of not less than one million dollars per incident ("Employer Liability Policy"). Within seven days of the date of the Notice of Award or prior to the Commencement Date, whichever is sooner, the Contractor shall execute and provide to the District the "Certification Regarding Workers Compensation" included in the Required Contract Forms.

6.5.4 Professional Liability Insurance.

6.5.4.1 Contractor. In connection with the Contractor having responsibility, whether directly or indirectly through any Subcontractor, for any design, engineering or similar professional services in accordance with the Contract Documents (e.g., design of fire sprinklers, shoring, falsework, scaffolding, *et cetera*), the Contractor shall obtain and maintain a policy of professional liability (errors and omissions) insurance ("Professional Liability Policy") providing coverage in an amount not less than the

amount specified in the Special Provisions for each claim and in the aggregate. Notwithstanding Section 6.4 of these General Provisions: (i) the Contractor must have the Professional Liability Policy in full force and effect prior to commencing any such professional services; (ii) each renewal or replacement of the Professional Liability Policy must have a retroactive date that is prior to the date the Contractor commenced any such professional services; and (iii) as a condition to final payment pursuant to the Contract, the Contractor must obtain at its cost a supplemental extended reporting period (tail) applicable to the Professional Liability Policy for a period of not less than four years after the Substantial Completion Date.

6.5.4.2 Subcontractors. In addition to the Contractor obtaining and maintaining the Professional Liability Policy, the Contractor must require and ensure that each of its Subcontractors having responsibility for any design, engineering or similar professional services in connection with the Project obtains and maintains a policy of professional liability (errors and omissions) insurance ("Subcontractor Professional Liability Policy") providing coverage in an amount not less than the amount specified in the Special Provisions for each claim and in the aggregate. Notwithstanding anything else to the contrary: (i) each such Subcontractor must have its Subcontractor Professional Liability Policy in full force and effect prior to commencing any such professional services; (ii) each renewal or replacement of the Subcontractor Professional Liability Policy must have a retroactive date that is prior to the date the Subcontractor commenced any such professional services; and (iii) as a condition to final payment to the Contractor pursuant to the Contract, the Subcontractor must obtain at its cost a supplemental extended reporting period (tail) applicable to the Subcontractor Professional Liability Policy for a period of not less than two years after the Substantial Completion Date; provided that, upon request of the Contractor, the District in its discretion may waive the requirement for some or all of the tail coverage with respect to any Subcontractor whose professional services relate solely to temporary work (e.g., shoring, falsework, or scaffolding).

6.5.5 Contractor All-Risk Insurance. If the Special Provisions provide that the Contractor must obtain such insurance, the Contractor must procure a policy of builder's all-risk insurance, written on a non-reporting, completed value basis, providing coverage for all of the Work in an amount not less than the greater of (i) the full estimated replacement cost of the Work or (ii) the Contract Price ("Contractor All-Risk Policy"). The Contractor All-Risk Policy must apply, at a minimum, to: (i) completed Work; (ii) Work in progress; (iii) temporary structures and improvements; (iv) materials, supplies and equipment stored on the Project Site; (v) materials, supplies and equipment stored at off-site locations or in transit; and (vi) operational and performance testing, commissioning and start-up. The Contractor All-Risk Policy must cover: (i) losses arising from causes that include, without limitation, fires, windstorms, lightening, explosions, theft, earth movement (including but not limited to earthquake, landslide, and subsidence), collapse, and water damage; (ii) costs associated with clean-up, demolition, repair or other correction of covered losses, including, without limitation, fees for necessary architectural, engineering and other professional services; and (iii) all ensuing or consequential losses attributable to causes of loss excluded under the Contractor All-Risk Policy, including, without limitation, faulty design or workmanship. The Contractor All-Risk Policy must be endorsed for extended coverage, vandalism, malicious mischief, and theft, including theft of materials not then incorporated into the Work. Any exclusion of losses attributable to faulty design or workmanship shall not exceed the total costs the District would have incurred to repair or otherwise correct the fault if it had been discovered prior to the loss having occurred. The Contractor All-Risk Policy must name or be endorsed to name the District, the Architect, the Project Manager, the Inspector of Record, the Contractor, and each Subcontractor, as additional insureds. The Contractor All-Risk Policy also must name the District as loss payee, including, without limitation, for the purposes of any tax-exempt bond proceeds used to fund the Project, and the District shall be deemed to be the owner of all work and materials on the Project Site or

stored for use on the Project Site. The Contractor must maintain the Contractor All-Risk Policy in full force and effect at all times prior to the Project Acceptance Date. The payment by the District of any Construction Progress Payments, in and of itself, shall not be deemed or construed to: (i) create an insurable interest for the District; or (ii) relieve the Contractor of responsibility it otherwise may have for losses arising from any direct physical loss, damage, or destruction incurred prior to final completion and acceptance of the Project in accordance with Section 18.9 of these General Provisions.

6.6 Umbrella Coverage. The District, in its sole discretion, may approve or disapprove of a request by the Contractor to satisfy portions of the coverage requirements for the Insurance Policies specified in Section 6.5 of these General Provisions (excluding the Workers Compensation Policy) by means of additional umbrella policy of insurance. Any such umbrella policy must: (i) follow the form of the underlying Insurance Policies; (ii) provide coverage at least as broad as the underlying Insurance Policies; and (iii) provide coverage in excess of the coverage of the underlying Insurance Policies, without gaps in coverage limits. Both the District and the Contractor must be named as insureds pursuant to the umbrella policy. In no event shall: (i) the aggregate coverage (including umbrella) be less than the coverage that would otherwise be available pursuant to the separate policies specified in such Section 6.5; or (ii) terms of coverage be impaired or otherwise provide less protection than would otherwise be available pursuant to the separate policies specified in such Section 6.5. The District may impose any other conditions or requirements on or for the umbrella policy that the District determines are reasonable.

6.7 Contractor Insurance Shall be Primary. The coverages provided by each of the Liability Policy, the Vehicle Liability Policy, and the Contractor All-Risk Policy shall be primary and not contributing with respect to any insurance or self-insurance programs covering the District, the District Board, any individual members of the District Board, or the District's officers, employees, agents or consultants.

6.8 Insurer Standards. Each Insurance Policy must be issued by one or more insurers licensed to do business in this State and having an A.M. Best Company rating (Best's Rating) of not less than an "A," a "Ratings Outlook," if assigned, of either stable or positive, and Financial Size Category of not less than "X." If a "Ratings Outlook" has been assigned to any such insurer that is not either stable or positive, the District may consider the insurer's Ratings Outlook and all other relevant factors in determining whether the insurer is satisfactory, and, if the District reasonably determines that there may be a significant risk in accepting an Insurance Policy issued by such insurer, then, upon request of the District, the Contractor must obtain such Insurance Policy through another insurer that satisfies the standards set forth in this Section.

6.9 Designation of Additional Insureds. The Liability Policy, the Vehicle Liability Policy, and the Contractor All-Risk Policy, each must name or be endorsed to name the District, the Architect, the Project Manager, and the Inspector of Record, as additional insureds. All endorsements specifying additional insureds for any of the Insurance Policies shall be ISO Form CG 20 10 11 85 or an equivalent endorsement reasonably acceptable to the District. Each additional insured endorsement shall include a "primary insurance clause" stating to the effect that: "The insurance afforded by this policy for the benefit of the additional insureds shall be primary insurance, and any insurance maintained by the additional insureds shall be excess and non-contributory with the insurance provided hereunder." The coverage provided to the additional insureds must be at least as broad as the coverage provided to the Contractor and may not contain any additional exclusionary language or limitations applicable only to the additional insureds.

6.10 Cross-Liability and Waivers of Subrogation. Each of the Liability Policy, the Vehicle Liability Policy, and the Contractor All-Risk Policy, must: (i) be endorsed with a cross-liability endorsement (separation

of insureds) and include a waiver of the insurer's rights of subrogation against the other insureds or additional insureds. Each of the Workers Compensation Policy and the Employer Liability Policy must be endorsed to include a waiver of the insurer's rights of subrogation against the District. A waiver of subrogation shall be effective with respect to each applicable person or entity regardless of whether the person or entity: (i) has a right to indemnification; (ii) has an obligation to indemnify any other person or entity; (iii) paid any premium for the applicable insurance; or (iv) has an insurable interest in any property. To the extent required pursuant to Part 23 of these General Provisions, the Contractor shall indemnify and defend the District, the Architect, the Project Manager, and the Inspector of Record, against any and all subrogation claims arising from any of the Insurance Policies.

6.11 Premiums, Deductibles and Self-Insured Retentions. The Contractor shall be solely responsible and liable for paying any and all premiums and other costs incurred in obtaining and maintaining the Insurance Policies, including, without limitation, any and all renewal premiums. Subject to written approval by the District, which the District may grant or withhold in its reasonable discretion, one or more of the Liability Policy, the Vehicle Liability Policy, and the Contractor All-Risk Policy may be subject to deductibles or self-insured retentions. The Contractor shall be solely responsible and liable for any and all such deductibles and self-insured retentions. To the extent required pursuant to Part 23 of these General Provisions, the Contractor shall indemnify and defend the District, the Architect, the Project Manager, and the Inspector of Record, against any and all claims arising from such premiums, deductibles and/or self-insured retentions.

6.12 Evidence of Coverage. For each Insurance Policy required pursuant to this Part 6, the Contractor shall provide a certificate of insurance evidencing that the Insurance Policy is in effect (each a "Certificate of Insurance"). Each Certificate of Insurance must: (i) be executed by a duly-authorized officer, agent or other representative of the insurer; (ii) include an original handwritten signature of the insurer's representative, not a stamped or printed signature; and (iii) must certify the names of the insured, any additional insureds, the type and amount of the insurance, the location and operations to which the insurance applies, and the expiration date of such insurance. The Contractor must provide to the District an updated Certificate of Insurance for each renewal of an Insurance Policy not less than thirty days prior to any expiration of the Insurance Policy. Each renewal and replacement of any Insurance Policy that is permitted by these General Provisions to be written on a "claims made" basis must have a retroactive date that is prior to the date the Contractor was initially required to have such insurance policy in effect pursuant to this Part 6. In each case that a Certificate of Insurance sets forth language to the effect that it "does not amend, extend or alter the coverage" of the Insurance Policy, or that the coverage available pursuant to the Insurance Policy "is subject to all of the terms, exclusions, and conditions of the policy," the Contractor must provide to the District a certified copy of the Insurance Policy and all associated endorsements, riders, *et cetera* concurrently with providing the Certificate of Insurance to the District. The foregoing shall not be deemed or construed to limit or qualify the Contractor's obligation to comply with requirements of Section 6.14 of these General Provisions relating to the time(s) within which the Contractor must provide such documents to the District.

6.13 Mandatory Notice from Insurer of Change in Coverage. Each Insurance Policy and associated Certificate of Insurance must require or be endorsed to require that the insurer notify the District not less than thirty days prior to any cancellation, termination, reduction in coverage, or expiration without renewal of the Insurance Policy, or, in the case of any cancellation for non-payment of premium, not less than ten days prior to cancellation. Language in any Insurance Policy or Certificate of Insurance to the effect

that the insurer shall "endeavor" to provide such notice, or to the effect "that failure to mail such notice shall impose no obligation and liability upon the company, its agents or representatives," shall not be acceptable.

6.14 District Review and Approval of Insurance Policies. Within the time(s) required pursuant to Section 6.4, Subsection 6.5.4.1 and/or Subsection 6.5.4.2 of these General Provisions for the Contractor to have any required Insurance Policy in effect, the Contractor must provide to the District a certified copy of such Insurance Policy and all associated Certificates of Compliance, endorsements, riders, *et cetera*. Each Insurance Policy and associated other documents shall be subject to review and approval by the District in regard to compliance with the requirements of this Part 6. No such review by the District, and no failure by the District to undertake any such review, shall be deemed or construed to be an assumption of liability by the District or to constitute a waiver of any non-compliance by the Contractor with the requirements of this Part 6.

6.15 Additional Required and/or Optional Insurance. In addition to maintaining in effect all other insurance coverage required pursuant to this Part 6, the Contractor, at all times during the performance of the Work or as otherwise required by law, shall obtain or otherwise have in effect any and all other insurance coverage that the Contractor is required to maintain in accordance with applicable laws, regulations and/or other governmental requirements. The Contractor also may obtain or otherwise have in effect any and all other insurance coverages that the Contractor determines are necessary in light of prudent business practices, including, without limitation, coverages in excess of the amounts required pursuant to the Contract. The Contractor shall be responsible for obtaining its own insurance coverage for tools, equipment and materials not intended to be incorporated into the Work or the Project. The Contractor shall be solely responsible for any and all premiums, deductibles, self-insured retentions, losses, *et cetera* attributable to any additional required and/or optional insurance coverage described in this Section.

6.16 Subcontractor Insurance. The Contractor shall require in each Subcontract that the Subcontractor also obtain and maintain insurance coverage consistent with the Insurance Policies required pursuant to this Part 6. However, if the Special Provisions do not specify lesser per-occurrence and/or aggregate limit(s) for a Subcontractor's coverage, the District, in its reasonable discretion, may approve lesser limit(s) if consistent with a limited scope of work and limited potential for loss attributable to the Subcontractor's work, as justified by information provided to the District. The Contractor shall be responsible for ensuring that any and all Subcontractors are insured in accordance with this Part 6, or as otherwise approved by the District, and for providing all documentation of the Subcontractors' insurance coverage (i.e., Insurance Policies, Certificates of Insurance, *et cetera*) to the District within the time(s) required pursuant to this Part 6. To the extent required pursuant to Part 23 of these General Provisions, the Contractor shall indemnify and defend the District, the Architect, the Project Manager, and the Inspector of Record, against any and all claims arising from the failure of any Subcontractor to obtain and maintain the insurance required pursuant to this Part 6. All Subcontractor insurance coverage shall be subject to review and approval as described in Section 6.14 of these General Provisions.

6.17 Compliance with Safety Programs. The Contractor, and each Subcontractor, materialman, and other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work, must at all times comply with the requirements of any and all applicable Safety Programs, insurer's property protection or conservation recommendations, *et cetera*, in order to assist in minimizing claims, damages and losses in connection with the Work and the Project.

6.18 Failure to Maintain Required Insurance. If the Contractor or any Subcontractor fails to maintain any required Insurance Policy in full force and effect consistent with the requirements of this Part 6, the District may purchase or otherwise obtain such insurance, and the District shall deduct the cost thereof from one or more Construction Progress Payments, without recourse by the Contractor.

6.19 Insurance Coverage Not a Limitation on Liability. The requirements set forth in this Part 6, including, without limitation, the types and limits of insurance coverage specified, are not intended to and shall not in any manner be deemed or construed to limit or qualify the liabilities and obligations otherwise assumed by the Contractor pursuant to the Contract Documents. However, insurance proceeds received by either the District or the Contractor attributable to claims or damages for which the other party is responsible shall serve to offset the responsible party's liability, on account of such claims or damages, to the party receiving the proceeds. The Contractor shall be solely responsible for paying any loss amount, or portion thereof, that is subject to an applicable deductible or self-insured retention requirement.

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PART 7
PERFORMANCE AND PAYMENT BONDING REQUIREMENTS

7.1 Surety Bonds a Condition Precedent to Commencing the Work. Timely compliance by the Contractor with all requirements of this Part 7 shall be deemed and construed as a condition precedent to the Contractor commencing any portion of the Work. However, in no event shall the Contractor's compliance, failure to comply, or failure to timely comply, with the requirements of this Part 7 be deemed or construed to relieve the Contractor of any of its responsibilities pursuant to the Contract Documents, including, without limitation, the requirement to commence the Work on the Commencement Date. The Contractor shall be responsible for all damages and costs incurred by the District arising from any failure by the Contractor to comply or to timely comply with the requirements of this Part 7.

7.2 Delivery of Surety Bonds. Within seven days of the date of the Notice to Proceed or prior to the Commencement Date, whichever is sooner, the Contractor must provide to the District: (i) a material and labor payment bond to ensure satisfaction of any claims of materials suppliers and of mechanics and laborers employed in connection with the Work ("Payment Bond"); and (ii) a bond to ensure faithful (including, without limitation, timely) performance by the Contractor of its obligations pursuant to the Contract Documents ("Performance Bond").

7.3 Forms of Surety Bonds. The Payment Bond and the Performance Bond (each a "Surety Bond") must be in substantially the forms included in the Required Contract Forms; provided, however, that each of the Surety Bonds must conform to and comply in all respects with all applicable State laws. Each of the Surety Bonds must name the District as the entity to which the Contractor and the surety are bound. Neither of the Surety Bonds shall have a stated expiration date, and each shall remain in effect at all times that the Contractor has any obligation pursuant to the Contract.

7.4 Penal Sums of Surety Bonds. Each of the Surety Bonds initially must have a penal sum equal to the Contract Price. If the Contract Price is increased in accordance with the Contract Documents, then, within seven days after such increase, the Contractor must increase the amount of each of the Surety Bonds to equal the total increased Contract Price. In addition, the Contractor shall review and renew or amend either or both of the Surety Bonds within seven days after receiving notice from the District that either or both have become insufficient.

7.5 Surety Qualifications. Each of the Surety Bonds must be issued by a surety that is authorized and admitted to transact business in the State in accordance with Code of Civil Procedure Section 995.120. Each of the Surety Bonds must be signed by the duly-authorized representatives of both the Contractor and the surety, and the signatures must be notarized. In addition, the Contractor must attach to each Surety Bond: (i) a printout from the website of the California Department of Insurance confirming that the surety is an admitted surety insurer; or (ii) a certificate from the Clerk of the county in which the Project Site is located ("County") that the surety is an admitted surety insurer. Should any surety lose its status as a State-admitted surety, the Contractor shall immediately provide written notice thereof to the District, and the District shall make no further payments to the Contractor pursuant to the Contract Documents until such time as the surety regains its status or the Contractor obtains and the District qualifies and approves a substitute surety.

7.6 Surety Obligations Not Affected by Changes in Work. No change in the Work or the Project, extension of time for performance of the Work or any Work by Others, or other action permitted

pursuant to the Contract shall be deemed or construed to, in any manner or respect, release the Contractor or any surety that has issued one or both of the Surety Bonds from their respective obligations pursuant to the Surety Bonds, and each such surety shall be deemed to have waived notice of such changes, extensions and other actions.

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PART 8
PERFORMANCE OF THE WORK GENERALLY

8.1 Contractor Must Furnish Everything Required. Except to the extent the Contract Documents expressly provide otherwise, the Contractor must obtain, furnish, or otherwise make available or have in effect, all at its own cost, any and all labor and other services, materials (including, without limitation, any that will not be incorporated into the Work), systems and building equipment, tools, construction equipment and machinery, heat, air conditioning, water, electricity, other utilities, transportation, temporary and permanent facilities, permits and licenses, layout, surveys and other things as are necessary or convenient for the Contractor to undertake and properly complete the Work in accordance with the Contract Documents, including, without limitation, all assemblies and systems specified in the Contract Documents and anything that is not specified in, but that reasonably may be inferred from, the Contract Documents as described in Section 4.7 of these General Provisions. The Contractor shall be solely responsible and liable for paying all applicable federal, State, and local taxes and other charges assessed or levied on or in connection with such labor, materials, and other services and things. For purposes of the Contract, the Work includes each and every obligation described or otherwise specified in the Contract Documents that must be undertaken, performed and completed by the Contractor in connection with the Project, including, without limitation: (i) any Work inferred as provided in Section 4.7 of these General Provisions; and (ii) any Work performed on behalf of the Contractor by any Subcontractor or other person or entity.

8.2 Contractor Responsible for Permits and Fees. Except for initial DSA approval of the Drawings and Specifications, the Contractor shall not assume that the District or some other Party has obtained any and all permits, licenses, approvals, and inspections, or paid any and all fees and other costs, necessary for the Contractor to perform the Work. The Contractor must ascertain for itself whether any permits, licenses, approvals or inspections must be obtained, or any fees or other costs paid, in order for the Contractor to properly and legally perform the Work. Unless the Contract Documents expressly provide otherwise, the Contractor must complete the application processes (including, as required, obtaining the signature of an Authorized District Officer on any such application) and obtain all permits, licenses and similar authorizations that are necessary for or in connection with performance of the Work, including, without limitation, any construction, encroachment, or other permits necessary for off-site improvements and utility facilities. The Contractor shall be responsible for ensuring that it and each Subcontractor has applied for, obtained, and maintains in effect at all times during the performance of the Work, any and all permits and licenses as are required by law to be in effect in connection with performance of the Work. As between the District and the Contractor, the Contractor shall be solely responsible for paying the costs of all such permits, licenses, and authorizations, including, without limitation: (i) fees for any business, contractor's, or other license or permit required for the Contractor to conduct its business; (ii) any filing and plan-check fees for Deferred Approvals or other approvals that the Contractor must obtain in accordance with the Contract Documents; and (iii) any royalties and/or license fees arising from the use of any material, machine, method or process used in performing the Work.

8.3 Contractor Must Comply with Applicable Laws. At all times during and in connection with performance of the Work, the Contractor must fully comply with, give any and all notices required by, and undertake any and all actions required pursuant to, all applicable federal, State and local laws, ordinances, rules, regulations, and lawful orders of public authorities, including, without limitation, applicable building, mechanical, plumbing, fire and other codes. The Contractor shall be solely responsible and liable for any failure to comply with such requirements in connection with the Work, and shall bear the cost of any and all delays and/or additional work arising from any such failure, including without limitation, any costs and/or

delays arising from any stop-work order issued by the DSA as a result of the Contractor failing to perform the Work in compliance with applicable law.

8.4 Contractor Must Implement Quality Control Procedures. All Work performed must result in sound, high-quality construction that meets or exceeds the requirements of: (i) the Contract Documents; (ii) typical standards for construction of public schools in the State; and (iii) all applicable materials and/or equipment manufacturer's standards and specifications. The Contractor must ensure that all elements, assemblies and other parts of the Work fit properly and well with each other and with any Work by Others. The Contractor must develop, implement and, at all times during the performance of the Work, continuously apply and enforce written quality-control procedures as a means of ensuring that the Work is performed in accordance with all requirements of the Contract Documents. The scope and detail of the quality control procedures will be dependent on the nature and scope of the various portions of the Work. The quality control procedures are subject to reasonable approval by the Project Manager, which approval the Contractor must obtain prior to commencing any portion of the Work. In the case of limited scope and appropriate nature of any portion of the Work, the Project Manager in its reasonable discretion may waive the requirement that quality control procedures be set forth in writing, but no such waiver shall be deemed or construed to relieve the Contractor of any of its other obligations pursuant to the Contract Documents.

8.5 Contractor Must Appropriately Coordinate and Time the Work. The Contractor shall be solely responsible for: (i) appropriately and adequately coordinating and timing the various portions of the Work to ensure that all Work is properly completed within the time(s) required pursuant to the Master Construction Schedule; and (ii) determining that portions of the Work completed or in the process of being completed are sufficient and ready for subsequent portions of the Work. The Contractor must coordinate, time and perform all portions of the Work so as to avoid and/or prevent any interference with any Work by Others. The Contractor shall be solely responsible and liable for any costs and/or delays arising from any failure of the Contractor to appropriately and adequately coordinate and time the performance of the various portions of the Work.

8.6 Contractor Must Furnish Sufficient and Skilled Workforce. The Contractor must at all times furnish a sufficient number of workers to ensure that the Work is efficiently and timely undertaken and completed in accordance with all milestones set forth in the Master Construction Schedule. The Contractor shall permit the Work to be performed only by workers who are appropriately qualified and skilled in the work assigned to them. Notwithstanding the foregoing, apprentices may perform portions of the Work if enrolled in an appropriate apprenticeship program and appropriately supervised at all times during performance of such portions of the Work.

8.7 Contractor Must Confine Work to Designated Areas. The Contractor must confine all activities, materials, equipment and other things that occur or are present on, at or in the vicinity of the Project Site to specific areas where the Work is then occurring and within such other areas or limits as specified by the Project Manager or any applicable law, rule, regulation, ordinance, permit, or order of governmental entity with competent jurisdiction.

8.8 Requirements for Accessing the Project Site. The Contractor and every other person or entity: (i) must enter and exit the Project Site only through construction entrances and exits designated by the Project Manager; (ii) must access the Project Site or Work to be performed in the vicinity of the Project Site following only the specific route(s) over the local public streets, if any, designated by the Project Manager or any governmental entity with competent jurisdiction; and (iii) comply with all requirements

applicable to delivery or transport of materials, supplies and/or equipment, including, without limitation, requirements for reduced speed and covering of loads.

8.9 District Responsible for Utility Easements and Rights of Entry. Unless the Contract Documents expressly provide otherwise, the District, at its cost, shall be responsible for granting or obtaining any temporary or permanent easements, rights of entry, or similar rights for utility company facilities or similar purposes necessary in connection with the Work. The Contractor shall be responsible for requesting, sufficiently in advance to avoid or prevent any delay in the Work or any Work by Others, that the District grant or obtain each such necessary easement, right of entry and/or similar right.

8.10 District to Furnish any Necessary Survey of Project Site. The Contractor must provide written notice to the Project Manager if the Contractor reasonably determines that a legal description and/or survey of the boundaries of the Project Site is necessary for performance of the Work. If the District thereafter concurs that a legal description and/or survey of the Project Site is reasonably necessary for performance of the Work, the District, at its cost, shall furnish such legal description and/or within a reasonable time cause such survey to be performed, if not previously done, and provided to the Contractor.

8.11 Contractor Responsible for Construction Surveying. The Contractor must, at its cost, timely schedule, perform and/or cause the performance of all surveying, field measurements, staking, *et cetera*, required for purposes of any grading, site work and construction to be performed in connection with the Work.

8.12 Contractor Must Preserve Survey Monuments and Markers. At all times prior to completion of the Work, the Contractor must employ reasonable caution to avoid removing, dislocating, covering or otherwise disturbing any survey monuments, stakes, markers, devices, or implements. In the event any such monument, stake, marker, device, or implement is disturbed by any person on, at or in the vicinity of the Project Site on account of the Work, regardless of whether due to negligence, accident or other cause, the Contractor shall be solely responsible and liable for all costs and/or delays attributable to such disturbance, including, without limitation, costs of replacement and/or other correction by a licensed land surveyor or registered civil engineer and any necessary compliance with requirements to file records thereof with appropriate governmental authorities.

8.13 NPDES Permit and SWPPP.

8.13.1 District to Obtain Coverage. The District shall be responsible for obtaining any required coverage for the Project from the State Water Resources Control Board under the National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities ("NPDES Permit"), including, without limitation, filing the required "Permit Registration Documents," which includes a Notice of Intent, Storm Water Pollution Prevention Plan ("SWPPP"), and other compliance related documents. The District may contract with a consultant for the preparation and processing of some or all of such documents, including, without limitation, the SWPPP.

8.13.2 Implementation and Compliance. If NPDES Permit requirements are applicable to the Project, the Contractor must not commence work on the Project until the District has provided a copy of the NPDES Permit and the SWPPP to the Contractor, and it shall be the Contractor's responsibility to incorporate such requirements into all subcontracts on the Project. The Contractor shall be responsible for implementing and complying with the provisions of the NPDES Permit and the SWPPP, including, without

limitation, the standard provisions, monitoring and reporting requirements as required by the NPDES Permit. The Contractor shall provide copies of all reports and monitoring information to the District, Architect and Project Manager. The Final GMP shall be deemed and construed to include compensation to the Contractor for all costs of compliance with specified requirements of the NPDES Permit and SWPPP. The Contractor shall be responsible for removal and clean-up of all run-off and other control measures upon completion of the Work.

8.13.3 Consequences of Failure to Comply. Failure to comply with the NPDES Permit is in violation of federal and State law. The Contractor shall be solely responsible and liable for any and all costs and/or delays arising from any failure of the Contractor to comply with any of the requirements described in this Section.

8.14 Contractor Must Comply with Run-Off Control Requirements. At all times during performance of the Work, the Contractor must comply with all federal, State and local governmental and quasi-governmental requirements providing for control of erosion, run-off, drainage and/or discharges into any storm-drain systems and/or watercourses, including, without limitation, all applicable requirements of any city, County and/or flood-control district, and any NPDES Permit and SWPPP applicable to the Work and/or the Project. The Contractor must ascertain for itself the requirements applicable to the Work and the Project, but the Project Manager will have copies of the applicable NPDES Permit and SWPPP available for review at the Project Site. The Contractor shall be solely responsible and liable for any and all costs and/or delays arising from any failure of the Contractor to comply with any of the requirements described in this Section 8.14.

8.15 Contractor Must Not Disturb Run-Off Control Measures. Except to the extent the Project Manager consents in writing, the Contractor must not remove, relocate, damage, destroy or otherwise disturb any on-site or off-site erosion and/or run-off control measures established in connection with the Project. The Contractor must replace and/or restore any such control measures disturbed by any person or entity on, at or in the vicinity of the Project Site on account of the Work. The Contractor shall be solely responsible and liable for any and all costs and/or delays arising from any failure of the Contractor to comply with any of the requirements described in this Section 8.15.

8.16 Contractor Must Protect Site and Existing Improvements. At all times prior to completion of the Work, the Contractor must adequately secure, preserve and protect all: (i) completed and in-progress portions of the Work; (ii) materials and equipment used in connection with the Work; (iii) all Work by Others and other existing improvements in the immediate vicinity of, affected by, or receiving any portion(s) of, the Work; and (iv) the portion(s) of the Project Site in the vicinity of the Work. The foregoing shall be deemed to require, among other things, that the Contractor: (i) install barricades around any shrubs or trees that the Contract Documents or the Project Manager require to be preserved or protected, but that may be adversely affected by performance of the Work; (ii) drain, remove or otherwise mitigate any water, mud, dust, debris, *et cetera*, as necessary for proper performance of the Work; (iii) avoid driving over, parking on, and placing any loads (including, without limitation, stabilization legs of cranes or other equipment) on, any curbs, gutters and sidewalks on, at or in the vicinity of the Project Site; and (iv) avoid overloading any completed or partially completed building, structural members or elements, or other improvements, with workers, materials and/or equipment. The Project Manager may require that the Contractor promptly repair, replace or otherwise correct any damage to property caused by the Contractor or any other person or entity performing any of the Work or, alternatively, the Project Manager may cause any such damaged property to be repaired, replaced or otherwise corrected by another party at the Contractor's expense. The Contractor

shall be solely responsible and liable for any costs and/or delays arising from any failure of the Contractor to provide adequate security, preservation and protection as provided herein.

8.17 Requirements for Cutting and Patching of Work. The Contractor must obtain the written consent of the Architect prior to cutting and/or patching any completed portions of the Work, any Work by Others, or existing improvements on, at or in the vicinity of the Project Site. The Architect may impose reasonable conditions on any such approval as relate to the appearance, quality, functionality, integrity and/or safety of the Work and any Work by Others. In undertaking any such activities, the Contractor must adequately protect all other completed or in-progress portions of the Work, any Work by Others, the Project Site, and off-site improvements and properties in the vicinity of such activities. The Contractor shall be solely responsible and liable for any and all costs and/or delays arising from any cutting and/or patching that is performed without consent of the Architect, performed contrary to direction or instructions of the Architect, or is otherwise defective or improperly performed, including, without limitation, any costs and/or delays arising from the need to obtain Architect, DSA and/or other approvals. If the District or the Architect determines that any patch does not reasonably match the appearance, quality or functionality of the adjacent Work or any Work by Others, or otherwise fails to conform to requirements of the Architect or the Contract Documents, the District may require that the Contractor, at its sole cost, remove and replace the patch and/or refinish or replace, to the extent necessary, the Work or any Work by Others that was patched.

8.18 Requirements for Cutting, Drilling or Attaching to Structural Members. Except as expressly provided in the Contract Documents, the Contractor must obtain the written consent of the Architect prior to cutting, boring or drilling into, or attaching anything onto, any structural members or elements, including, without limitation, columns, shear walls, trusses, *et cetera*. The Contractor must resolve any doubt regarding whether an improvement is a structural member or element by consulting with the Architect. The Architect may impose reasonable conditions on any such approval as relate to the appearance, quality, functionality, integrity and/or safety of the Work and any Work by Others. In undertaking any such activities, the Contractor must adequately protect all other completed or in-progress portions of the Work and any Work by Others. The Contractor shall be solely responsible and liable for any and all costs and/or delays arising from any such activities that are performed without consent of the Architect, performed contrary to direction or instructions of the Architect, or are otherwise defective or improperly performed, including, without limitation, any costs and/or delays arising from the need to obtain Architect, DSA and/or other approvals.

8.19 District Responsibility to Provide for Testing and Inspection. Except as the Contract Documents may provide in any particular case, the District, at its cost, shall obtain, furnish or otherwise provide for all testing and inspections of the Work and any materials, equipment and/or assemblies to be incorporated therein, as required pursuant to the Contract Documents and applicable laws, ordinances, rules, regulations, and orders of governmental entities with competent jurisdiction. The District, the Project Manager, the Inspector of Record and/or the entity performing any test shall select each sample of materials that must be tested, not the Contractor. The Contractor must not: (i) incorporate into the Work any materials and/or equipment that are required to be tested and/or inspected prior to such materials and/or equipment having been tested and approved; or (ii) close or otherwise make inaccessible any assembly or assemblies that must be tested prior to being closed or otherwise becoming inaccessible.

8.20 Contractor Must Give Timely Notice of Testing and Inspections. The Contractor must provide written notice to the Project Manager and the Inspector of Record sufficiently in advance of when it is necessary for any required testing or inspection to occur, in order to: (i) permit the District to arrange for

such testing or inspection, including, without limitation, if materials and/or equipment are required to be inspected at the place of manufacture or other source of supply; and (ii) avoid and/or prevent any delays in performing the Work and any Work by Others. If the Contractor closes, covers or otherwise constructs any portion of the Work or an assembly incorporated therein prior to such portion of the Work being inspected as required, the Project Manager may require that the Contractor open, uncover or otherwise deconstruct that portion of the Work in order to permit the required inspection(s) to occur. In such event, the Contractor shall be solely responsible and liable for any costs and/or delays arising from the need to open, uncover or deconstruct such portion of the Work and to thereafter replace or otherwise correct such portion of the Work.

8.21 District May Require Special or Additional Testing or Inspection. If the District, the Architect, the Project Manager, the Inspector of Record and/or any governmental entity with competent jurisdiction determines it necessary or advisable, the District may require special or additional testing and/or inspection, not otherwise required, of any portion of the Work and/or any materials and/or equipment incorporated or to be incorporated therein. To the extent required, the Contractor must open, uncover, or deconstruct any portions of the Work or any assemblies incorporated therein in order to reveal hidden portions of the Work. If the special or additional testing and/or inspection reveals that the Work conforms to all requirements of the Contract Documents, the District shall be responsible for the cost of the testing and/or inspection and for costs incurred by the Contractor, as required, to open, uncover, or deconstruct any portions of the Work and, thereafter, correct such Work and any Work by Others disturbed by the additional testing and/or inspection. If the special or additional testing and/or inspection reveals that the Work does not substantially conform to all requirements of the Contract Documents, the Contractor shall be solely responsible for the cost of the testing and/or inspection and for costs incurred by the Contractor, as required, to open, uncover or deconstruct any portions of the Work and, thereafter, correct such Work and any Work by Others disturbed by the additional testing and/or inspection.

8.22 Contractor Responsibility for Costs of Testing and Inspections. The Contractor shall be solely responsible and liable for paying all costs attributable to any testing and/or inspection if: (i) the Contract Documents require that the Contractor pay such costs; (ii) the Contractor provided notice requesting the testing and/or inspection, but the applicable Work, materials, equipment and/or assemblies were not ready to be tested and/or inspected at the indicated time; (iii) the testing and/or inspection was necessary because the applicable Work, materials, equipment and/or assemblies previously failed required testing and/or inspection; (iv) the testing and/or inspection had to be performed outside the hours of a normal eight-hour workday on any Monday through Friday, excluding holidays, because the Contractor, for any reason except as excused by the District in writing, performed any portion of the Work outside the hours of a normal eight-hour workday; or (v) the testing and/or inspection occurred outside a fifty mile radius of the Project Site. In no event shall any consent by the District or the Project Manager to performance of any portion(s) of the Work outside the hours of a normal eight-hour workday be deemed or construed to constitute consent by the District to pay costs attributable to testing and/or inspection of such portion(s) of the Work that must occur outside the hours of a normal eight-hour workday. To the extent additional services are required in connection with any such testing and/or inspections, the costs payable by the Contractor shall include, without limitation, costs of the Architect's, Project Manager's and Inspector of Record's services attributable to the testing and/or inspections.

8.23 Contractor Must Correct Non-Conforming Work. The District may require that the Contractor remove any Work, materials and/or equipment that is(are) inferior, defective or otherwise fail(s) to conform to requirements of the Contract Documents, regardless of whether already incorporated into the

Work, and correct the Work using proper materials and/or equipment. Upon request, the Contractor must provide to the Project Manager such documentary evidence (e.g., invoices, receipts, purchase orders, *et cetera*) as reasonably evidences the type and quality of any materials and/or equipment that is to be or that has been incorporated into the Work. The Contractor, without extension of the Contract Time or increase in the Contract Price, shall be solely responsible and liable for all costs of such removal and replacement, as well as all other costs to bring the Work into compliance with the Contract Documents. If the Contractor fails to timely remove and replace any inferior or defective materials and/or equipment, or fails to otherwise bring the Work into compliance with the Contract Documents, the District may do so, and the cost thereof shall be charged to the Contractor and/or deducted from amounts otherwise payable to the Contractor pursuant to the Contract. If the District is required to undertake any such actions, the District may sell any materials that it removes from the Work and, if any, the proceeds thereof less the District's costs of sale, transport, *et cetera*, shall be a credit that will offset monies withheld from the Contractor.

8.24 Contractor Must File Verified Reports. From time to time during the performance of the Work, and at any other time required by the DSA, the Contractor, and each other person or entity performing any portion of the Work required by law, must prepare and file with the DSA any and all verified reports required pursuant to Education Code Section 17309, Section 36 of Title 21 of the California Code of Regulations ("CCR"), and Section 4-366 of Title 24 of the CCR. Verified reports must be prepared on form(s) prescribed by the DSA and specify, based on the personal knowledge of the person preparing the report, that the Work during the period covered by the report has been performed and materials have been used and installed in every material respect in compliance with the duly approved Drawings and Specifications, and setting forth such detailed statements of fact as shall be required.

8.25 Contractor Must File Daily Reports. For each day on which any portion of the Work is performed, regardless of the scope or amount of such Work, the Contractor must provide to the Project Manager a report describing all activities in connection with performance of the Work that day, listing all workers performing any Work that day and their respective trades, experience levels and employers, and any equipment or materials delivered and/or installed or incorporated into the Work that day. For each safety meeting conducted in connection with the Project, the Contractor must prepare, and must submit with the daily report for the day the safety meeting occurred, reasonably detailed minutes and a sign-in or attendance sheet for the safety meeting.

8.26 Contractor Must Control Noise and Dust. At all times during performance of the Work, the Contractor must ensure that all construction equipment used in connection with the Work are properly fitted with appropriate and adequate noise-reduction devices or mechanisms, and that all such devices and mechanisms are properly and well maintained. The Contractor must comply with any and all federal, State and local governmental laws, ordinances, rules, regulations and other requirements applicable to noise originating or emanating from construction sites and activities, e.g., the Noise Control Program (Title 40, Code of Federal Regulations, Part 204). The Contractor also must take all such actions as are necessary to prevent dust and/or debris attributable to the Work from blowing into, or otherwise creating a nuisance or polluting, any other areas on or off the Project Site. At any time the Contractor is or will be performing any portion of the Work while school is in session, and the District determines that noise or dust originating or emanating from the Work is unreasonably disturbing students and/or teachers, the District may require that the Contractor stop such portion of the Work and reschedule such activities during hours that will not cause any such unreasonable disturbance. If the Work is to be performed at any time school is in session, the risk of the District stopping the Work on account of any such unreasonable disturbance shall be deemed and

construed as foreseeable, and the Contractor in no such event shall be entitled to an extension of the Contract Time or an increase in the Contract Price.

8.27 Contractor Must Clean Work Areas. The Contractor, at all times, must keep the Project Site free of trash, debris, dust, excess water, excess materials, unused equipment, *et cetera* attributable to the Work, and shall maintain the Project Site and all structures or other improvements in a clean and orderly condition. Each day during the course of the Work, the Contractor shall: (i) clean the areas in which the Work is or was being performed, together with any other areas affected by such Work (including, without limitation, adjacent streets, sidewalks, gutters, *et cetera*), break areas, lunch areas, *et cetera*; and (ii) remove from the Project Site and properly and legally dispose of all trash, debris, dust, excess water, excess materials, *et cetera* resulting or arising from performance of the Work. If the Project Manager or Inspector of Record determines that trash, debris, dust, excess water, excess materials, unused equipment, *et cetera* resulting or arising from performance of the Work is a potential safety hazard, upon request, the Contractor shall immediately remove the items or matter creating the hazard and clean the vicinity thereof.

8.28 Consequences of Failure by Contractor to Clean Work Areas. If at any time the Contractor fails to timely comply with its responsibilities pursuant to Section 8.27 of these General Provisions, the District or Project Manager may cause such responsibilities to be fulfilled by others, and the cost thereof shall be a charge to the Contractor and/or deducted from amounts otherwise payable to the Contractor pursuant to the Contract. If the Contractor or other contractor working on the Project disputes responsibility for cleanup of the Project Site: (i) the District or Project Manager may cause necessary cleanup to be performed; (ii) the District shall allocate the cost of such cleanup among the Contractor and others that the District determines should have been responsible for the cleanup; and (iii) the cost thereof allocated to the Contractor shall be a charge to the Contractor and/or deducted from amounts otherwise payable to the Contractor pursuant to the Contract.

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PART 9
COORDINATION WITH WORK BY OTHERS

9.1 Contractor Must Ascertain Impacts of Work by Others. The District, in its sole discretion, may enter into other contracts to provide for Work by Others in connection with the Project, or may perform any such Work by Others using its own forces. In addition, the District, in its sole discretion, may provide for phasing of various portions of the Project. The Contractor must ascertain for itself the overall scope and nature of the Project, the scope and nature of any Work by Others required to complete the Project and the potential impacts of any Work by Others on the coordination, timing, scheduling, and performance of the Work, including, without limitation, the impacts of any phasing of the Project. The Contractor must accommodate all such potential impacts, and shall be deemed and construed to have accommodated all such potential impacts, when: (i) preparing the proposed Master Construction Schedule; (ii) coordinating, timing, and scheduling the Work; and (iii) performing the Work. If the work on the Project by any other contractor causes or results in any unreasonable delay and/or unreasonably increases the cost of performing the Work, the Contractor's sole remedy for damages, including delay damages, shall be to seek compensation from the contractor whose work caused or resulted in such delays and/or increased costs, not from the District.

9.2 Contractor Must Accommodate Partial Occupancy by District. Subject to the provisions of this Section 9.2, the District shall have the right to occupy and/or use any completed or partially completed portion of the Project. The District and Contractor shall attempt to agree in writing as to their respective responsibilities for payments, security, maintenance, heat, utilities, damage to the Work, insurance, correction of the Work, commencement of guarantee periods, *et cetera*. In the event the District and Contractor are not able to so agree, the District may issue a unilateral Change Order to provide for such occupancy and/or use. Immediately prior to any such partial occupancy and/or use, the District, Architect, Project Manager, Inspector of Record, and Contractor shall jointly inspect the portion of the Project to be occupied and/or used in order to determine and record the status and condition of the Work. The Contractor must make all reasonable efforts to accommodate any such partial occupancy and/or use by the District. Unless set forth in a written agreement or unilateral Change Order, the partial occupancy and/or use of any portion of the Project that includes any portion of the Work shall not constitute acceptance of Work that does not conform with the requirements of the Contract Documents. In no event shall performance of any Work by Others be deemed or construed to constitute partial occupancy and/or use by the District in accordance with this Section 9.2.

9.3 Contractor Must Coordinate with Work by Others. In no circumstances shall the Contractor be deemed or construed to have exclusive occupancy of any portion of the Project Site, the Project, or any property in the vicinity of the Project that is under the control of the District or any other governmental or quasi-governmental entity. The Contractor must coordinate the Work with any Work by Others, and, to the extent required, must properly match, connect to, and/or build upon such Work by Others. The Contractor must not unreasonably interfere with or delay any Work by Others, or unreasonably refuse to permit those performing any Work by Others to: (i) receive deliveries of and/or store any materials, equipment or supplies; (ii) access the various areas on, at or in the vicinity of the Project Site in, at, or on which the Work is located or being performed; or (iii) perform the Work by Others, including, without limitation, matching, connecting to, or building upon, any portion of the Work. Upon request, the Contractor must meet with the Project Manager, the Inspector of Record, and/or others as the District determines necessary or advisable, for purposes of coordinating the various activities of the Contractor and those performing any Work by Others. The Contractor must notify the Project Manager if the performance of any Work by Others is unreasonably interfering with, or likely will unreasonably interfere with, the performance of the Work, and

the Project Manager in all such cases shall ascertain whether it is possible for the Work and such Work by Others to proceed simultaneously or whether it is necessary to prioritize the performance of the Work and such Work by Others. Any such prioritization shall be deemed and construed to be a normal incident of the Project, and the District shall not be responsible or liable for direct or indirect delays, costs and/or expenses incurred by the Contractor on account of such prioritization.

9.4 Contractor Must Inspect Certain Work by Others for Deficiencies. If the proper performance or results of any portion of the Work depends to any extent on the proper performance or results of any Work by Others (including, without limitation, if the Contractor must match, connect to, or build upon, such Work by Others), then, prior to commencing such portion of the Work, the Contractor must measure and otherwise inspect that Work by Others, and compare the results of that Work by Others with the requirements of the Contract Documents, to ensure that the Work can be properly performed. The Contractor must perform each such inspection sufficiently in advance to avoid and/or prevent any delay in the Work or any Work by Others. The Contractor must immediately provide written notice to the Architect, the Project Manager and the Inspector of Record if the Contractor reasonably believes that any Work by Others upon which the Work is dependent is materially defective, deficient, improper or otherwise does not conform to requirements of the Contract Documents, and thereby precludes proper performance of the Work. The Contractor shall be deemed and construed to have fully accepted any and all Work by Others as fit and proper for purposes of performance of the subsequent Work if: (i) the Contractor fails to inspect, or fails to adequately inspect, such Work by Others; or (ii) the Contractor does not provide notice that such Work by Others is materially defective, deficient, improper or otherwise does not conform to requirements of the Contract Documents, and thereby precludes proper performance of the Work.

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PART 10
PROJECT SITE DECORUM

10.1 Performance of Work at Operating School Facilities. If the Work or any portion thereof is to be performed at any existing and operating school facility, the Contractor and each Subcontractor and other person or entity on, at or in the vicinity of the Project Site on account of the Work must: (i) become informed of and take into account the age and maturity of the students on the Project Site; (ii) control their behavior accordingly; (iii) coordinate, schedule and perform any Work that may cause inconvenience, interference or other disturbance of any classes or other school operations during times that will eliminate or minimize the disturbance; (iv) enclose the area in which the Work is to occur with a substantial barricade or take other safety precautions as directed by the Project Manager; and (v) comply with directions from the District and/or the Project Manager regarding the timing and performance of the Work that are intended to avoid unnecessarily disturbing school operations.

10.2 Prohibition Against Contact with Students and Other Minors. Regardless of whether Section 10.3 of these General Provisions is made effective, no person who is at, on or in the vicinity of the Project Site on account of the Work, even if such person has never been convicted of any serious or violent felony, may converse or otherwise interact with any student or other minor-aged individual. The foregoing prohibition shall not apply to the extent reasonably necessary: (i) in the event of an Emergency; (ii) in the event the student or other minor-aged individual is accompanied by a parent, guardian, District staff member, or other adult who initiates the interaction (e.g., to ask for directions, to ask what is being constructed, *et cetera*); or (iii) when directing any minor-aged individual who is not authorized to be present on the Project Site to leave the Project Site. Each person who is at, on or in the vicinity of the Project Site on account of the Work shall attempt to keep to a minimum any contact initiated as provided in the foregoing clauses (ii) and (iii). Upon being directed to do so, if any individual not authorized to be present on the Project Site refuses or fails to leave the Project Site, the person who so directed the individual to leave must immediately inform the Project Manager. Each person at, on or in the vicinity of the Project Site on account of the Work shall fully comply with all procedures and other requirements established by the District and/or Project Manager and intended to limit contact with others.

10.3 Procedures to Prevent Contact with Students.

10.3.1 Significance of Requirements. This Section 10.3 shall be applicable to the Contract only if the Special Provisions so provide. If this Section 10.3 is applicable, it is because the District has determined that persons assigned to the Work or who otherwise will be present at, on or in the vicinity of the Project Site on account of the Work may have more than "limited contact" with minor-aged students.

10.3.2 Criminal-History Background Checks. The Contractor, in conformance with Education Code Section 45125.1, shall require and be responsible for ensuring that each person who will be at, on or in the vicinity of the Project Site on account of the Work shall comply with all California Department of Justice guidelines and requirements relating to fingerprinting and criminal-history background checks. The Contractor shall certify in writing to the District, using the "Certification of Employee Background" form included in the Required Project Forms, that no person assigned to the Work or who otherwise will be present at or on the Project Site has been convicted of any serious or violent felonies (as described in Education Code Section 45122.1). The Contractor must attach to the executed Certification of Employee Background a list of all persons to whom the certification applies. The Contractor shall prohibit and prevent each and every person who will be at, on or in the vicinity of the Project Site on account of the Work (including not only all persons assigned to the Work directly by the Contractor, but also all persons assigned

to the Work by any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work) from being present at, on or in the vicinity of the Project Site unless and until the Contractor provides the required certification including such person to the District.

10.3.3 Responsibility for Subcontractor Compliance. The Contractor shall require in each Subcontract that, if the Subcontractor will assign any person to the Work or otherwise will cause or permit any person to be present at or on the Project Site, the Subcontractor must cooperate in regard to, and fully comply with, the requirements of this Section 10.3. The Contractor may on that basis delegate responsibility for compliance with this Section 10.3 to any such Subcontractor; however, the Contractor at all times retains full responsibility and/or liability for such compliance or lack thereof.

10.3.4 Alternatives to Fingerprinting and Background Checks. Upon request of the Contractor with respect to any particular situation and/or limited duration of time, the District in its sole discretion may consent to the Contractor implementing measures intended to protect the District's minor-aged students, which measures would be in lieu of the Contractor complying with Subsections 10.3.2 and 10.3.3 herein. Subject to District approval, such alternative measures might include, but are not necessarily limited to: (i) installing a physical barrier to limit contact between students and the employees and other representatives of the Contractor, Subcontractors, and others present on or at the Project Site on account of the Work; (ii) providing for the continuous supervision and monitoring of specific employees, representatives and others by an employee of the Contractor who has received fingerprint clearance from the California Department of Justice; or (iii) providing for the surveillance of such employees, representatives and others by a District employee. The Contractor must implement any such approved alternative measures at no additional cost to the District, and the Contractor shall be responsible for ensuring compliance with such alternative measures by or with respect to all persons assigned to the Work or who otherwise will be present at, on or in the vicinity of the Project Site on account of the Work.

10.4 Consequences of Violating Prohibition Against Contact. Due to the possible adverse consequences of contact with students and other minor-aged individuals, any failure by the Contractor to ensure compliance with the requirements of Section 10.2 or, if applicable, Section 10.3 of these General Provisions, shall be deemed and construed to constitute a material breach of the Contract, upon which the District, in its sole discretion, may immediately terminate the Contract without any further compensation to Contractor and/or pursue all other rights and remedies it may have against the Contractor pursuant to law or the Contract.

10.5 Identification or Security Badges. The Project Manager may implement requirements for persons present at, on or in the vicinity of the Project Site on account of the Work to wear identification or security badges. In such event, each such person must comply with all requirements for producing, procuring or obtaining such badges, and each such person must wear the assigned badge at all times while at, on or in the vicinity of the Project Site, in a visibly noticeable location on the front, upper body of such person. Upon request, the Project Manager may consent to a person wearing his or her badge in an alternate location or by alternate means (e.g., lanyard, clip, *et cetera*) if reasonably necessary to ensure the safety of such person or the visibility of the badge. Any person in need of a replacement badge may obtain a replacement subject to paying a fee covering the District's costs of providing the replacement badge. If the Project Manager implements requirements for wearing badges, no person without a badge, or who refuses or fails to wear his or her badge, will be permitted to enter or remain at, on or in the vicinity of the Project Site. Upon final completion of the Work, the Contractor shall return, or cause to be returned, to the Project

Manager all badges issued in connection with the Work, which shall be a prerequisite to final payment to the Contractor pursuant to the Contract.

10.6 Prohibition Against Workers Leaving Vicinity of Their Work. Each person at, on or in the vicinity of the Project Site on account of the Work must remain in the immediate vicinity of the portion of the Work he or she is to perform, and must not stray to other areas of the Project Site. The foregoing shall not be construed to prohibit any such person from accessing, as reasonably necessary, his or her work area(s), restrooms, any designated lunch area, or any designated parking area.

10.7 Prohibition Against Unfit Workers. No unfit person may, and the Contractor must not permit any unfit person to: (i) perform any portion of the Work; or (ii) be present at, on or in the vicinity of the Project Site. For purposes of this Section 10.7, a person shall be deemed unfit if: (i) the person is not appropriately skilled for the tasks or work assigned to such person (other than designated apprentices working under the supervision of designated journeymen or other authorized supervisors); (ii) the person fails to comply with any rule or requirement set forth in the Contract Documents; or (iii) the person creates any safety hazard or unreasonably fails to recognize any apparent safety hazard that might jeopardize that person or other persons or property.

10.8 Requirements for Courteous and Professional Conduct. Each person at, on or in the vicinity of the Project Site for any reason, including, without limitation, any worker arriving for or departing from his or her work shift, shall at all times act in a courteous and professional manner. Each such person is hereby prohibited from: (i) acting in any violent, overly-aggressive or other anti-social manner, including, without limitation, fighting, hitting or striking of any other person or property, yelling or screaming, obscene gestures, leering, touching of any other person in a manner that violates any law, *et cetera*; (ii) using any word or language that is profane, demeaning, derogatory, sexually explicit, misogynistic, racially- or ethnically-biased, *et cetera*; (iii) making any lewd, obscene or otherwise indecent gestures, including, without limitation, "flipping off" any other person or thing; and (iv) taunting or inappropriately teasing any other person if likely or intended to annoy, harass, anger, or cause any other adverse emotional reaction by or of any person. No person may bring or keep on or in the vicinity of the Project Site, or any other place where any portion of the Work is to be performed, any gun, switchblade, or other knife with a blade greater than two inches in length (except that the Project Manager may permit knives with longer blades if reasonably necessary for performance of the Work).

10.9 Dress Code and Appearance Requirements. Each person at, on or in the vicinity of the Project Site on account of the Work must use and/or wear clothing and protective attire (e.g., hard-hats, eye-wear, boots, gloves, *et cetera*) as appropriate for the situation and/or the Work being performed, and such clothing and attire must be clean at the start of such person's work shift. No person at, on or in the vicinity of the Project Site on account of the Work may wear: (i) any shirt that does not fully cover the person's upper torso and shoulders (e.g., a tank-top or midriff shirt) as an only or as an outer layer of clothing; (ii) any tennis, athletic or similar type shoes; (iii) any flip-flops or other types of sandals; or (iv) any short pants or cut-offs. No person at, on or in the vicinity of the Project Site on account of the Work may wear or display any shirt, pants, hat or other garment, or any necklace, bracelet or other accessory, or any other thing of any nature that depicts, illustrates, states, describes, advertises or promotes: (i) any material or message that is obscene, violent, suggestive, derogatory, demeaning, sexual, misogynistic, racially- or ethnically-biased, *et cetera*; or (ii) any drug, alcohol, tobacco, or other controlled substance prohibited to minors.

10.10 Requirements for Use of Restrooms. If the Project Manager is not responsible for providing portable or other restroom facilities at the Project Site, the Contractor shall be responsible for providing portable restroom facilities (including, without limitation, hand-washing area and soap) for use by all persons at, on or in the vicinity of the Project Site on account of the Work. Each such person shall comply with any posted instructions or rules relating to use of the restroom facilities at, on or in the vicinity of the Project Site. In no circumstances may any such person urinate, defecate or expectorate (i.e., spit) anywhere at, on or in the vicinity of the Project Site other than into a urinal or toilet inside a restroom facility.

10.11 Control of Break-Time Activities. The Contractor shall control the break-time activities of all persons present on the Project Site on account of the Work. The Contractor shall ensure that break areas are cleaned after each break and that all refuse (including, without limitation, soda cans, food wrappers and containers, plastic bottles, and un-eaten food) are placed in appropriate trash or recyclable-materials receptacles. No person may bring onto, or keep in the vicinity of, the Project Site any glass bottle or other glass container. The Contractor shall encourage recycling and, if not the responsibility of the Project Manager, shall provide containers for the recycling of materials in connection with its activities at the Project Site.

10.12 Prohibition Against Drugs (including Alcohol) and Tobacco. All District properties, including, without limitation, the Project Site, are "drug-free" workplaces and, therefore, the Contractor is hereby made subject to the requirements of Government Code Sections 8350 *et seq*., the Drug-Free Workplace Act of 1990. In addition, all District properties, including, without limitation, the Project Site, are "tobacco-free" workplaces. No person at, on or in the vicinity of the Project Site on account of the Work may: (i) engage in the unlawful manufacture, dispensation, possession or use (including being under the influence) of any illegal or controlled substance; (ii) possess or use any alcoholic beverage; (iii) use any legal substance that results or likely will result in serious or significant impairment of normal abilities; or (iv) smoke, inhale, chew or otherwise use or consume tobacco products. Within seven days of the date of the Notice of Award, the Contractor must submit to the District an executed copy of the "Certification of Drug-Free and Tobacco-Free Workplace" form included in the Required Contract Forms. Due to the possible adverse consequences of the foregoing activities, any failure by the Contractor to ensure compliance with the requirements of this Section 10.12 shall be deemed and construed to constitute a material breach of the Contract, upon which the District, in its sole discretion, may immediately terminate the Contract, without any further compensation to Contractor, and pursue all other rights and remedies it may have against the Contractor pursuant to law or the Contract.

10.13 Prohibition Against Unnecessary Noise. No person at, on or in the vicinity of the Project Site on account of the Work shall make any loud and/or unnecessary noises, except loud noises reasonably resulting from performance of the Work. No person at, on or in the vicinity of the Project Site on account of the Work may: (i) use any radio, portable CD player, or other similar device, regardless of the volume at which it is used; (ii) use any I-Pod, MP-3 player or similar device (including, without limitation, if the device is a component of a cellular telephone or similar device) not typically audible to other than the user; or (iii) wear any earplugs or headphones for entertainment or other non-Work or non-safety purposes. The foregoing shall not be deemed or construed to prohibit the use of cellular telephones, walkie-talkies or other radio-communications devices for communications necessary in connection with the Work.

10.14 Limitations on Access to Project Site. Except as authorized by the Project Manager, no person not then-required in connection with the performance of the Work may enter or remain in or upon the Project Site, including, without limitation, any sales-person, food vendor, or friend or relative of any

person otherwise authorized to be present at or on the Project Site. All persons entering onto or exiting from the Project Site in any personal or work vehicle or equipment shall use only the ingress and egress routes established by the Project Manager and must not cross-over any boundaries or limit-lines established by the Project Manager.

10.15 Parking at the Project Site. The Project Manager may or may not designate an area at, on or in the vicinity of the Project Site to be used for parking of personal vehicles and work vehicles and equipment not then being used in connection with the Work. If the Project Manager has designated an on-site or off-site parking area for such purposes, personal and work vehicles and equipment may be parked only in that designated parking area. Each person, who brings a personal or work vehicle or equipment to the Project Site, shall fully comply with any parking controls and/or program established by the Project Manager, including, without limitation, any requirements for furnishing license-plate information and placing parking-stickers on such vehicles or equipment. If the Project Manager has not designated an on-site or off-site parking area, then no personal or work vehicles or equipment: (i) may be parked at or on the Project Site except as expressly authorized by the Project Manager; or (ii) may be parked in the vicinity of the Project Site in any manner that is illegal or otherwise creates a safety hazard or nuisance. Upon request of the Project Manager, the Contractor shall immediately cause to be relocated any improperly parked vehicle that is owned or used by any person present at the Project Site on account of the Work.

10.16 Use of Vehicles and Equipment at the Project Site. The Contractor must obtain consent and directions from the Project Manager prior to using, or permitting any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work to use, any work vehicle or equipment on, at or in the vicinity of the Project Site. Any work vehicles and/or equipment so used shall be removed from the Project Site or, if applicable, shall be removed to a designated location, promptly after completion of the portion of the Work for which the vehicle or equipment is required. The Contractor shall be responsible for damage to the Project Site or any necessary repair or other work at the Project Site resulting from any such use of any vehicle or equipment, whether authorized or not.

10.17 Prohibition Against Displays on Vehicles and Equipment. No person may bring or keep any personal or work vehicle or equipment on or in the vicinity of the Project Site that displays any sign, decal, sticker, bumper-sticker, or other image that depicts, illustrates, states, describes, advertises or promotes: (i) any material or message that is obscene, violent, derogatory, demeaning, sexually suggestive, misogynistic, racially- or ethnically-biased, *et cetera*; or (ii) any drug, alcohol, tobacco, or other controlled substance prohibited to minors.

10.18 No District Responsibility for Vehicles or Equipment. The Contractor and/or the individual owners of any personal or work vehicles or equipment at, on or at the Project Site shall be and remain responsible for the security, safety and condition of such vehicles and equipment. None of the District, Architect, Project Manager or Inspector of Record shall be responsible or liable for any theft or damage that occurs to any vehicles and/or equipment at, on or in the vicinity of the Project Site (although any such individual who steals or causes damage may be personally liable).

10.19 Prohibition Against Animals at Project Site. No person at, on or in the vicinity of the Project Site may bring to the Project Site, or keep at, on or in the vicinity of the Project Site, any pet or other animal, including, without limitation, any horse, dog, cat, bird, snake, lizard, insect, *et cetera*, other than an

assistance animal as permitted by law. The foregoing shall be deemed and construed to prohibit having or keeping animals in any vehicles or equipment, whether in operation or parked.

10.20 Contractor to Require Compliance. With respect to each person present on the Project Site on account of the Work, regardless of whether such person works directly for the Contractor or any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work, the Contractor shall: (i) be solely responsible for ensuring compliance with the conduct-related rules and requirements set forth in this Part 10 of these General Provisions and elsewhere in the Contract Documents (collectively, "Conduct Rules"); (ii) strictly enforce all Conduct Rules; and (iii) maintain discipline and order at all times. In each Subcontract, the Contractor shall require that each Subcontractor: (i) fully comply with and enforce, and require that each of their respective employees, agents and other representatives fully comply with, all Conduct Rules; and (ii) provide a copy of this Part 10 (accurately translated to other languages, if necessary) to each of their respective employees, agents and other representatives who will be present at, on or in the vicinity of the Project Site on account of the Work.

10.21 Consequences of Non-Compliance. If the Contractor determines that any person at, on or in the vicinity of the Project Site on account of the Work has violated any Conduct Rule, the Contractor shall immediately remove such person from the Project Site and prohibit such person from returning to the Project Site. If the District, Architect, Project Manager or Inspector of Record determines that any person at, on or in the vicinity of the Project Site on account of the Work has violated any Conduct Rule, then, upon request, the Contractor shall immediately remove such person from the Project Site and prohibit such person from returning to the Project Site. The Contractor shall prohibit, and shall take appropriate steps to prevent, any person removed from the Project Site for any Conduct Rule violation from returning to the Project Site or resuming any work, duties or other responsibilities in connection with the Work. No such person may return to the Project Site, or may resume any work, duties or other responsibilities in connection with the Work, unless the District or the Project Manager consents in writing.

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PART 11
PROJECT SITE SAFETY

11.1 General Safety-Related Responsibilities of the Contractor. Without limiting any other provision of the Contract Documents, the Contractor has, and shall at all times retain, the ultimate responsibility for all of the following: (i) keeping the areas at, on and in the vicinity of the Project Site free of safety hazards arising from performance of, or in any way connected with, the Work; (ii) performing the Work in a manner that ensures the safety of persons and property at, on or in the vicinity of the Project Site; (iii) providing all physical safety measures required in connection with the Work required to adequately protect persons and property at, on or in the vicinity of the Project Site pursuant to any legal requirement or the Contract Documents, or as necessary or advisable based on conditions in which the Work will be performed; (iv) complying with all applicable safety laws, standards, orders, rules, regulations and other requirements of any federal, State, local or other governmental or quasi-governmental entity with competent jurisdiction, including, without limitation, posting of all required information regarding protection of workers and giving of any and all required notices, warnings and disclosures; (v) protecting the Work and all materials, equipment and other things to be incorporated into the Work or used in connection with the Work, whether on or off the Project Site; and (vi) protecting property at, on or in the vicinity of the Project Site that may be affected by the Work, including, without limitation, structures, streets, sidewalks, gutters, paved areas, utilities, trees, shrubs and lawns that will not be removed or replaced in connection with the Project.

11.2 Required Safety Programs. The Contractor shall prepare in writing any and all safety, loss-prevention and/or injury and illness prevention plans and/or programs required in connection with the Work by the Contract Documents or by any applicable law, rule, regulation or other governmental requirement, including, but not limited to, Cal-OSHA requirements (each a "Safety Program"). The Contractor shall provide a copy of each Safety Program to the Project Manager prior to commencing any portion of the Work. The Project Manager, an insurance loss-prevention agent, and/or other District representative may implement a Safety Program in connection with the Project, in which case, the Contractor and each Subcontractor shall fully comply with all requirements of such Safety Program. As directed by the Project Manager, the Contractor shall coordinate its Safety Program procedures and requirements with those of any other Safety Programs applicable to the Project. The Contractor shall be responsible for implementing and ensuring compliance with any and all procedures, training and other requirements of each applicable Safety Program, including, without limitation, training of workers in regard to security of the Project Site and the transportation, storage and use of hazardous materials.

11.3 Designation and Duties of Safety Officers.

11.3.1 Contractor Safety Officer. Prior to commencing any portion of the Work, the Contractor shall provide, in writing to the Project Manager, the name, position or title, and resume of an individual who the Contractor proposes shall be responsible for ensuring compliance with all Safety Programs and other safety-related requirements applicable to the Work ("Safety Officer"). The person designated as the Safety Officer must be appropriately knowledgeable and experienced in fulfilling such responsibilities, and the District may in its reasonable discretion approve or disapprove of any proposed Safety Officer. Depending on the complexity and scope of the Work, and based on recommendations from the Project Manager, the District may consent to the Job Superintendent serving also as the Safety Officer, but, in such event, the District in its reasonable discretion may withdraw such consent at any time thereafter. No portion or element of the Work that is to occur at, on or in the vicinity of the Project Site may proceed if the Safety Officer is not present at or on the Project Site. The Safety Officer shall: (i) prepare and submit to the Project

Manager all Safety Programs, Accident Reports, and other documentation required of the Contractor pursuant to this Part 11 of these General Provisions; (ii) attend construction-progress meetings, and attend and/or conduct safety-related meetings, as required by the Project Manager or the Safety Programs; (iii) cooperate with the Project Manager in regard to coordinating Safety Programs and other safety-related requirements applicable to the Work and other portions of the Project; (iv) ensure effective implementation and compliance with all on-site safety-related responsibilities of the Contractor pursuant to this Part 11 of these General Provisions; (v) monitor all weather and other conditions affecting the Work; (vi) convey all necessary safety information and requirements to all employees and other representatives of the Contractor and each Subcontractor, as required by the Project Manager or the Safety Programs; and (vii) cooperate with each other person and entity, as required by the District, Project Manager or the Safety Programs, in the event of any accident, injury, damage or loss.

11.3.2 Subcontractor Safety Officer. In each Subcontract, the Contractor shall require that the Subcontractor: (i) designate in writing to the Project Manager a Safety Officer with responsibility for enforcing the Safety Programs on behalf of the Subcontractor; (ii) require that its Safety Officer attend all safety-related meetings as required by the Project Manager or the Safety Programs; (iii) require that its Safety Officer fully cooperate with the Contractor's Safety Officer and with the Project Manager in regard to coordinating and implementing Safety Programs and other safety-related requirements applicable to the Work and other portions of the Project; (iv) require that its Safety Officer convey all necessary safety information and requirements to all employees and other representatives of the Subcontractor, as required by the Project Manager or the Safety Programs; (v) require that its Safety Officer prepare and submit to the Project Manager any Accident Reports required of the Subcontractor pursuant to Section 11.10 of these General Provisions; and (vi) require that its Safety Officer fully cooperate with each other person and entity, as required by the District, Project Manager or the Safety Programs, in the event of any accident, injury, damage or loss.

11.4 Required Safety Measures. To the extent required by an applicable Safety Program, any applicable law, rule, regulation, ordinance or other governmental requirement, or the Project Manager, or as dictated by the conditions and progress of the Work, the Contractor shall: (i) post applicable safety regulations; (ii) erect and maintain physical safety measures as necessary for protection of persons and property at, on or in the vicinity of the Project Site, including, without limitation, signs, lights and other warning devices, audible devices for protection of the blind, cones and other directional aids, canopies, nets, scaffolding, supports, rails, and barriers; (iii) relocate physical safety measures as necessary to maintain safe working conditions and paths of travel at, on or in the vicinity of the Project Site; (iv) employ security forces for protection of persons and property at, on or in the vicinity of the Project Site; (v) give written notice of construction activities and hazards to owners and users of adjacent properties and to utility companies; and (vi) maintain fully-stocked and adequate first-aid supplies at the Project Site consistent with U.S. Department of Labor, Occupational Safety and Health Administration ("OSHA") and DIR's Division of Occupational Safety and Health ("Cal-OSHA") requirements.

11.5 Contractor Must Not Impose Unsafe Loads. The Contractor must not impose any load (including, without limitation lateral or surcharge loads) on any temporary or permanent structure, equipment or other work or thing that is on, at or in the vicinity of the Project Site, if the load will exceed safe limits or reasonably might result in damage to the structure or equipment, any other property or thing, or the Project Site. In no event shall the Contractor place any stabilization leg(s) of cranes or other equipment, cribbing, bracing, *et cetera*, on any curb, gutter, sidewalk or similar improvement on, at or in the vicinity of the Project Site, without the express written consent of the Project Manager. No such consent

shall be deemed or construed to relieve the Contractor from its responsibility and liability for damage caused by the Contractor's activities.

11.6 Design and Use of Temporary Structures and Equipment. The Contractor shall be solely responsible and liable for the design, construction, integrity and use, in accordance with all applicable laws, ordinances, rules, regulations, and orders of governmental entities with competent jurisdiction, of any and all temporary structures, equipment and other things used in the performance of the Work, including, without limitation, any scaffolding, hoists, cribbing, shoring, and bracing. The Contractor must ensure that all temporary structures, equipment and other things are designed, constructed, used and removed in such manners as will not damage the Work, any Work by Others, the Project Site or other property or things in the vicinity of the temporary item, including, without limitation, accommodating natural earth movement, high winds, and shaking and vibrations caused by construction activities. The Contractor shall be solely responsible and liable for any and all costs and/or liabilities arising from the design, construction and use of temporary structures, equipment and/or other things in connection with the performance of the Work.

11.7 Trench Safety Plans. If the Contract Price exceeds $25,000, then, prior to undertaking the excavation of any trench that will or reasonably might be five feet or more in depth, the Contractor must submit to the Project Manager a detailed plan showing the design of the shoring, bracing, sloping or other mechanisms for protection of workers and others from collapse or cave-in of the trench ("Trench Safety Plan"). Without limiting any other requirement applicable to contents of a Trench Safety Plan, each Trench Safety Plan must also: (i) provide for safe means for workers, as necessary, to enter and exit the trench; (ii) consider active and surcharge loads, and specify minimum required distances between the trench edges and adjacent buildings, embankments, subsurface utilities, construction equipment, spoils, *et cetera*; and (iii) provide for daily inspection of the trench by a competent person prior to each work shift and after any change in existing conditions. Each Trench Safety Plan must be prepared by an appropriately skilled, experienced and licensed civil or structural engineer, who must certify that the Trench Safety Plan complies with minimum requirements of all applicable Construction Safety Orders of Cal-OSHA. If a Trench Safety Plan varies from the standards established by applicable Construction Safety Orders, the Contractor must obtain Cal-OSHA approval of the Trench Safety Plan. The Contractor shall not commence the excavation of a trench within the scope of this Section 11.7 until the Contractor has provided (and the District has accepted) the applicable Trench Safety Plan and a copy of the excavator's current and valid Cal-OSHA Construction Activity Permit. Neither anything in this Section 11.7 nor any review and/or acceptance by the District of any Trench Safety Plan shall be deemed or construed to relieve the Contractor from responsibility for providing shoring, bracing, sloping, or other mechanisms adequate to protect workers and others on, at or in the vicinity of the Project Site in connection with any trench to be excavated by or on behalf of the Contractor.

11.8 Other Safety Requirements. The Contractor and each Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work shall comply with all other reasonable safety-related directives that the District or the Project Manager may, from time to time, deem necessary or convenient for ensuring safety of any persons or property at, on or in the vicinity of the Project Site, including, without limitation, efforts by the Project Manager to coordinate responsibilities for safety precautions and programs between the Contractor and one or more other parties providing work or services in connection with the Project.

11.9 Contractor Response to Emergency Situations. In the event of an Emergency that endangers or reasonably might endanger the health, safety or welfare of any person(s) or property, the Contractor shall take such action the Contractor, in its discretion, determines is necessary to prevent the

threatened damage or injury to person(s) or property, including, without limitation, rendering first aid to any injured person. If the Contractor reasonably believes that it is entitled to an adjustment in the Contract Price or extension of the Contract Time on account of the Contractor's response to an Emergency, within five days after the Contractor takes action in response to the Emergency, the Contractor may submit a request for Change Order to the Project Manager. However, in no event shall the Contractor be entitled to an increase in the Contract Price or an extension of the Contract Time on account of an Emergency arising from the acts, omissions, negligence or willful misconduct, or from causes within the reasonable control of, the Contractor or any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work.

11.10 Required Reporting of Accidents, Injuries and Damage.

11.10.1 Contractor Accident Reports. The Contractor must file a written report with the Project Manager as provided in this Section 11.10 (each an "Accident Report") in each case in which, due to any cause: (i) any significant accident occurs (regardless of whether any injury or damage occurs), any person is injured (including death), or any property on, at or in the vicinity of the Project Site is damaged, in connection with the performance of the Work or by any person at, on or in the vicinity of the Project Site on account of the Work, and regardless of whether such portion of the Work is being or to be performed by the Contractor or any Subcontractor; or (ii) the Contractor renders aid to any person as described in Section 11.9 of these General Provisions. Each Accident Report shall include all information relevant to the injury or damage, including, but not limited to: (i) identification of the person(s) injured or the property damaged; (ii) the extent or scope of the injury or damage; (iii) all known facts regarding when, where and how the incident occurred; (iv) identification of, and statements by, all persons who witnessed or were involved in the incident; (v) the weather and other conditions existing at the time and location of the incident; and (vi) other information deemed relevant in connection with the incident. The Contractor shall provide an Accident Report to the Project Manager within twenty-four hours of the incident detailed in the Accident Report. In addition, if the incident resulted in the serious injury of any person (something more than a minor cut, scratch or bruise) or substantial damage to any property (estimated to be in excess of $500), the Contractor shall contact the Project Manager immediately by telephone to report the incident.

11.10.2 Subcontractor Accident Reports. In each Subcontract, the Contractor shall require that the Subcontractor: (i) file with the Project Manager a written Accident Report containing all the information described in Subsection 11.10.1 in each case that an accident, injury or damage occurs in connection with any Work being performed by the Subcontractor or involves any person at, on or in the vicinity of the Project Site on account of the Work being or to be performed by the Subcontractor; (ii) file each Accident Report with the Project Manager within twenty-four hours of the incident detailed in the Accident Report; (iii) contact the Project Manager immediately by telephone to report the incident if it resulted in the serious injury of any person (something more than a minor cut, scratch or bruise) or substantial damage to any property (estimated to be in excess of $500).

11.11 Notice and Correction of Non-Compliance. If, at any time, the Contractor is not in compliance with the requirements of this Part 11, or if the Contractor or any Subcontractor has created an actual or potential hazard to the health or safety of any person or property at, on or in the vicinity of the Project Site, then the District, the Project Manager, or other public agency with competent jurisdiction (including, without limitation, Cal-OSHA) may provide written notice thereof to the Contractor. Upon receipt of such notice, the Contractor shall immediately undertake action to correct or cure the non-compliance or actual or potential hazard specified in the notice. If the Contractor fails to correct or cure, or fails to implement reasonable efforts to correct or cure, any non-compliance or actual or potential hazard within

twenty-four hours after receipt of notice or within such other time as specified in the notice, the District may, but shall not be obligated to, correct or cure the non-compliance or actual or potential hazard, and the cost thereof shall be charged to the Contractor and/or deducted from amounts otherwise payable to the Contractor pursuant to the Contract.

11.12 Contractor Liability. In no event shall the failure by any party to provide notice to the Contractor of any non-compliance or actual or potential hazard in accordance with Section 11.11 of these General Provisions be deemed or construed to relieve the Contractor from any responsibility or liability whatsoever attributable to such non-compliance or actual or potential hazard. Unless and only to the extent set forth in the Contract Documents, the District assumes no responsibility or liability for the physical condition or safety of the Project Site, any ongoing or completed construction thereon, or any equipment, supplies or materials present at, on or in the vicinity of the Project Site.

11.13 Compliance a Condition Precedent to Payment. As a condition precedent to payment of invoices submitted by the Contractor, each such invoice must be accompanied by written certification by the Contractor under penalty of perjury that: (i) all required Safety Program(s) and other requirements of this Part 11 have been implemented and remain in effect; and (ii) that the Contractor has continuously administered and enforced such requirements during the period covered by the invoice.

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PART 12
COMPLIANCE WITH LABOR LAWS

12.1 Contractor Must Comply with Prevailing Wage Laws. The Contractor must be, and shall be deemed and construed to be, aware of and understand the requirements of California Labor Code Sections 1720 *et seq*. and 1770 *et seq*., and Title 8 of the CCR, Section 16000 *et seq*. (collectively, "Prevailing Wage Laws"), which require the payment of prevailing wage rates and the performance of other requirements on certain "public works" and "maintenance" projects. The Project is a "pubic works" project, as defined by the Prevailing Wage Laws, and the Contractor must perform all of the Work as a public works project. The Contractor must fully comply, and must ensure full compliance by all Subcontractors and other persons and entities as required, with all applicable Prevailing Wage Laws.

12.2 Copies of Prevailing Wage Rates. The Project Manager has obtained from the Director of Industrial Relations the general prevailing rate of per-diem wages and the general prevailing rate for holiday and overtime work in the locality in which the Work is to be performed for each craft, classification, or type of worker needed to perform the Work, in effect as of the date the District sought bids or proposals for the Work. Prior to commencing any portion of the Work, the Contractor must obtain a copy of such prevailing rates of per-diem wages from the Project Manager. The Contractor must make copies of the prevailing rates of per-diem wages for each craft, classification or type of worker needed to perform the Work available to interested parties upon request, and must post copies at the Contractor's principal place of business and at the Project Site.

12.3 Penalties for Violations of Prevailing Wage Laws. In accordance with Labor Code Section 1775, the Contractor and any Subcontractor shall forfeit, as a penalty to the District, not more than $200 and, subject to limited exceptions, not less than certain amounts specified by law, for each calendar day, or portion thereof, for each worker paid less than the prevailing wage rates as determined by the Director of the DIR for the work or craft in which the worker is employed. The Contractor or the applicable Subcontractor shall pay to each worker the difference between such stipulated prevailing wage rate and the amount paid to the worker for each calendar day or portion thereof for which the worker was paid less than the applicable prevailing wage rates.

12.4 Compliance with Labor Requirements. The Contractor acknowledges that, in applicable circumstances, the DIR and/or the CMU may provide certain services in connection with the Project, in accordance with the California Labor Code, Section 16450 *et seq*. of Title 8 of the California Code of Regulations and/or other applicable law. In any event, the Contractor and all Subcontractors, at no additional cost to the District, must comply with any and all applicable labor-related requirements, regardless of how implemented, including, without limitation, requirements for payment of wages in accordance with the Prevailing Wage Laws, maintenance, inspection and submittal (electronically, as required) of payroll records, interviewing of workers, *et cetera*. The Contractor, at no additional cost to the District, must cooperate with the DIR, the CMU, the District, and any District consultants in connection with labor-law compliance matters. The Contractor must make all Subcontractors aware of the foregoing requirements and must require that the Subcontractors comply with all labor-related requirements at no extra cost to the District. The District will coordinate and conduct any mandatory pre-construction conference, and the Contractor and each of its Subcontractors must attend the conference in order to ensure they are aware of applicable labor-law requirements.

12.5 Prohibition Against Debarred Subcontractors. No Subcontractor may perform any portion of the Work if the Subcontractor is ineligible to perform work on a public works project pursuant to Section 1777.1 or Section 1777.7 of the Labor Code. Any contract relating to a public works project entered into by the Contractor and any such "debarred" party is void as a matter of law, and a debarred party may not receive any public money for performing work as a contractor or subcontractor on any public works project. The Contractor must refund to the District any public money that has been paid to a debarred party in connection with the Work. The Contractor shall be responsible for the payment of wages to workers of any debarred party that is allowed to perform any of the Work.

12.6 Employment of Apprentices. The Contractor and each Subcontractor shall be responsible for compliance with the provisions of law relating to employment of apprentices, including, without limitation, Sections 1777.5, 1777.6, and 1777.7 of the California Labor Code. As provided by Labor Code Section 1777.7, violations of Labor Code Section 1777.5 may result in forfeiture not to exceed $100 for each full calendar day of non-compliance. Information regarding apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of Industrial Relations, ex officio the Administrator of Apprenticeship, San Francisco, California, or from the Division of Apprenticeship Standards of the DIR ("DAS"). **IF THE CONTRACT FALLS WITHIN THE JURISDICTION OF SECTION 1777.5, THE CONTRACTOR MUST NOTIFY THE DISTRICT NOT MORE THAN TWENTY-FOUR HOURS AFTER RECEIVING THE NOTICE OF AWARD.**

12.7 Limitations on Daily Hours of Work. Except as provided in this Section, the Contractor and each Subcontractor shall not permit any person performing any of the Work to work more than eight hours during any one calendar day or more than forty hours during any one calendar week. The Contractor and any Subcontractor shall forfeit, as a penalty to the District, $25 for each worker employed in the execution of the Work by the Contractor or the Subcontractor who is required or permitted to work more than eight hours in any one calendar day or forty hours in any calendar week in violation of Sections 1810 through 1815, inclusive, of the Labor Code. However, notwithstanding the foregoing, in accordance with Labor Code Section 1815, the Contractor or a Subcontractor may permit a worker to work in excess of eight hours per day, or forty hours per week, if all work in excess of such limits is compensated at a rate not less than one and one half times the worker's basic rate of pay.

12.8 Requirements for Payroll Records. The Contractor and each Subcontractor must comply with all applicable provisions of Labor Code Section 1776, which relates to preparing and maintaining accurate payroll records, and making such payroll records available for review and copying by the District, the DIR's Division of Labor Standards Enforcement, and DAS. The payroll records must be certified, maintained at the principal offices of the Contractor, and made available as required pursuant to Labor Code Section 1776. The Contractor must inform the District of the location at which the payroll records are located, including the street address, city, and county, and must, within five working days, provide a notice of any change of location and address. The Contractor and any Subcontractor that fails to timely comply with requests for certified payroll records shall forfeit, as a penalty to the District, $100 for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated, and, in addition to penalties as provided by law, may be subject to debarment pursuant to Labor Code Section 1771.1.

12.9 Contractor Must Know and Comply with All Labor Laws. The Contractor shall be responsible and liable for ascertaining, knowing, understanding and complying with all laws, rules, regulations, ordinances, and other governmental requirements applicable to the matters addressed in this Part 12, including, without limitation all such requirements specifically cited in this Part 12. If any provision of this Part 12 conflicts with, or is not a complete statement of, any provision of the applicable requirements,

such provision of the applicable requirements shall be deemed, respectively, to govern over or to expand on the provisions of this Part 12, and the Contractor and each Subcontractor shall be required to comply in all respects with such provision of the applicable requirements. To the extent required pursuant to Part 23 of these General Provisions, the Contractor shall indemnify, defend and hold-harmless the District, the Architect, the Project Manager and the Inspector of Record, with respect to any failure or alleged failure to comply with this Part 12 or any laws, rules, regulations, ordinances, and other governmental requirements applicable to the matters addressed in this Part 12, by the Contractor, any Subcontractor, or any other person or entity that must comply in connection with the Work.

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PART 13
TIME FOR COMPLETION AND DELAYS

13.1 Time is of the Essence. Time is of the essence with respect to each time period for performance of an obligation set forth in, or to be determined in accordance with, or to be performed pursuant to, the Contract Documents. The Contractor must undertake, perform and complete all portions of the Work in strict accordance with milestones and time period(s) specified in the Master Construction Schedule as it may be modified from time to time pursuant to the Contract Documents.

13.2 Pre-Construction Activities. After receipt of the Notice of Award, the Contractor shall undertake all activities necessary for Contractor to commence performance of the Work on the date specified in Section 4 of the Special Provisions as the anticipated date for issuance of the Notice to Proceed ("Pre-Construction Activities"). The Pre-Construction Activities shall include, without limitation: (i) reviewing the Contract Documents pursuant to Section 4.10 of these General Provisions; (ii) consulting and cooperating with the District and the Project Manager in regard to developing coordinated construction schedules for the Project, including for both the Work and any Work by Others; (iii) coordinating use of the Contractor's workforce, equipment and administrative resources; (iv) coordinating use of each Subcontractor's workforce, equipment and administrative resources; and (v) arranging procurement and delivery of any long-lead-time items. Notwithstanding the foregoing, during the Pre-Construction Activities period, the Contractor shall consult with the Project Manager and obtain the District's and Project Manager's concurrence prior to actually ordering any long-lead-time items.

13.3 Proposed Master Construction Schedule.

13.3.1 Submittal Requirements. Within ten days of the date of the Notice of Award or prior to the Commencement Date, whichever is sooner, the Contractor must submit to the Project Manager a proposed critical-path-method schedule that includes all the elements required by this Section and that provides for completion of all portions of the Project in accordance with the time(s) permitted pursuant to the Contract ("Master Construction Schedule"). The Master Construction Schedule must be prepared using software approved in advance by the Project Manager. The Contractor must provide the Master Construction Schedule to the Project Manager in both electronic-file format and printed hard-copy.

13.3.2 Schedule Coverage. The Master Construction Schedule must provide for a logical and orderly progression of the Work to completion within the Contract Time and must specify time for accomplishing all activities and events needed for completion of the Project, including, without limitation: (i) review and approval of submittals; (ii) procurement and delivery of equipment and materials having long-lead-times; (iii) obtaining all required Deferred Approvals; (iv) mobilizing on the Project Site; (v) delays resulting from anticipated Rain Days; (vi) performance of the Work and other activities of the Contractor (including its Subcontractors); (vii) performance of any Work by Others; (viii) building and systems start-up, testing and balancing; (ix) equipping and furnishing included within the scope of the Work; and (x) requirements, if any, for priority occupancy of portions of the Project.

13.3.3 Minimum Required Elements. The Contractor must specify at least the following elements in the Master Construction Schedule: (i) a single critical path of activities for the Work and any Work by Others; (ii) all milestones for "critical" and "constraining" or "controlling" activities as determined by the Contractor, Architect and/or Project Manager; (iii) a duration of not more than twenty days for any one activity; (iv) earliest and latest dates for commencement of each activity; (v) earliest and latest dates for completion of each activity; (vi) "float" time, if any, for each activity and for the Project overall; (vii) order

deadlines for long-lead-time items; (viii) delivery dates for critical or special equipment and/or materials; (ix) dates for providing all submittals to the Architect; (x) dates by which each of the Deferred Approvals must be obtained; and (xi) portions of the Work to be performed by any Subcontractor that must be completed prior to commencement of any portions of the Work by any other Subcontractor.

13.4 Normal Weather Deemed Foreseeable. Because normal seasonal weather conditions are foreseeable, the Contractor must accommodate in the proposed Master Construction Schedule the anticipated number of work days during which performance of the Work cannot occur or continue due to normal seasonal weather conditions (each a "Rain Day"). The number of Rain Days included in the Master Construction Schedule shall be determined by reference to weather data compiled by the National Oceanic and Atmospheric Administration ("NOAA") that establishes the normal seasonal weather conditions for the general location of the Project Site and the time(s) of the year(s) during which the Work will be performed. However, even if fewer Rain Days would be included in the Master Construction Schedule based on NOAA weather data, the Contractor shall include in the Master Construction Schedule not less than three Rain Days for each month of October and November and at least four Rain Days for each month of December, January, February and March. Notwithstanding the foregoing, Rain Days shall be included in the Master Construction Schedule only to the extent the performance of the Work can be adversely affected by inclement weather (e.g., sheltered work that can continue regardless of weather shall not require an allocation of Rain Days), and any question regarding allocation of Rain Days shall be directed to and resolved by the Project Manager prior to the Contractor submitting the proposed Master Construction Schedule.

13.5 Time for Deferred Approvals Deemed Included in Schedule. The Contractor must accommodate in the proposed Master Construction Schedule all time required to obtain any and all Deferred Approvals that are the responsibility of the Contractor pursuant to the Contract Documents. The Contractor must allow sufficient time to obtain all required Deferred Approvals as necessary to avoid any adverse affect on the critical-path schedule for the Project, and the Contractor shall be deemed to have considered all possible delays and damages that might arise in connection with efforts to obtain such Deferred Approvals. The proposed Master Construction Schedule must specify the date by which the Contractor must obtain each required Deferred Approval.

13.6 Approval and Modification of Master Construction Schedule.

13.6.1 Approval by Project Manager. Upon receipt from the Contractor of the initially-proposed Master Construction Schedule, the Project Manager will review the Master Construction Schedule and may, as necessary, return the Master Construction Schedule to the Contractor for correction or other revision. If the Project Manager requires revisions, the Contractor shall correct or otherwise revise the Master Construction Schedule and return it to the Project Manager within 72 hours. Upon approval of the Master Construction Schedule, the Contractor must sign and submit to the Project Manager a copy of the "Acknowledgment of Master Construction Schedule and Phasing" form included in the Required Project Forms, and, thereafter, the Master Construction Schedule may be changed only as provided in these General Provisions. The approval of the initially-proposed Master Construction Schedule in accordance with the foregoing and submittal of the executed Acknowledgment of Master Construction Schedule and Phasing form shall be conditions precedent to the Contractor receiving any payment for the Work pursuant to the Contract Documents.

13.6.2 Modifications to Master Construction Schedule. The Master Construction Schedule shall be subject to reasonable modification by the District from time to time during the course of construction of the Project, due to changes in the Project, coordination of the various trades and/or

contractors performing work on the Project, circumstances beyond the control of the District, *et cetera*, and such modifications may result in the Master Construction Schedule not including any float that previously had been included in the Master Construction Schedule. The Master Construction Schedule, as it may be so modified, shall govern with respect to the time(s) within which all and each of the various portions of the Work must be completed.

13.6.3 Updates and Revisions to Master Construction Schedule. Not less than once per month and consistent with requirements of Section 21.8 of these General Provisions, the Contractor must update and, as necessary, revise the Master Construction Schedule to accommodate authorized changes in the Work and/or Contract Time, as well as any other authorized modifications to the Master Construction Schedule. Each update and/or revision of the Master Construction Schedule must, at a minimum, note any changes to the elements specified in Subsection 13.3.3 of these General Provisions, together with actual commencement and completion dates for the activities included in the Master Construction Schedule. The Contractor must submit copies of each such updated and/or revised Master Construction Schedule to the District, Architect and Project Manager, with copies to the latter being in both electronic-file format and printed hard-copy as provided in Subsection 13.3.1 of these General Provisions. Each updated and/or revised Master Construction Schedule shall be subject to the same procedures for review and approval as are set forth in Subsection 13.6.1 of these General Provisions and applicable to the initially-proposed Master Construction Schedule, including, without limitation, requirements for the Contractor to correct or otherwise revise the Master Construction Schedule.

13.7 Issuance of Notice to Proceed. Within sixty days of the date of the Notice of Award, the District will issue a Notice to Proceed. However, the District and the Contractor may agree that the District shall defer issuing the Notice to Proceed for one or more specific periods of time after expiration of the sixty-day period following award of the Contract. In such event, if the District and the Contractor agree that any additional compensation is to be paid to the Contractor as a result of the delayed issuance of the Notice to Proceed, such additional compensation shall be set forth in a Change Order.

13.8 Commencement and Diligent Performance of Work. The Contractor must commence performance of the Work on the Commencement Date and, thereafter, must diligently perform all acts and cause to be done all other things necessary to complete the Project within the time period(s) specified in the Master Construction Schedule, including, without limitation: (i) performing all required Work; (ii) obtaining all required services; (iii) providing an adequate workforce at all times; and (iv) providing sufficient quantities of equipment, materials and supplies when needed. If the performance of the Work falls behind schedule, the Contractor must provide to the Project Manager a proposed revision to the Master Construction Schedule that clearly specifies how the Contractor will bring the Work back into conformance with the time for completion required pursuant to the Contract Documents ("Recovery Schedule"). Each Recovery Schedule shall be subject to the same procedures for review and approval as are set forth in Subsection 13.6.1 of these General Provisions and applicable to the initially-proposed Master Construction Schedule, including, without limitation, requirements for the Contractor to correct or otherwise revise the Recovery Schedule. Upon approval of the Recovery Schedule, it shall become the Master Construction Schedule and the Contractor must, at no additional cost to the District, accelerate the Work and/or do all other things as necessary to complete the Project within the time specified in such Master Construction Schedule.

13.9 Times During Workday When Work May be Performed.

13.9.1 Work During Regular Working Hours. Except as otherwise provided in this Section 13.9 or specifically required by the District or the Project Manager, and subject to all provisions of Part 12 of

these General Provisions, the Contractor must perform the Work that is to occur on, at or in the vicinity of the Project Site only during Regular Working Hours. If the Contractor performs any Work on any days or at any times other than Regular Working Hours, regardless of whether pursuant to Subsection 13.9.2 of these General Provisions or Subsection 13.9.3 of these General Provisions, the Contractor shall be responsible and liable for compliance with all requirements of Part 12 of these General Provisions.

13.9.2 Permissive Work Outside of Regular Working Hours. If the Contractor desires to perform any portion of the Work on, at or in the vicinity of the Project Site on any days or at any times other than during Regular Working Hours, or for more than eight working hours per day, the Contractor must obtain the written consent of the Project Manager, the Inspector of Record and/or any specialty inspector, and, if necessary, any city, County and other governmental agencies having competent jurisdiction. The Contractor may request such consent for the Contractor's convenience, including, without limitation, because the Contractor desires to accelerate the Work in order to comply with requirements of the Master Construction Schedule. The Contractor shall be responsible for paying any and all additional or increased management, supervision, inspection and other costs incurred by the District attributable to: (i) the Contractor performing any of the Work on, at or in the vicinity of the Project Site on any days or at any times other than Regular Working Hours, or for more than eight working hours per day, based on consent obtained pursuant to this Subsection 13.9.2; (ii) the Contractor performing any Work at a location that is not on, at or in the vicinity of the Project Site on any days or at any times other than Regular Working Hours; or (iii) the District requiring that the Contractor perform any of the Work on any days or at any times other than Regular Working Hours for any reason that is the fault of, caused by, or otherwise the responsibility of, the Contractor. Any such amounts payable by the Contractor shall be charged to the Contractor and/or deducted from amounts otherwise payable to the Contractor pursuant to the Contract.

13.9.3 Mandatory Work Outside Regular Working Hours. The Contractor must perform portion(s) of the Work on any days or at any times other than Regular Working Hours if: (i) such requirement is set forth in the Contract Documents; or (ii) the Contractor is so required by the District for any reason that is not the fault of, caused by, or otherwise the responsibility of, the Contractor. If the District requires performance of the Work outside Regular Working Hours pursuant to the foregoing clause (ii), the District shall be responsible for paying any and all additional or increased management, supervision, inspection and other costs incurred by the District in connection with such portion(s) of the Work.

13.10 Mandatory Notice of Anticipated Delay. At any time the Contractor anticipates that a delay in the performance of the Work will occur, regardless of the cause of the delay, the Contractor must immediately provide written notice of the anticipated delay to the Project Manager ("Notice of Anticipated Delay"). A Notice of Anticipated Delay must set forth the cause(s) of the anticipated delay and be accompanied by documentation reasonably evidencing and supporting the Contractor's position with respect to the cause(s) of the anticipated delay. Upon receipt of a Notice of Anticipated Delay, the District, the Project Manager and/or the Architect may take any such reasonable actions as necessary to prevent or minimize the anticipated delay. A Notice of Anticipated Delay shall in no event be deemed or construed to satisfy the requirement for, or be provided in lieu of, any Notice of Actual Delay to be provided pursuant to Section 13.11 of these General Provisions.

13.11 Mandatory Notice of Actual Delay. Within five days of the beginning of any delay in the performance of the Work, regardless of the cause of the delay, and regardless of whether the delay is then ongoing, the Contractor must provide written notice of the delay to the Project Manager ("Notice of Actual Delay"). If the Contractor provides a Notice of Actual Delay later than five days after the beginning of a

delay: (i) the Contractor shall be deemed and construed to have waived and released any right to an extension of time or to additional compensation attributable to any time more than five days prior to the date the Project Manager receives the Notice of Actual Delay; and (ii) the District may hold the Contractor responsible for any delays and/or increased costs that the District reasonably might have mitigated had the District received a timely Notice of Actual Delay. A Notice of Actual Delay must set forth the cause(s) of the delay and be accompanied by documentation reasonably evidencing and supporting the Contractor's position with respect to the cause(s) of the delay. **THE GIVING OF A NOTICE OF ACTUAL DELAY IN CONNECTION WITH A DELAY SHALL BE DEEMED AND CONSTRUED AS A MANDATORY PREREQUISITE FOR ANY EXTENSION OF TIME AND/OR ADDITIONAL COMPENSATION TO THE CONTRACTOR ON ACCOUNT OF SUCH DELAY.**

13.12 Review of Facts and Circumstances Resulting in Delay. Upon receipt of a Notice of Actual Delay and all related documentation, the District, the Architect and/or the Project Manager will investigate the facts and circumstances relating to the delay. The Project Manager may request that the Contractor provide any additional or more detailed information regarding the delay, which the Contractor must provide within five days of request.

13.13 Requests for Additional Time and/or Compensation for Delays. The Contractor must submit each request for an extension of time and/or additional compensation on account of a delay in accordance with the provisions of the Contract Documents relating to Change Orders. The Contractor must submit such Change Order Request within fourteen days of providing the associated Notice of Actual Delay, regardless of whether the delay is then ongoing, and any failure to timely submit the Change Order Request shall be deemed and construed as a waiver and release by the Contractor of any rights to an extension of time and/or additional compensation on account of the delay. Each such Change Order Request must: (i) clearly specify that the Contractor is seeking an extension of time and/or additional compensation on account of a delay and in accordance with this Part 13; (ii) reference the Notice of Actual Delay (including date) previously provided in connection with the delay; and (iii) be accompanied by any additional evidentiary or supporting information not provided with the Notice of Actual Delay. If the Contractor fails to provide any such additional information with the Change Order Request, the Contractor shall be deemed and construed to have waived its rights to thereafter provide any such information, except for any information substantiating and justifying the amount of time for an extension and/or the amount of any additional compensation attributable to a delay that was ongoing at the time the Contractor submitted the Change Order Request. **THE CONTRACTOR'S COMPLIANCE WITH THE FOREGOING PROCEDURAL REQUIREMENTS IN CONNECTION WITH A DELAY SHALL BE DEEMED AND CONSTRUED AS A MANDATORY PREREQUISITE FOR ANY EXTENSION OF TIME OR ADDITIONAL COMPENSATION TO THE CONTRACTOR ON ACCOUNT OF SUCH DELAY, AND FOR FILING OF A RELATED CLAIM IN ACCORDANCE WITH PART 24 OF THESE GENERAL PROVISIONS.**

13.14 Change Orders Deemed Not to Cause or Create Delays. As provided in Section 17.19 of these General Provisions, in no event shall any approved Change Order, either by itself or cumulatively with other Change Orders, be deemed or construed to create or be the cause of any delay or, unless specifically stated in such Change Order, to constitute the basis for any extension of time to perform the Work.

13.15 Delays Resulting from Abnormal Weather. The Contractor shall bear the risk attributable to all normal seasonal weather conditions, including, without limitation, precipitation, temperatures, winds, amount of daylight, *et cetera*. The Contractor shall not be entitled to an extension of time to complete the Work on account of Rain Days within the number specified in the Master Construction Schedule, and any

such Rain Days not actually used to compensate for inability to perform the Work due to inclement weather shall be considered float for the Project. The Contractor shall be entitled to an extension of time to complete the Work only if the performance of the Work is delayed as a result of inclement weather in an amount, frequency, or duration in excess of the number of Rain Days determined pursuant to Section 13.4 of these General Provisions and included in the Master Construction Schedule pursuant to Section 13.3 of these General Provisions ("Abnormal Weather"). The District shall grant to the Contractor an extension of time for performance of the Work subject to the Contractor establishing, based on sufficient proof, that: (i) the weather conditions constituted Abnormal Weather, i.e., were in excess of "normal" Rain Days; (ii) the delay was caused by the Abnormal Weather; and (iii) the delay affected the critical-path activities of the Work.

13.16 Extensions of Time for Performance of the Work. If the District grants the Contractor an extension of time for performance of the Work, the extension shall be proportionate to the actual delay in the performance of the Work, e.g., a half-day extension for a half-day delay. In determining if extensions of time for performance of the Work are necessary on account of a delay, the District shall consider whether portions of the Work were able to continue despite other portion(s) of the Work being delayed, and any extension of time for performance of the Work shall apply only to the portion(s) of the Work affected by the delay, not to other portions of the Work.

13.17 No Compensation for Certain Delays. Neither the District nor any person or entity acting on its behalf shall be required to pay any additional compensation to the Contractor or shall otherwise be liable for any costs attributable to a delay (each a "Non-Compensable Delay") if: (i) the cause of the delay was beyond the control of and without the fault of the District; (ii) the delay was reasonable under the circumstances involved; or (iii) the delay was within the contemplation of the District and the Contractor. Non-Compensable Delays may include, among others, delays arising from: (i) any act of nature, including, without limitation, fire, flood, storm, earthquake or other event or condition not directly caused by any person; (ii) any health Emergency, including, without limitation, any epidemic and/or quarantine; (iii) any act or omission of any governmental, quasi-governmental, or publicly-regulated entity, including, without limitation, any utility company; (iv) any war or any other act of a public enemy; (v) any riot, insurrection or other civil disturbance or disobedience; (vi) any strike, embargo, interruption in transportation services, or other labor-related action; (vii) any act or omission of the Contractor or any of its Subcontractors, employees or agents; or (viii) any act or omission by any person over whom the District has no control or for whom the District has no legal responsibility. The Contractor's sole and exclusive remedy in the event of a Non-Compensable Delay shall be to seek an extension of time for performance of the Work.

13.18 Compensation for Delays Caused by District. The Contractor shall be entitled to compensation from the District on account of a delay in the performance of the Work (each a "Compensable Delay") only if: (i) the District caused or otherwise was responsible for the delay; (ii) the delay was unreasonable under the circumstances involved; and (iii) the delay was not within the contemplation of the District and Contractor. A delay shall not be considered to be a Compensable Delay to the extent the delay was caused, contributed to, or continued by the Contractor or any Subcontractor or other party or entity under the control or direction of, or otherwise performing any work or services on behalf of, the Contractor. A delay shall be considered a Compensable Delay only to the extent the delay adversely affects a portion of the Work that is a critical-path item as described in the Master Construction Schedule then in effect, and the District shall not be required to pay any compensation whatsoever to the Contractor (including, without limitation, any extended overhead, general-conditions costs, impact costs, and/or out-of-sequence costs) in the absence of any such adverse affect on the critical-path of the Work. For purposes of the Contract, delays within the contemplation of the District and the Contractor shall be deemed and construed to include,

without limitation, delays attributable to: (i) normal seasonal weather conditions; (ii) coordination of the Work with any Work by Others; (iii) work on the Project that must be completed prior to some or all of the Work being commenced or completed; (iv) discovery of hazardous materials (including, without limitation, asbestos) if the Work or the Project involves or relates to the presence, repair, modification, rehabilitation, reconstruction, demolition, removal or other accommodation of existing structures, utilities, or other improvements; (v) the location, time of year and other conditions in which the Work is to be performed; and (vi) other matters typically attendant to construction projects of the same general type and scope as the Project. Subject to the Contractor's compliance with applicable requirements of this Part 13, and based on sufficient proof provided by the Contractor or otherwise obtained by or provided to the District, the District shall pay additional compensation to the Contractor for each Compensable Delay. Additional compensation payable to the Contractor on account of a delay for which the District is responsible may accommodate, without limitation, costs attributable to any disruption of, interference with, or need to accelerate, the Work. Any such additional compensation shall be set forth in and authorized by an applicable Change Order.

13.19 Compensation for Delays Caused by Contractor. The District shall be entitled to compensation from the Contractor on account of delays in the performance of the Work or performance of any Work by Others, if such delays: (i) have been caused by or are attributable to any fault or negligence of the Contractor or any employee, agent, Subcontractor or other person or entity acting on behalf of the Contractor; or (ii) arise from any failure by the Contractor to timely perform the Work in accordance with requirements of the Contract Documents. For purposes of this Section, the Contractor shall be deemed and construed to have allowed and scheduled adequate time for all activities required in connection with performance of the Work in accordance with the Contract Documents. The foregoing shall be construed to mean, e.g., that the Master Construction Schedule has taken into account and accommodated all potential delays, by governmental agencies or others having authority over Deferred Approvals or other requirements specified in the Contract Documents, in granting any approval that the Contractor is responsible for obtaining. Therefore, except as provided in this Section, the Contractor shall be deemed and construed to be at fault for, among other matters, any failure by the Contractor to timely: (i) complete the Pre-Construction Activities; (ii) obtain and provide to the District all Surety Bonds required pursuant to the Contract Documents; (iii) obtain or otherwise have in effect all Insurance Policies required pursuant to the Contract Documents; (iv) obtain Deferred Approvals for which the Contractor is responsible pursuant to the Contract Documents; (v) schedule inspections of the Work as necessary; and/or (vi) undertake and complete the Work in strict accordance with milestones and time period(s) specified in the Master Construction Schedule as it may be modified pursuant to this Part 13. The Contractor shall not be deemed to be at fault for delays resulting from any tidal waves or earthquakes in excess of 3.5 magnitude; provided that any damaged portion of the Work had been constructed or otherwise performed in accordance with the Contract Documents. Compensation payable to the District on account of a delay for which the Contractor is responsible may accommodate, without limitation, costs attributable to any disruption of, interference with, or need to accelerate, the Work or any Work by Others arising from the delay. Any such compensation to the District shall be charged to the Contractor and/or deducted from amounts otherwise payable to the Contractor pursuant to the Contract.

13.20 No Compensation for Delays Having Concurrent Causes. Notwithstanding anything to the contrary, to the extent the District and the Contractor concurrently cause or are otherwise responsible for a delay in the performance of the Work (i.e., both are equally and contemporaneously responsible), then neither the District nor the Contractor shall be entitled to recover additional compensation or other costs attributable to the delay.

13.21 Liquidated Damages for Delay in Completing Project. The District and the Contractor hereby expressly agree that it is impracticable and extremely difficult to ascertain the actual damages and costs the District will incur on account of a delay in completion of the Project or a phase or portion thereof for which the Contractor is responsible. Such damages could include, among others, those arising from the District being unable to timely have exclusive possession of, or to timely commence operations of, the Project or any phase or portion thereof. Therefore, to the extent the Contractor is responsible pursuant to this Part 13 for compensating the District on account of a delay in completing the Project or a phase or portion thereof, the Contractor shall pay to the District the amount of liquidated damages set forth in the Special Provisions for each day (or portion thereof) of such delay. The District and the Contractor each hereby expressly agree that such liquidated damages amount constitutes fair and reasonable compensation to the District for such delay, regardless of whether such amount is at any time determined not to constitute actual full-compensation. The District shall provide invoices to the Contractor for any and all liquidated damages payable by the Contractor. If the Contractor does not pay the amounts of such invoices to the District when due, the District may deduct the unpaid amounts from any monies due or to become due to the Contractor in accordance with the Contract Documents and/or may pursue such other remedies as are permitted by law or the Contract. Because this Section applies only to damages incurred by the District due to delay in completion of the Project or phase or portion thereof for which the Contractor is responsible, nothing in this Section shall be deemed or construed to limit or preclude any right of the District to recover additional or other damages or costs if such right is expressly set forth elsewhere in any of the Contract Documents, including, without limitation, as provided in Section 2.15, Section 8.3, Section 13.22, Section 15.5, Section 15.10 and Subsection 17.1.4 of these General Provisions.

13.22 Damages Incurred by District Pursuant to Other Contracts. Notwithstanding anything to the contrary, if the District is required, pursuant to any other contract entered into by the District in connection with the Project, to pay any damages (whether liquidated or otherwise) and/or costs (whether fixed by a court of competent jurisdiction or otherwise), and the District would not have been responsible for such damages and/or costs but for a delay that is the fault of, caused by, or otherwise the responsibility of, the Contractor, then, in addition to paying any required liquidated damages to the District, the Contractor shall be responsible for paying all such other damages and costs incurred by the District. The District shall provide invoices to the Contractor for any and all such damages and costs incurred by the District. If the Contractor does not pay the amounts of such invoices to the District when due, the District may deduct the unpaid amounts from any monies due or to become due to the Contractor in accordance with the Contract Documents or may pursue such other remedies as are permitted by law or the Contract.

13.23 Contractor Claims Arising from Delays. **IF THE CONTRACTOR DISPUTES ANY DETERMINATION MADE BY OR ON BEHALF OF THE DISTRICT IN REGARD TO THE CAUSE OF, RESPONSIBILITY FOR, EXTENSION OF TIME ATTRIBUTABLE TO, OR ADDITIONAL COMPENSATION ATTRIBUTABLE TO, ANY DELAY IN THE PERFORMANCE OF THE WORK, THEN, SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF SECTIONS 13.10 THROUGH 13.13, INCLUSIVE OF THESE GENERAL PROVISIONS, THE CONTRACTOR MAY FILE A CLAIM IN ACCORDANCE WITH PART 24 OF THESE GENERAL PROVISIONS.**

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PART 14
MATERIALS AND EQUIPMENT

14.1 Types and Quality of Materials and Equipment. Except as permitted in accordance with the Contract Documents, including, without limitation, any authorized substitutions, any and all materials or equipment to be incorporated as a permanent part of the Work must be of the type and quality specified in the Contract Documents. If the Contract Documents do not specify a particular quality of any materials or equipment, the Contractor must furnish and incorporate materials and equipment of the highest quality commercially available. Except to the extent set forth in the Contract Documents, any and all materials and/or equipment to be incorporated as permanent part(s) of the Work must be newly manufactured or produced, i.e., no previously used, recycled, and/or refurbished materials and/or equipment may be incorporated into the Work.

14.2 Contractor to Furnish Sufficient Materials and Equipment. In order to ensure that the Work is efficiently and timely undertaken and completed in accordance with all milestones set forth in the Master Construction Schedule, the Contractor must at all times furnish sufficient quantities of all materials and equipment required to perform the Work, including, without limitation, all materials and equipment, the need for which may reasonably be inferred from the Contract Documents. Within such times as will ensure that the Work can be completed in accordance with the milestones set forth in the Master Construction Schedule, the Contractor must order and/or purchase, and deliver or cause to be delivered to the Project Site, all materials and equipment required to perform the Work. Upon request, the Contractor must furnish to the Project Manager such documentary evidence (e.g., invoices, receipts, purchase orders, *et cetera*) as reasonably evidences that the Contractor has timely ordered required materials and/or equipment. The Contractor must monitor and track all orders for such materials and equipment, and must promptly take corrective action in the event the delivery of any such materials or equipment is delayed. The Contractor must provide written notice to the Project Manager and the Inspector of Record of each delivery to the Project Site of any materials and/or equipment to be incorporated into the Work, and must permit the Project Manager and/or the Inspector of Record to inspect any or all such materials and/or equipment. The Contractor must promptly remove from the Project Site any and all materials and/or equipment that the Project Manager and/or the Inspector of Record determine do not conform to applicable requirements of the Contract Documents.

14.3 Storage and Protection of Materials and Equipment. The Contractor shall be responsible for safely and securely storing and protecting all materials and equipment prior to incorporation into the Work. The Contractor must arrange and coordinate the storage type(s) and location(s) on, at or in the vicinity of the Project Site with the Project Manager. The Contractor must maintain, at the Project Site, an accurate written inventory of all such materials and equipment, and upon request must make the inventory available for review by the Project Manager. The Contractor shall not remove from the Project Site, or use for purposes other than the Work, any materials or equipment ordered, purchased or otherwise intended for incorporation into the Work without the express written approval of the Project Manager, including, without limitation, any materials or equipment that the Contractor believes are surplus or otherwise in excess of what is needed for the Work.

14.4 Authority to Request Substitution of Specified Items. Except as the Contract Documents expressly provide, any material, product, service or thing described in the Contract Documents as being required in connection with the Work and designated by specific brand or trade name (each a "Specified Item") shall be deemed and construed to set forth the minimum requirements for such Specified Item and to

be followed by the words "or equal." To the extent permitted pursuant to Section 14.5 of these General Provisions, the Contractor may offer in place of any Specified Item any substitute item that the Contractor can demonstrate is equal or better in all material respects to the Specified Item and that will adequately and fully accomplish the intended aesthetics, purposes and/or functions of the Specified Item. The District in no event shall be required to permit substitution of any Sole-Source Item that, in accordance with Public Contract Code Section 3400, was specified in order to: (i) field test or conduct an experiment to determine the suitability of the Specified Item for future use; (ii) match other products in use on a particular public improvement either completed or in the course of completion; (iii) obtain a necessary item that is only available from one source; or (iv) respond to an Emergency. In no event shall the Contractor substitute any item in place of a Specified Item unless and until the Contractor obtains written approval in accordance with Sections 14.4 through 14.10, inclusive, of these General Provisions.

14.5 Procedures and Conditions for Requesting Substitution of Specified Items. Any requests for substitution of a Specified Item made by the Contractor prior to submitting its bid for the Work must have been submitted in accordance with the procedures described in the Instructions For Bidders. The Contractor may request substitution of a Specified Item after it has submitted its bid for the Work only if the Specified Item becomes commercially unavailable after the Contractor submitted such bid. The Contractor in such event must provide documentation to the Project Manager that reasonably evidences that the Specified Item is no longer commercially available. An increase in the cost of a Specified Item shall not be deemed or construed to have made the Specified Item commercially unavailable. The Project Manager may independently verify whether the Specified Item is no longer commercially available. Absent a Specified Item becoming commercially unavailable, the District, in its sole discretion, may, but is not required to, consent to the Contractor submitting a post-bid request for substitution of the Specified Item only upon a showing of good cause by the Contractor, as determined by the District. The Contractor must submit to the Project Manager an executed original copy and one photocopy of each request for substitution of a Specified Item, using copies of the "Substitution Request" form included in the Required Project Forms. Only the Contractor, and not any Subcontractor or other person or entity, may request substitution of a Specified Item.

14.6 Contractor Must Substantiate Requests for Substitution.

14.6.1 Contractor Has Sole Responsibility. The Contractor shall be solely responsible for providing to the Project Manager such exemplary and/or documentary information as will reasonably substantiate that a proposed substitute item is equal or better in all material respects to the Specified Item, will adequately and fully accomplish the intended aesthetics, purposes and/or functions of the Specified Item, and otherwise satisfies all requirements of Sections 14.4 through 14.10, inclusive, of these General Provisions. The Contractor must submit two copies of each such item of substantiating information. Only the Contractor, and not any Subcontractor or other person or entity, may submit information intended to substantiate a request for substitution of a Specified Item.

14.6.2 Timing for Providing Substantiating Information. With respect to pre-bid requests for substitution, the Contractor must provide, or must have provided, all information substantiating a request for substitution of a Specified Item to the Project Manager within the time(s) provided in the Instructions For Bidders. With respect to any post-bid request for substitution, the Contractor must provide such information to the Project Manager concurrently with the corresponding Substitution Request form.

14.6.3 Nature of Substantiating Information. The information provided by the Contractor to substantiate a proposed request for substitution of a Specified Item must include, without limitation, all available information relevant to whether the proposed substitute item will or will not: (i) comply with all

requirements of the Specifications; (ii) be equal to or better than the Specified Item in all material respects, including, without limitation, with respect to durability and expected useful life of the substitute item; (iii) be consistent with the design and intended aesthetics of the Work and the Project; (iv) fit with, or require any change in the construction of, the Work and/or the Project; (v) result in the District incurring more or less operations, maintenance and/or other costs; (vi) have replacement parts and service available at least to the same extent as the Specified Item; (vii) require any increase in the Contract Price; and (viii) require any increase in the Contract Time or modification of the Master Construction Schedule. The foregoing shall be deemed and construed to require that the Contractor must provide any and all information that would tend to indicate that a proposed substitute item is not suitable as a substitute for the Specified Item (including, without limitation, specifically pointing out any characteristic of the proposed substitute item that does not satisfy any requirement of the Specifications), and the Contractor shall have breached its obligations pursuant to the Contract if it intentionally or negligently fails to provide all of such information. The types or forms of information submitted by the Contractor in connection with a request for substitution of a Specified Item must include, without limitation, all illustrations, specifications, catalog cut-sheets, manufacturer's brochures and other documentation that describe the characteristics, quality and aesthetics of the proposed substitute item.

14.6.4 Adequacy of Substantiating Information. The District may reject any request for substitution of a Specified Item if the Contractor fails to provide information that is reasonably sufficient and adequate to permit the District to substantiate the suitability of the proposed substitute item. The District may, but shall not be required to, request that the Contractor provide additional information regarding any request by the Contractor for substitution of a Specified Item.

14.6.5 Contractor Certification. The Contractor shall not request approval of a proposed substitute item unless the Contractor has a reasonable and good-faith belief that the proposed substitution can be approved in accordance with the requirements of Sections 14.4 through 14.10, inclusive, of these General Provisions. The Contractor must execute the certification set forth on the Substitution Request form, subject to penalty of perjury, that the Contractor: (i) has made all reasonable efforts to obtain all information relevant to the request for substitution of the Specified Item; (ii) has provided all of such information to the Project Manager; and (iii) reasonably and in good faith believes that the proposed substitute item is equal or better in all material respects to the Specified Item, will adequately and fully accomplish the intended aesthetics, purposes and/or functions of the Specified Item, and otherwise satisfies all requirements of Sections 14.4 through 14.10, inclusive, of these General Provisions.

14.7 District Discretion to Approve Requests for Substitution. The District, in its sole discretion and after consultation with the Architect and/or the Project Manager, shall determine whether a proposed substitute item: (i) is equal or better in all material respects to the Specified Item; (ii) will adequately and fully accomplish the intended aesthetics, purposes and/or functions of the Specified Item; and (iii) otherwise satisfies all requirements of Sections 14.4 through 14.10, inclusive, of these General Provisions. Upon determining that a proposed substitute item satisfies all of the foregoing conditions, the District shall approve the request for substitution. The District, in its sole discretion, may, but is not required to, approve a request for substitution of a Specified Item despite the proposed substitute item not fully satisfying all of the foregoing conditions. If the District approves a request for substitution of a Specified Item, the approval and all terms and conditions thereof shall be set forth in a Change Order, and execution of such Change Order by the Contractor shall be a condition to it taking or having any effect.

14.8 Conditional Approval of Requests for Substitution. The District reasonably may impose conditions on any approval of any request for substitution, including, without limitation, requirements for the Contractor: (i) to compensate the District (or for a reduction in the Contract Price) on account of any projected increase in operations, maintenance or other costs to be incurred by the District or on account of any lesser utility of the substitute item in comparison to the Specified Item; or (ii) to provide to the District an extended warranty on the substitute item or some other assurance of the compatibility, fitness, quality, durability, or performance of the substitute item. The foregoing shall not be deemed or construed to require that the District approve any proposed substitute item that is not equal or better in all material respects to the Specified Item.

14.9 Contractor Responsible for Impacts and Costs of Substitution. In connection with each request for substitution of a Specified Item, the Contractor shall bear all risks of, and be solely responsible and liable for: (i) any failure by the Contractor to request the substitution sufficiently in advance to avoid or prevent any delay in the Work or any Work by Others; (ii) any reasonable delay arising from the need to obtain approval of a proposed substitute item from the District, Architect and/or Project Manager; (iii) any costs incurred by the District, including, without limitation, administrative costs and costs of professional services of the Architect and/or Project Manager, attributable to any incomplete or unreasonable submission associated with the request; and (iv) any delays or additional costs arising from the need to procure the substitute item. In addition, except with respect to requests for substitution of a Specified Item that is legitimately and reasonably no longer commercially available, in connection with each request for substitution of a Specified Item, the Contractor shall bear all risks of, and be solely responsible and liable for: (i) any delays arising from the need to obtain approval of a proposed substitute item from the DSA and/or other governmental entity with competent jurisdiction; (ii) any costs of professional design services necessary to process and obtain any required approvals by the DSA and/or any other governmental entity with competent jurisdiction; (iii) any costs of professional design services necessary to redesign or otherwise ensure coordination of the proposed substitute item with other portions of the Work or any Work by Others; and (iv) any costs or additional work or services necessary to fit the substitute item with adjoining portions of the Work attributable to use of the substitute item.

14.10 Disapproval of Requests for Substitution. If the District disapproves a pre-bid request for substitution of a Specified Item, the Contractor must provide the Specified Item (unless the Specified Item is no longer commercially available), without any extension of the Contract Time or increase in the Contract Price. If the District disapproves either a pre-bid or post-bid request for substitution of a Specified Item that is no longer commercially available, then, within such time as will avoid or prevent any delay in the Work or any Work by Others, the Contractor must submit an alternate proposal for substitution of the Specified Item in accordance with Sections 14.4 through 14.10, inclusive, of these General Provisions.

14.11 Purchase and Ownership of Materials and Equipment. The Contractor shall be solely responsible and liable for ensuring that the sellers and suppliers of any and all materials and/or equipment to be incorporated into the Work, and all applicable federal, State, and local taxes and other charges levied or assessed on or in connection with such materials and/or equipment, are paid when due. The District typically is exempt from federal excise taxes and, upon request, the District will provide, but will not warrant the effect of, written certification of such exemption. The Contractor shall not purchase or furnish in connection with the Work any materials or equipment subject to any chattel mortgage, conditional sale, or other interest of the seller or supplier in such materials or equipment. The Contractor shall retain ownership of, and responsibility for, all materials and equipment that the Contractor will incorporate into or otherwise use in connection with the Work unless and until such materials and equipment are incorporated into the

Work and the Project has been fully completed and accepted in accordance with Section 18.9 of these General Provisions.

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PART 15
HAZARDOUS EQUIPMENT, MATERIALS AND SUBSTANCES

15.1 Use of Hazardous Materials in Connection with the Work. If the Contractor reasonably must use explosives or other hazardous equipment, materials or substances in order to adequately complete the Work, the Contractor must provide written notice to, and obtain the consent of, the Project Manager at least seven days prior to bringing such hazardous items onto the Project Site, unless the Project Manager waives such seven-day requirement. Such notice must identify the hazardous items and specify the date(s) the items will be used, the location on the Project Site where the items will be used, whether the items will be stored on the Project Site and, if storage is required, the proposed location and means of adequate and secure storage. The Project Manager may impose conditions on any such approval for use of hazardous equipment, materials or substances to ensure safety and protect the Work, Project and Project Site, and any such use must comply in all respects with applicable laws, rules, regulations, ordinances and orders of governmental entities with competent jurisdiction. If storage of any hazardous items at the Project Site is required, the Contractor must coordinate the location and means of storage with the Project Manager and local public officials with competent jurisdiction. The Contractor shall be solely responsible and liable in all respects for the safe, appropriate and lawful use, handling, and storage in connection with the Work of any hazardous equipment, materials and/or substances.

15.2 Hazard Communication Program. The Contractor must comply with all requirements of the Safe Drinking Water and Toxic Enforcement Act of 1986 (Health and Safety Code Section 25249.5 *et seq*.), commonly referred to as "Proposition 65," that are applicable to a "person in the course of doing business." Prior to commencing any portion of the Work, and as required by and in accordance with Cal-OSHA regulations and other applicable laws and regulations, the Contractor must develop a written hazard communication program ("HCP") that specifies, among other required matters, criteria for: (i) labeling and/or other forms of warning in regard to hazardous substances to be used in connection with performance of the Work; (ii) making available all required material safety data sheets ("MSDS") for such substances; and (iii) informing and training employees in regard to dangers and proper handling of such substances. The Contractor shall implement, maintain and enforce its HCP at all times prior to full completion of the Work. As required by law, and in addition to fulfilling any other applicable requirements in connection with performance of the Work, the Contractor must: (i) develop and provide to the Project Manager an adequate list of hazardous substances brought onto or kept at the Project Site; (ii) make required MSDS available in a readily-accessible place at the Project Site; (iii) comply with requirements for giving notice to all persons who may be exposed to any chemical known to the State to cause cancer, including, without limitation, ensuring that any such substances brought onto or kept on the Project Site properly labeled; and (iv) ensure that all persons working with or in the vicinity of any such substances are informed of applicable hazards and trained in proper use and handling of such substances.

15.3 Contractor Prohibited from Using Asbestos. Notwithstanding Section 15.1 of these General Provisions, in no circumstances may the Contractor use or incorporate into the Work any asbestos or asbestos-containing materials, or use or employ in connection with the Work any equipment, tools, clothing or other things that contain or incorporate asbestos or asbestos-containing materials. For purposes of the foregoing: (i) "asbestos" means any naturally occurring fibrous hydrated mineral silicate, including, without limitation, chrysotile, crocidolite, amosite, fibrous tremolite, fibrous anthophyllite, and fibrous actinolite; and (ii) "asbestos-containing materials" means materials or products formed by mixing asbestos fibers with other materials, such as cement, rock wool, plaster, cellulose, clay, vermiculite, perlite, adhesive, *et cetera*. Within seven days of the date of the Notice of Award, the Contractor must provide to the Project Manager an

executed copy of the "Certification of Asbestos-Free Materials" form included in the Required Contract Forms.

15.4 Contractor Deemed Fully Aware of the Dangers of Asbestos. The Contractor shall be deemed and construed for all purposes of the Contract to have undertaken the Work with full knowledge of the currently-accepted standards, hazards, risks and liabilities associated with asbestos and asbestos-containing materials. Therefore, the Contractor shall be solely responsible and liable for: (i) safely and appropriately performing, in accordance with applicable requirements, any Work that involves or relates to asbestos or asbestos-containing materials, including, without limitation, any repair, modification, rehabilitation, reconstruction, demolition, removal or other accommodation of existing structures, utilities, or other improvements; and (ii) avoiding and/or preventing use in connection with the Work, or incorporation into the Work, of any asbestos or asbestos-containing materials in violation of the prohibition set forth in Section 15.3 of these General Provisions. To the extent provided in Part 23 of these General Provisions, the Contractor shall indemnify, defend and hold-harmless the District, the Architect, the Project Manager, and the Inspector of Record, with respect to any and all costs and other liabilities, including, without limitation, attorneys' fees, arising from the failure of the Contractor to comply with the foregoing.

15.5 Consequences of Violating Prohibition Against Asbestos. In the event the Contractor incorporates into the Work any asbestos or asbestos-containing materials, otherwise is responsible for asbestos contamination on, at or in the vicinity of the Project Site, or otherwise violates the prohibition against asbestos set forth in Section 15.3 of these General Provisions, the Contractor shall be solely responsible and liable for any and all costs and/or delays attributable to: (i) correction of the Work; (ii) any and all investigations, analyses, removals, abatements, decontaminations or other actions necessary to correct the violation ("Asbestos Remediation"), including, without limitation, costs incurred by the District for additional administrative and professional services and for laboratory services, consultants, and contractors; and (iii) any injury to any person and/or damage to any property arising or alleged to have arisen from the violation.

15.6 District to Arrange for Necessary Asbestos Remediation. The District shall arrange for performance of any necessary Asbestos Remediation. Any Asbestos Remediation must be performed in accordance with all applicable laws, regulations, ordinances and other governmental requirements, under the direct supervision of a qualified asbestos consultant who is accredited or certified by the Environmental Protection Agency ("EPA"). The District, in its sole discretion, shall select the asbestos consultant. The asbestos consultant, subject to District approval, will select a qualified contractor to perform the Asbestos Remediation. The Asbestos Remediation contractor must be experienced, knowledgeable, and accredited or certified by the EPA. No Asbestos Remediation shall be deemed complete or accepted until all asbestos contamination and/or asbestos-containing materials are eliminated or reduced to acceptable levels, as reasonably determined by the asbestos consultant.

15.7 Discovery of Hazardous Materials During Performance of the Work. If, during performance of the Work, the Contractor encounters materials that the Contractor reasonably believes to be asbestos or a hazardous substance, and the asbestos or hazardous substance has not been rendered harmless, the Contractor must continue the Work in unaffected areas reasonably believed to be safe, but must immediately cease the Work in the area affected and report the condition, in writing, to the Project Manager. In such event, and subject to the provisions of Section 15.6 of these General Provisions in the case of asbestos, the District shall obtain the services of an independent and qualified person or company to identify the materials suspected as being asbestos or some other hazardous material, and to determine

whether removal or some other corrective measures are required to render the materials harmless. The Contractor may resume work on the affected area only upon a determination that: (i) the material identified by the Contractor is not asbestos or some other hazardous material; (ii) such materials are not harmful and removal or other measures are not necessary; or (iii) removal or other measures necessary to render the materials harmless have been completed in accordance with applicable law. Any required asbestos-related work (defined in Health and Safety Code Section 25914.1) and/or hazardous substance removal (defined in Business and Professions Code Section 7058.7) that is not disclosed in the Contract Documents shall be performed pursuant to a separate District contract.

15.8 Discovery of Hazardous Materials in Excavations Deeper Than Four Feet. If the Work involves digging any trenches or other excavations that extend deeper than four feet below the surface, and the Contractor, while performing such excavation, discovers any material that the Contractor believes may be hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law, the District and the Contractor must comply with the provisions of Section 16.10 of these General Provisions.

15.9 Delays Resulting from Discovery of Hazardous Materials. To the extent the Work or any Work by Others involves or relates to the presence, repair, modification, rehabilitation, reconstruction, demolition, removal or other accommodation of existing structures, utilities, or other improvements, the District and the Contractor shall be deemed and construed, for purposes of Public Contract Code Section 7102 and otherwise, to have anticipated that asbestos and/or other hazardous substances (including without limitation, lead, and petroleum distillates and/or by-products) may exist or be discovered during the course of the Work that may delay or otherwise disrupt the performance of the Work. In such event, the Contractor's sole remedy for any delay attributable to the investigation, analysis, removal, abatement, decontamination and/or other actions necessary to correct such condition shall be an extension of time, unless the delay continues for more than ninety days past the date the hazardous materials were discovered, in which case the Contractor shall be entitled to additional compensation, as provided in Section 13.18 of these General Provisions, for the period in excess of ninety days.

15.10 Contractor Responsibility for Releases of Hazardous Substances. If any person on, at or in the vicinity of the Project Site on account of the Work dumps, pours, spills, buries, places, discharges or otherwise releases any hazardous materials, waste or substances into or onto the Project Site or property in the vicinity of the Project Site, whether intentionally or otherwise, the Contractor shall be solely responsible and liable for any and all costs and/or delays attributable to such release, including, without limitation: (i) costs of any necessary correction of the Work; (ii) any and all investigations, analyses, removals, abatements, decontaminations or other actions necessary to correct such release, including, without limitation, costs incurred by the District for additional administrative and professional services and for laboratory services, consultants, and contractors; and (iii) any injury to any person and/or damage to any property arising or alleged to have arisen from the violation. To the extent provided in Part 23 of these General Provisions, the Contractor shall indemnify, defend and hold-harmless the District, the Architect, the Project Manager, and the Inspector of Record, with respect to any and all costs and other liabilities, including, without limitation, attorneys' fees, arising from any such release.

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PART 16
EXCAVATIONS AND UTILITIES

16.1 Contractor Must Locate Underground Utilities and Installations. Except as the Contract Documents expressly indicate otherwise in any particular case, the existence, locations and, if available, depths of underground utilities, facilities and/or installations indicated in the Contract Documents as being on, at or in the vicinity of the Work and/or the Project Site are: (i) based on records available to the District, not on surveys or excavations prepared or performed by the District; and (ii) are to be considered approximate, not exact. The District may, but shall not be deemed or construed to be required to, indicate in the Contract Documents the location of service laterals and/or appurtenances within the vicinity of the Work if the presence of such utilities can be inferred from the presence of other visible facilities, such as buildings, meters, junction boxes, *et cetera*. Prior to commencing any excavation in connection with the Work or any other activity that reasonably might damage underground utilities, facilities or installations, the Contractor must: (i) thoroughly inspect the vicinity of the Work for above-ground facilities, such as buildings, meters, junction boxes, *et cetera*, that might indicate the presence of underground service mains, trunklines, laterals or appurtenances; (ii) determine the exact location of any underground utilities, facilities and installations within an indicated approximate location, using air-vacuum excavation (i.e., potholing) techniques (or an underground-utility locating service to perform such services); (iii) immediately report to the Project Manager any utilities, facilities or installations located in the vicinity of the Work that are not indicated in the Contract Documents or are in a location materially different from the location indicated in the Contract Documents; and (iv) provide a written report to the Project Manager describing the exact location of all underground utilities, facilities and installations within the vicinity of the Work, including a diagram thereof, if necessary to adequately describe such exact locations. The Contractor must coordinate with and obtain the consent of the Project Manager prior to conducting any air-vacuum excavation (or any underground-utility locating service performing such services) on, at or in the vicinity of the Project Site.

16.2 Contractor Must Contact Regional Notification Center. If the Work involves any trenching, boring, tunneling, digging or other excavation, the Contractor shall be solely responsible and liable for compliance with all applicable requirements of Government Code Sections 4216 through 4216.9, and with all requirements of the Contractors State License Board relating to such Government Code provisions. As required, the Contractor must, prior to commencing any excavation, contact the appropriate Regional Notification Center and obtain an Underground Service Alert identification number and provide such identification number to the Project Manager. The Contractor must contact the Regional Notification Center for any necessary revalidation of the identification number, prior to it expiring. If the Contractor will be excavating within the approximate location of any subsurface installation, except as agreed by the Project Manager that use of hand-tools will be acceptable, the Contractor must provide written notice to the operator(s) of the subsurface installation of the Contractor's intent to use, and make reasonable attempts to obtain such operator(s) consent for use of, air-vacuum excavation techniques (i.e., potholing) to determine the exact location of the subsurface installation. The Contractor shall be responsible for any and all additional costs and/or delays in the Work or any Work by Others arising from any failure by the Contractor to timely comply with the requirements described in this Section.

16.3 Main or Trunkline Utilities Not Identified in Contract Documents. In accordance with Government Code Section 4215, if the Contractor, while performing the Work, discovers utility facilities not identified by the District in the Contract Documents, the Contractor shall immediately provide written notice to the District and the applicable utility company. The public utility, if it owns the utility facilities, shall have the sole discretion to perform any necessary repairs or relocation work or to permit the Contractor to do

such repairs or relocation work at a reasonable price. The District shall not be required to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities on the Project Site can be inferred from the presence of other visible facilities, such as buildings, meter and junction boxes, on or adjacent to the Project Site. The District shall be responsible for the timely removal, relocation, or protection of existing main or trunkline utility facilities located on the Project Site, if such utilities are not identified by the District in the Contract Documents. The District shall compensate the Contractor for the costs of locating, repairing damage not due to the failure of the Contractor to exercise reasonable care, and removing or relocating such main or trunkline utility facilities not indicated in the Drawings and Specifications with reasonable accuracy, and for equipment used in connection with the Work necessarily idled during such work. The Contractor shall not be assessed liquidated damages for delay in completion of the Work, when such delay was caused by the failure of the District or the owner of the utility to provide for removal or relocation of such main or trunkline utility facilities. The provisions of this Section 16.3 shall not be deemed or construed to preclude the District from requiring changes in the Work that will eliminate the need to remove and/or relocate any utility facilities.

16.4 Responsibility for Cost of Relocating Utility Facilities. The Contractor shall be solely responsible and liable for all costs to locate, repair, remove, relocate and/or protect any and all utility facilities (including, without limitation, main and trunkline facilities, service laterals, and appurtenances) as may be required in connection with the Work, except to the extent: (i) the Contractor can provide reasonable documentary evidence, satisfactory to the District, that the owner of the utility facilities has concurred that it is responsible for and will pay such costs; and/or (ii) the District is responsible in accordance with Section 16.3 of these General Provisions for the costs relating to main or trunkline utility facilities not indicated in the Drawings and Specifications with reasonable accuracy.

16.5 Contractor Must Obtain and Pay for Utility Services. Unless the Contract Documents expressly provide otherwise, the Contractor must submit required applications, arrange, and pay all fees for: (i) all temporary utility connections and service facilities required in connection with performance of the Work; (ii) all utilities consumed in connection with performance of the Work; and (iii) all permanent utility connections and service facilities included within the scope of the Work. The Contractor must give written notice to the Project Manager not less than five days prior to installation, in connection with the Work, of any utility meter or other similar equipment on, at or in the vicinity of the Project Site that is to be owned by the applicable utility company, not by the District. The District shall reimburse to the Contractor the actual documented cost, without any increase for overhead, profit or other costs or charges by the Contractor, of connection fees for permanent utilities that will serve the completed Project.

16.6 Contractor Must Coordinate with Utility Companies. Sufficiently in advance in order to avoid and/or prevent any delay in the Work or any Work by Others, the Contractor must coordinate each portion of the Work involving or requiring construction of, or connection to, utility facilities (including, without limitation, any relocation of facilities) with the applicable utility company. In any case that the owner of a utility has the option of performing any required work, but such owner permits the Contractor to perform such work, the Contractor must perform such work in compliance with all requirements of such owner.

16.7 Contractor Must Have Permit for Excavations. The Contractor must not commence any excavations required in connection with the Work until the Contractor or the appropriate Subcontractor has: (i) applied for and obtained all necessary permits for the excavations, including, without limitation, any OSHA and Cal-OSHA permits; (ii) provided a copy of each such permit to the Project Manager; and (iii) posted a

copy of each such permit in a prominent location on the Project Site. The Contractor must immediately notify the Project Manager in writing if any such permit is revoked prior to the District issuing a Notice of Completion for the Work.

16.8 Contractor Must Protect Adjacent Improvements. The Contractor shall be solely responsible and liable for protecting all completed and in-progress Work, any Work by Others, the Project Site, and all on-site and off-site improvements and properties, in the vicinity of each excavation undertaken in connection with the Work. The foregoing shall be deemed to require that the Contractor, among other things, ensure that improvements and properties in the vicinity of the excavation are protected from settlement, loss of lateral support, *et cetera*.

16.9 Trench Safety Plans for Trenches Deeper Than Five Feet. If the Contract Price exceeds $25,000, then prior to undertaking the excavation of any trench that will or reasonably might be five feet or more in depth, the Contractor must comply with all requirements of Section 11.7 of these General Provisions relating to Trench Safety Plans. Neither the foregoing nor the provisions of Section 11.7 of these General Provisions shall be deemed or construed to impose tort liability upon the District.

16.10 Differing Conditions in Excavations Deeper Than Four Feet. If the Work involves digging any 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: (i) material discovered during such excavation that the Contractor believes may be hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law; (ii) subsurface or latent physical conditions at the Project Site differing from those indicated in information made available to the Contractor before it submitted its bid for the Work; or (iii) unknown physical conditions at the Project 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 Documents. The District shall promptly investigate any such conditions identified by the Contractor. If the District determines that such conditions exist and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of the Contract, the District shall issue a Change Order or Construction Change Directive in accordance with the procedures set forth in these General Provisions. In the event a dispute arises between the District and the Contractor in regard to whether any such condition actually exists, or causes a decrease or increase in the Contractor's cost of, or time required for, performance of the Contract, the Contractor shall not be excused from completing all Work in accordance with the milestones set forth in the Master Construction Schedule, but shall proceed with all Work to be performed pursuant to the Contract Documents. However, the Contractor shall retain all rights in such regard as provided by law or the Contract, and the Contractor may file a Claim in accordance with the Contract Documents.

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PART 17
CHANGES IN THE WORK

17.1 Authorization Required for Changes in the Work.

17.1.1 District Approval of Changes Required. The Contractor must perform all Work in strict accordance with the DSA approved Drawings and Specifications and other Contract Documents, as those may from time to time be amended, supplemented, or otherwise modified. Except for the District and except to the extent of the Architect's authority to issue Architect Field Directives, no person or entity (including, without limitation, the Architect, Project Manager and Inspector of Record) has the unilateral authority to order any changes in the Work or to make any changes in the Drawings, Specifications or other Contract Documents. Absent a duly-authorized Change Order, Construction Change Directive or Architect Field Directive, the Contractor must not change the Work, or permit any changes in the Work to occur, including, without limitation, any substitution, addition, omission, deviation or other change. Notwithstanding anything to the contrary, in order to be valid and enforceable against the District, each Change Order and Construction Change Directive must have been approved by the District Board directly or, as described in Section 2.1 of these General Provisions, the District Board must have delegated to the Authorized District Officer the authority to approve such Change Order or Construction Change Directive.

17.1.2 DSA Approval of Certain Changes. In circumstances in which the DSA must approve changes to the Work, the Architect will be responsible for obtaining any such DSA approval. The DSA presently may approve changes in the Work by means of: (i) a Field Change Document ("FCD") process pursuant to which the DSA may approve changes prior to District Board approval; or (ii) a change order process that, for purposes of the DSA, may include any number of previously approved FCDs and/or Change Orders issued in accordance with the Contract Documents. The Architect may seek FCD approval of any Construction Change Directive, Architect Field Directive, or other document describing the Work or changes in the Work. Because FCDs and Change Orders may be grouped together for purposes of obtaining DSA approval, a "change order" as approved by the DSA will not necessarily correspond in reference-number or content to Change Orders issued pursuant to the Contract Documents.

17.1.3 Direction to Proceed With Changes. An Authorized District Officer may determine that it is necessary, in order to prevent delays in the Work, to direct the Contractor to proceed with changes in the Work that are included in a proposed Change Order, but the Change Order has not yet been approved or ratified by the District Board. In such event, the Authorized District Officer, to the extent so authorized, may issue written instructions to the Contractor to implement and proceed with such changes (each a "Construction Change Directive"). However, in no event may the Contractor receive any payment on account of any Work performed pursuant to a Construction Change Directive until the District Board has approved or ratified the corresponding Change Order.

17.1.4 Responsibility for Unauthorized Changes. Except to the extent a Change Order expressly identifies and/or describes specific deviations from the requirements of the Specifications or other Contract Documents, the Work to be performed pursuant to the Change Order must conform in all respects to the requirements of the Specifications and other Contract Documents. Regardless of whether an unauthorized change in the Work occurs in connection with any Change Order, the Contractor shall be responsible for any and all costs and/or delays attributable to unauthorized changes in the Work from what is required pursuant to the Contract Documents, including, without limitation, all costs of any replacement or other correction of the Work and all costs incurred by the District for additional administrative and professional services in connection with such correction. In addition, the Contractor shall be deemed and

construed to have waived any and all rights to any compensation for any change in the Work that was not duly authorized prior to being commenced or otherwise implemented.

17.2 Changes Required by Change Order. Subject to the provisions of this Part 17 and other requirements of the Contract Documents, the District may at any time issue an amendment to the Contract for purposes of ordering change(s) in the Work to be performed pursuant to the Contract, adjustment(s) in the Contract Price and/or Contract Time, or other change(s) in the requirements of the Contract (each a "Change Order"). As provided in this Part 17, a Change Order may be unilateral if issued without approval by the Contractor or mutual if the District and the Contractor have both approved the Change Order. The Architect shall prepare each Change Order and, upon taking effect, a Change Order shall constitute one of the Contract Documents and shall be subject to all other applicable provisions of the Contract Documents as if originally included therein. In no event shall any Change Order be deemed or construed to invalidate the Contract. The Contractor must implement the changes specified in a Change Order promptly or by such time as specified in the Change Order. The Contractor must perform all work necessary to complete any change(s) specified in a Change Order in accordance with all provisions of the Contract, except as any such provisions are expressly modified by the Change Order.

17.3 Changes Required by Architect Field Directive. At any time and without invalidating the Contract, the Architect may issue a written directive requiring any minor changes in the Work that are consistent with the intent of the Contract Documents and that do not require an adjustment in the Contract Price or Contract Time (each an "Architect Field Directive"). An Architect Field Directive will be substantially in the form included in the Required Project Forms. An Architect Field Directive must be signed by the District, the Architect, and the Project Manager, in order to be valid and binding on the Contractor. Upon taking effect, an Architect Field Directive shall constitute one of the Contract Documents and shall be subject to all other applicable provisions of the Contract Documents as if originally included therein. The Contractor's approval of an Architect Field Directive shall not be required, and the Contractor must implement each minor change specified in an Architect Field Directive promptly or by such time as specified in the Architect Field Directive.

17.4 Changes Required by Unilateral Change Order. At any time and without invalidating the Contract, the District may issue a Change Order to require any changes in the Work that are within or consistent with the general scope of the Contract and/or the Project. In order to be binding on the Contractor, each such unilateral Change Order must be signed by the District, the Architect, and the Project Manager. The Contractor's approval of a unilateral Change Order shall not be required, and the Contractor must implement each change specified in a unilateral Change Order promptly or by such time as specified therein. The District may, but shall not be required to, issue a unilateral Change Order in any case that the District and the Contractor have been unable to agree on the terms of a requested mutual Change Order. A unilateral Change Order may direct that any Work pursuant to the Change Order be performed on a time-and-materials, lump-sum, or unit-price basis. **IF THE CONTRACTOR DISAGREES WITH ANY OF THE TERMS OF A UNILATERAL CHANGE ORDER THAT THE CONTRACTOR DID NOT SIGN TO INDICATE ACCEPTANCE OF SUCH CHANGE ORDER, THE CONTRACTOR MAY PROVIDE NOTICE AS PROVIDED IN SECTION 17.5 OF THESE GENERAL PROVISIONS.**

17.5 Mandatory Notice of Disagreement Regarding Contract Price or Time. The Contractor may provide written notice to the District, the Architect and the Project Manager if the Contractor: (i) reasonably believes that the implementation of any Bulletin, Interpretation or Clarification will require an adjustment to the Contract Price and/or Contract Time that is not set forth in a corresponding Change Order; (ii) reasonably

believes that it is entitled to an adjustment of the Contract Price and/or Contract Time on account of a change required pursuant to an Architect Field Directive; or (iii) reasonably disagrees with the adjustment to the Contract Price and/or the Contract Time, if any, set forth in a unilateral Change Order. Any such notice must set forth in reasonable detail all bases asserted by the Contractor in support of its position that it is entitled to an adjustment of the Contract Price and/or Contract Time, or that any specified adjustment of the Contract Price and/or Contract Time is not adequate. **THE CONTRACTOR MUST PROVIDE SUCH NOTICE PRIOR TO COMMENCING ANY WORK OR OTHERWISE IMPLEMENTING THE APPLICABLE BULLETIN, INTERPRETATION, CLARIFICATION, ARCHITECT FIELD DIRECTIVE OR UNILATERAL CHANGE ORDER, OR WITHIN THREE DAYS OF THE ISSUANCE OF SUCH DOCUMENT, WHICHEVER IS SOONER**.

17.6 Consequences of Failure to Provide Mandatory Notice. The purpose of the written notice required pursuant to Section 17.5 of these General Provisions is to permit the District to evaluate the Contractor's bases for believing that it is entitled to an adjustment, or a further adjustment, to the Contract Price and/or Contract Time and, as appropriate: (i) order any such adjustment or further adjustment to the Contract Price and/or Contract Time; (ii) order the Contractor to proceed without any adjustment or further adjustment to the Contract Price and/or Contract Time; (iii) modify the Work and/or the Project to resolve the matter; or (iv) forego a change in the Work and/or the Project. Therefore, if the Contractor fails to provide such notice prior to commencing any work or otherwise implementing any change required pursuant to an applicable Bulletin, Interpretation, Clarification, Architect Field Directive or unilateral Change Order, or fails to provide such notice within three days of the issuance of the Bulletin, Interpretation, Clarification, Architect Field Directive or unilateral Change Order, whichever is sooner, the Contractor shall be deemed and construed to have waived any and all rights to any adjustment in the Contract Price and/or Contract Time on account thereof. **THE GIVING OF AN APPLICABLE NOTICE PURSUANT TO SECTION 17.5 OF THESE GENERAL PROVISIONS SHALL BE A CONDITION PRECEDENT TO THE CONTRACTOR HAVING ANY RIGHT, WHETHER PURSUANT TO A CLAIM FILED IN ACCORDANCE WITH PART 24 OF THESE GENERAL PROVISIONS OR OTHERWISE, TO SEEK OR OBTAIN AN ADJUSTMENT (OR FURTHER ADJUSTMENT) OF THE CONTRACT PRICE AND/OR CONTRACT TIME ON ACCOUNT OF AN APPLICABLE BULLETIN, INTERPRETATION, CLARIFICATION, ARCHITECT FIELD DIRECTIVE OR UNILATERAL CHANGE ORDER.**

17.7 Changes Requested by the District. The District may at any time request that the Contractor propose any adjustments to the Contract Price and/or Contract Time attributable to any change(s) in the Work or other requirements of the Contract desired by the District (each a "Request for Proposal" or "RFP"). The Architect shall prepare each RFP in writing and submit it to the Contractor with all information reasonably necessary to permit the Contractor to determine the nature and scope of the proposed change(s), including, without limitation, any Drawings and Specifications. Within seven days of receipt of an RFP, and without additional compensation, the Contractor must provide to the District, the Architect and the Project Manager a written proposal setting forth any proposed adjustments to the Contract Price and/or Contract Time that the Contractor reasonably believes are appropriate considering the nature and scope of the proposed change(s). Each proposal that includes a proposed adjustment to the Contract Price must be accompanied by an estimate of the effect (whether additive or deductive) of the change(s) on the Contract Price ("Change Order Cost") detailed by one of the methods specified in Section 17.9 of these General Provisions. Each proposal that includes a proposed adjustment to the Contract Time must set forth the impact of the proposed change(s) on any milestones and on the critical path of the Work as set forth in the Master Construction Schedule, not just specify an increase in the number of days desired for completion of all Work. The District may accept the Contractor's proposal in regard to a Change Order, may attempt to negotiate terms for a Change Order that are different from those proposed by the Contractor, or may determine not to further pursue the change(s) originally desired by the District. If the District and the

Contractor are able to agree on all terms of a Change Order, the Architect will prepare the Change Order to include all such terms.

17.8 Changes Requested by the Contractor. The Contractor may at any time request that the District issue a Change Order to provide for adjustments to the Contract Price and/or Contract Time attributable to any change(s) in the Work or other requirements of the Contract desired by, or required of, the Contractor (each a "Change Order Request"). The Contractor may, not as a limitation, base a Change Order Request on a Claim asserted by the Contractor. The Contractor must prepare each Change Order Request in writing and must submit it to the District, the Architect and the Project Manager with: (i) all information reasonably necessary to permit the District, Architect and Project Manager to determine the nature and scope of the proposed change(s); and (ii) the proposed adjustments to the Contract Price and/or Contract Time, if any, that the Contractor reasonably believes are appropriate considering the nature and scope of the proposed or other change(s). The Contractor must submit each Change Order Request a sufficient time in advance of when the change must be implemented in order to avoid and/or prevent any delay in the Work or the Project. Each Change Order Request that includes a proposed adjustment to the Contract Price must be accompanied by an estimate of the Change Order Cost detailed in accordance with one of the methods specified in Section 17.9 of these General Provisions. Each Change Order Request that includes a proposed adjustment to the Contract Time must set forth the impact of the proposed or other change(s) on any milestones and on the critical path of the Work as set forth in the Master Construction Schedule, not just specify an increase in the number of days desired for completion of all Work. The District may agree to the terms set forth in a Change Order Request, may attempt to negotiate terms for a Change Order that are different from those proposed by the Contractor, or may determine not to agree to the Change Order Request. If the District and the Contractor are able to agree on all terms of a Change Order Request, the Architect will prepare the Change Order to include all such terms.

17.9 Determining Affect of Change on Contract Price. In response to an RFP or in connection with a Change Order Request, the Contractor must prepare a written estimate of the Change Order Cost, which must include a complete itemization of all materials, labor and other costs, whether additive or deductive, that affect the Contract Price, including, without limitation, estimates of hours of labor required, wage rates, material quantities, unit prices, *et cetera*. The District in its sole discretion may require that the Contractor provide any estimate of the Change Order Cost, or some portion thereof, on: (i) a "time and materials" basis as described in Section 17.10 of these General Provisions; (ii) a lump-sum basis as described in Section 17.11 of these General Provisions; and/or (iii) a unit-price basis as described in Section 17.12 of these General Provisions. Upon request, the Contractor must furnish to the Architect and the Project Manager such information as reasonably substantiates wage rates, bond premiums or other amounts included in an estimate. No work may be performed on a time-and-materials basis or unit-price basis if the cost thereof will exceed the ten percent limit set forth in Public Contract Code Section 20118.4, and the District may include in any Change Order providing for completion of required change(s) on either such basis a condition on payment that the final Change Order Cost not exceed such limit.

17.10 Determining Change Order Cost Based on Time and Materials. In the event the District requests that an estimate of a Change Order Cost, or portion thereof, be prepared on a time-and-materials basis, the Contractor must provide an itemization of the estimated costs of all time, materials and equipment necessary to complete the required change(s). Each unit-price estimate must include the cost components and conform to all associated requirements specified in Section 17.13 of these General Provisions, except that the Contractor must make reasonable and good-faith efforts to estimate and include in the estimate the

maximum number of hours of labor in the various job classifications, and the maximum quantities of materials, required to complete the required change(s) on a time-and-materials basis.

17.11 Determining Change Order Cost Based on Lump Sum Proposal. In the event the District requests that an estimate of a Change Order Cost, or portion thereof, be prepared on a lump-sum basis, the Contractor must provide an itemization of the costs of all time, materials and equipment necessary to complete the proposed change(s). Each lump-sum estimate must include the cost components and conform to all associated requirements specified in Section 17.13 of these General Provisions as being applicable to time-and-materials estimates. Upon being approved by the Parties, a lump-sum estimate shall in all circumstances be deemed and construed to be the agreed Change Order Cost regardless of the total time, number of hours of labor, quantities of materials, *et cetera*, actually required to complete or otherwise implement the proposed change(s).

17.12 Determining Change Order Cost Based on Unit Pricing. In the event the District requests that an estimate of a Change Order Cost, or portion thereof, be prepared on the basis of unit-prices, the Contractor must provide an itemization of the costs of all time, materials and equipment necessary to complete each logical, defined or specified unit of the proposed change(s). The Contractor must make reasonable and good-faith efforts to estimate the maximum number of each logical, defined or specified unit required to complete the proposed change(s) on a unit-price basis. Each unit-price estimate must include the cost components and conform to all associated requirements specified in Section 17.13 of these General Provisions as being applicable to time-and-materials estimates. Upon being approved by the Parties, a unit-price estimate shall in all circumstances be deemed and construed to be the Change Order Cost for each unit, regardless of the number or cost of such units actually required to complete or otherwise implement the proposed change(s).

17.13 Cost Components to be Included in All Estimates. The District and/or the Project Manager may require that reasonable additional or modified cost components or information be included in any necessary cost estimate, but, otherwise, each estimate prepared by the Contractor in response to an RFP or in connection with a Change Order Request must include the following cost components and conform to all associated requirements specified below:

(i) Labor Costs: Itemize all job classifications for labor necessary to complete the proposed change(s), direct hourly wage rates, and the estimated total number of hours in each job classification required to complete the change(s). Separately itemize any employer-paid payroll taxes, insurance, benefits and other costs attributable to such labor. Do not include off-site management, supervision and/or administration in this cost component, as the compensation for such costs shall be deemed to be included within the Contractor's general markup.

(ii) Materials Costs: Itemize (in sufficient detail to identify) all materials necessary to complete the proposed change(s), quantities required, taxes, and any delivery costs. The amounts itemized in this cost component must be reduced by the full amount of any credits and/or discounts given in connection with obtaining the materials, as described in Section 17.15 of these General Provisions.

(iii)	Equipment Costs:	Itemize all equipment necessary to complete the proposed change(s), hourly costs of rental or operations, and total number of hours required. Separately itemize any rented or leased equipment from any owned equipment. Separately itemize any equipment cost that is based on a per-load amount. Do not include in this cost component any hand tools, equipment with a value of less than $1,000, or equipment with a daily rental rate of less than $500, as the compensation for such items shall be deemed to be included within the Contractor's general markup. Also do not include in this cost component the rental of any equipment if other suitable equipment already is available at the Project Site, unless the use of such equipment would unreasonably delay the Work or any Work by Others.
(iv)	Subtotal:	Calculate the sum total of the labor, materials, and equipment costs determined in accordance with the foregoing clauses (i), (ii) and (iii).
(v)	General Markup:	Specify an amount, in no event in excess of twelve and one-half percent of the subtotal amount calculated in accordance with the foregoing clause (iv), which shall be deemed and construed to fully compensate the Contractor for overhead, profit and all other direct and indirect costs (other than bond markup) attributable to the proposed change(s), including, without limitation, any and all costs of research; negotiations; preparation of estimates and other documents; insurance; home-office overhead; on-site and off-site supervision; interference, delay, acceleration and other affects on the Work; guarantees; protection facilities; materials handling; supplies; safety equipment; and hand tools, equipment with a value of less than $1,000, and equipment with a daily rental rate of less than $500. Notwithstanding the foregoing, any portion of the work necessary to complete the proposed change(s) to be performed by any Subcontractor must not include a markup by the Subcontractor in excess of ten percent, or a markup by the Contractor in excess of five percent, of the total labor, materials and equipment included within such subcontracted work.
(vi)	Bond Markup:	Specify an amount, in no event in excess of one percent of the subtotal amount calculated in accordance with the foregoing clause (iv), to compensate the Contractor for any additional bonding costs incurred in connection with the work necessary to complete the proposed change(s). Do not include any such amount if no additional bonding costs will be incurred.
(vii)	Change Order Cost:	Calculate the total Change Order Cost, which shall be the sum total of the subtotal amount calculated in accordance with the foregoing clause (iv), the general markup specified in accordance with the foregoing clause (v), and any bond markup specified in accordance with the foregoing clause (vi).

17.14 Deductive or Reduced Change Order Costs. Any RFP or Change Order Request may propose any reduction in the amount and/or scope of the Work, regardless of whether the RFP or Change Order Request also proposes any additional or increased amount and/or scope of the same or other portions of the Work. In such event, the estimate prepared by the Contractor in response to the RFP or in connection with the Change Order Request must include the same cost components and conform to all associated requirements specified in Section 17.13 of these General Provisions, except that the estimate must determine the deduction from the Contract Price attributable to the reduction in the amount and/or scope of the Work. If an RFP or Change Order Request specifies only deductive changes(s), the Change Order Cost in its entirety will represent a deduction from the Contract Price. When both deductive change(s) and additive change(s) are specified in an RFP or Change Order Request, the Change Order Cost shall be based on the net affect on itemized costs, including, without limitation, general markup and bond markup.

17.15 Discounts and Refunds Deducted from Change Order Costs. The Contractor must make reasonable efforts to obtain or otherwise secure any and all discounts, rebates, refunds and/or offsets that may be available with respect to materials, equipment and supplies necessary, or no longer necessary, in connection with any change(s) in the Work or other requirements of the Contract. The Contractor must include in each estimate prepared in accordance with Section 17.13 of these General Provisions any such discounts, rebates, refunds and/or offsets as reasonably may be available. In the case of any change(s) completed on a time-and-materials basis or a unit-price basis, the Contractor must document any and all discounts, rebates, refunds and/or offsets as provided in Section 17.17 of these General Provisions.

17.16 Substantiation of Subcontractor Pricing Included in Estimates. If an estimate includes any work by a Subcontractor of any tier or materials provided by any materialman, the Contractor must furnish to the Architect and the Project Manager: (i) a detailed estimate, prepared and signed, as applicable, by the Subcontractor or materialman, of the cost for labor, material, equipment, markup, *et cetera*; and (ii) such information as reasonably substantiates wage rates, bond premiums or other amounts included in the estimate, including, without limitation, any markup by the Subcontractor.

17.17 Substantiation of Time and Materials and Unit-Price Costs.

17.17.1 Requirement for Notice. The Contractor must not commence performance of any portion of the Work authorized to be performed on a time-and-materials basis or a unit-price basis unless the Contractor gives notice at least twenty-four hours in advance to the Project Manager and the Inspector of Record that such Work will be commencing, so that they may be present during performance of such Work.

17.17.2 Requirements for Daily Time and Materials Tickets. The Contractor must obtain the Inspector of Record's signature on a copy of the "Time and Materials Ticket" form included in the Required Project Forms for each day during the performance of the Work, specifying: (i) the identification number assigned to that portion of the Work; (ii) the location and description of such Work; (iii) the job classifications, names and social security numbers of the workers performing such Work; (iv) the materials used in performing such Work; and (v) the equipment used in performing such Work, other than tools and equipment included within the Contractor's general markup. The Contractor must prepare the time and material tickets on a form that is reasonably acceptable to the Project Manager and that permits the Inspector of Record to tear off and retain a copy of the form after signing it. The Contractor must provide copies of the daily time and material tickets to the Project Manager at least once per week until the Work being performed on a time-and-materials basis or unit-price basis has been fully completed. Upon request, the Contractor must also submit any other relevant information as the District may require, including,

without limitation, copies of wage rates as included in certified payroll records, receipts, payment invoices, shipping invoices, bills of lading, *et cetera*. If the Contractor fails to provide documentary evidence or other information sufficient to substantiate the amount and/or costs of Work performed on a time-and-materials basis or unit-price basis, the District, in its reasonable discretion, may determine such amounts and/or costs. **IN ORDER TO AVOID ANY VIOLATION OF PUBLIC CONTRACT CODE SECTION 20118.4, THE CONTRACTOR MUST PROVIDE WRITTEN NOTICE TO THE PROJECT MANAGER IF AND WHEN THE COST OF ANY WORK PERFORMED ON A TIME-AND-MATERIALS BASIS REACHES SEVENTY-FIVE PERCENT OF THE CHANGE-ORDER LIMIT SPECIFIED IN SECTION 20118.4, i.e., SEVENTY-FIVE PERCENT OF THE GREATER OF $15,000 OR TEN PERCENT OF THE ORIGINAL CONTRACT PRICE.**

17.17.3 Requirements for Separate Accounting Records. If the Contractor performs any Work (whether pursuant to the original Contract, any Change Order, or otherwise) on a time-and-materials basis or a unit-price basis, the Contractor must adequately document all labor, materials and equipment used and/or consumed in connection with such Work. The Contractor must prepare and maintain separate cost-accounting records, in accordance with generally-accepted accounting standards and principles, for each portion of the Work performed on a time-and-materials basis or unit-price basis, and shall make such accounting records available to the District, the State, and other parties to the same extent as required pursuant to the Contract Documents for other accounting records related to the Work.

17.18 Changes Required Based on Bid Alternates. Notwithstanding anything to the contrary, the District may issue a Change Order to require any change(s) in the Work or in other requirements of the Contract as specified in any additive or deductive alternates included in the Contractor's bid. If the Contractor fails to agree to a Change Order that would implement any such additive or deductive alternate, the District may issue a unilateral Change Order to implement the required change(s).

17.19 Change Orders Include Full and Final Compensation. Except as expressly set forth in any particular Change Order, each Change Order shall be deemed and construed to include all adjustments to the Contract Price and/or Contract Time attributable to the work and/or other change(s) required pursuant to the Change Order, including, without limitation, any and all extensions of time and overhead, acceleration costs, profit, general conditions costs, expenses, and other direct and indirect costs and expenses of such work and/or changes. In addition, each Change Order shall be deemed and construed to include all necessary adjustments attributable to cumulative impacts of that and any and all preceding Change Orders, whether such impacts relate to scheduling, productivity or other matters. By signing a Change Order, the Contractor shall be deemed and construed to have waived any and all Claims and rights to any adjustments to the Contract Price and/or Contract Time other than as are set forth in the Change Order, and the Contractor may not thereafter attempt to hold the District responsible for any interference, delay, acceleration, or other affect on the Work and/or additional costs attributable to the change(s) required pursuant to the Change Order. The foregoing shall not be deemed to preclude compensation to the Contractor on a time-and-materials, unit-price or similar basis if authorized pursuant to a Change Order.

17.20 Alterations to Directives and Change Orders Prohibited. The Contractor must not alter any Architect Field Directive, Construction Change Directive or executed Change Order, and no such alteration shall be valid or binding in any respect whatsoever on the District or any other party. The Contractor must perform the change(s) required pursuant to any such Architect Field Directive, Construction Change Directive or executed Change Order in strict accordance with the provisions therein, and shall be responsible and liable for any and all costs and/or delays arising from any failure by the Contractor to so perform.

17.21 District Not Liable for Non-Conforming Work. The Contractor shall be responsible and liable for, and District shall not be liable and shall not pay for, any change in the Work if such change is necessary as a consequence of any Work that was negligently performed, is defective, or otherwise does not conform with requirements of the Contract Documents, whether because the Contractor failed to properly coordinate, schedule or supervise such portion of the Work or for any other reason that is not the result of the active negligence or willful misconduct of the District or any of its contract representatives.

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PART 18
FINAL INSPECTION AND COMPLETION OF WORK

18.1 Contractor Must Determine When Work is Complete. The Contractor shall be solely responsible for determining when the Work or any portion thereof is complete, and the Contractor must base any such determination on adequate reviews and inspections of the Work by the Contractor's own forces, rather than relying on representations by any Subcontractor or others. Based on such reviews and inspections, the Contractor must prepare "punch-lists" of items to perform prior to the Work being deemed complete. The Contractor must provide copies of each such punch-list to the Project Manager and the Inspector of Record, and must promptly perform or cause to be performed each item on such punch-lists. At such time as the Contractor reasonably believes that the Work is substantially complete and that all prerequisites set forth in Section 18.2 of these General Provisions have been completed, the Contractor may request an inspection of the Work in accordance with Section 18.3 of these General Provisions.

18.2 Contractor Must Complete Prerequisites Before Inspection. Prior to requesting any inspection, the Contractor, based on its own reviews and inspections as provided in Section 18.1 of these General Provisions, must confirm that, to the extent required by the Contract Documents or the Contractor is otherwise responsible (e.g., repair of damage arising from the Work), all of the following have been satisfactorily performed and completed:

(i) All general construction and all other elements of the Work have been substantially completed, and the Contractor has completed or caused to be completed all items included on the Contractor's punch-lists;

(ii) All water, gas, sewer, electric and other utility facilities, service connections and re-connections, meters, *et cetera*, have been installed and/or completed, tested, and are fully and properly functioning;

(iii) All safety and alarm systems, equipment, fixtures, *et cetera*, have been completed and are fully functioning;

(iv) All mechanical, plumbing, electrical and other building systems, equipment, fixtures, *et cetera*, have been installed, completed, balanced and tested, and are fully and properly functioning, and all testing and balance reports have been provided to the Project Manager;

(v) All electrical circuits, panels, disconnect switches, *et cetera*, are properly labeled;

(vi) All irrigation systems (including, without limitation, timers and pop-up sprinklers) have been completed, tested and are fully and properly functioning, and all planting (including, without limitation, all sod or other turf planting) has been installed and is established;

(vii) All operating instructions for any and all systems, equipment and other things have been properly posted, affixed, *et cetera*, as required pursuant to the Contract Documents;

(viii) All District personnel as required pursuant to the Contract Documents have been adequately instructed and/or trained with respect to the characteristics, maintenance and operation of safety, alarm, mechanical, plumbing, electrical and other systems, and the Contractor has prepared and

provided to the Project Manager a complete list of the names of District personnel instructed and/or trained, the building system(s) and type of instruction and/or training involved, the locations at which such instruction and/or training occurred, and the dates on which such instruction and/or training occurred;

(ix) All doors and windows, including locks, catches and other hardware, have been installed and adjusted, and are fully and properly functioning, with all temporary protective films or other coverings removed, tops and bottoms of doors sealed, all glass and similar surfaces cleaned and streak-free; all finished metal surfaces polished and streak-free;

(x) All painting and special finishes have been applied and have dried or otherwise cured or been completed;

(xi) All damage, as required by the Contract Documents or necessary as a consequence of the Work, has been repaired and/or replaced, including, without limitation, any broken glass replaced; and

(xii) All cleanup as required by the Contract Documents or necessary as a consequence of the Work has been completed, including, without limitation: cleanup pursuant to Section 8.27 of these General Provisions; hard-surface floors waxed and polished; carpets vacuumed; dirt, marks, stains, scratches, superfluous labels, and other foreign matter removed; tools and equipment removed from Project Site; and bare (dirt) areas of Project Site cleaned and raked.

18.3 Contractor's Initial Request for Final Inspection. At such time as the Contractor reasonably believes that the Work is substantially complete and that all prerequisites set forth in Section 18.2 of these General Provisions have been completed, the Contractor must provide to each of the District, Architect, Project Manager and Inspector of Record a copy of: (i) written notice that all Work has been completed and is ready for final inspection; and (ii) an executed copy of the "Certification of Final Inspection" form included in the Required Project Forms. The District, Architect, Project Manager and Inspector of Record will perform such inspection within ten days following receipt of notice from the Contractor, and the Project Manager will notify the Contractor regarding the date and approximate time such inspection is to commence. The Contractor must conduct the examinations of the Work in a logical and sequential manner in order to facilitate an efficient and thorough inspection.

18.4 Requirements for Re-Inspection of Work. If it is determined after the inspection described in Section 18.3 of these General Provisions, or after any subsequent re-inspection of the Work pursuant to this Section 18.4, that the Work is not substantially complete, the District, Architect and/or Project Manager will provide written notice to the Contractor describing the incomplete and/or unsatisfactory portions of the Work. The Contractor must complete and/or correct all such Work within a reasonable time, not to exceed any time limit specified in the notice to the Contractor. Upon completing and/or correcting all such Work, Contractor must submit a new notice and a new Certification of Final Inspection as described in Section 18.3 of these General Provisions, and the re-inspection of the Work shall occur in accordance with the procedures set forth in that Section. The new Certification of Final Inspection must expressly state, in addition to other required elements, that the previously incomplete and/or unsatisfactory portions of the Work have been completed and/or corrected in accordance with the Contract Documents. Nothing shall be deemed or construed to require that any re-inspection of the Work be limited to only any incomplete and/or unsatisfactory portions of the Work previously identified and/or other portions of the Work affected thereby.

18.5 Determination that Work is Substantially Complete. If it is determined after any inspection or re-inspection of the Work pursuant to Section 18.3 or Section 18.4 of these General Provisions that the Work is substantially complete, the District, Architect and/or Project Manager will provide written notice of such determination to the Contractor. In such event, the District, Architect, Project Manager and/or Inspector of Record will also prepare and provide to the Contractor a punch-list of any minor items of the Work that must be completed and/or corrected in order for the Work to be fully completed and accepted by the District ("Remaining Work").

18.6 Contractor Must Timely Complete Remaining Work. The Contractor must complete any and all Remaining Work within fourteen days of receiving the punch-list described in Section 18.5 of these General Provisions. If the Contractor fails to complete and/or correct the Remaining Work within the permitted fourteen-day period, the District may: (i) withhold from the final payment to Contractor an amount equal to 150% of the Architect's estimate of the total cost to correct and/or complete all Remaining Work; and (ii) cause such Remaining Work to be completed and/or corrected and, thereafter, deduct the costs thereof from the amount withheld.

18.7 Contractor Request for Final Walk-Through. At such time as the Contractor reasonably believes that all Remaining Work has been adequately completed, the Contractor must provide a written request to the District, Architect, Project Manager and Inspector of Record for a final walk-through inspection. The Project Manager will coordinate and schedule the final walk-through inspection. The purpose of the final walk-through inspection will be to confirm that all Remaining Work has been completed in accordance with the Contract Documents or as otherwise required. At such time as the District, Architect, Project Manager and Inspector of Record determine that all Remaining Work has been completed in accordance with the Contract Documents or as otherwise required, and any and all other requirements of the Contract Documents have been satisfied, the District will provide written notice thereof to the Contractor. The District will recommend that the District Board accept the Work as complete only as provided in Section 18.9 of these General Provisions.

18.8 Contractor Responsible for Certain Inspection Costs. In requesting any walk-through or other inspection of the Work or any portion thereof, the Contractor must have a good-faith belief that the Work or portion thereof has been fully and properly completed and is ready for inspection, based on the Contractor's own reviews and inspections of the Work performed in accordance with Section 18.1 of these General Provisions. The Contractor shall be solely responsible and liable for any and all costs (including, without limitation, costs of Architect, Project Manager and/or Inspector of Record services, administrative costs, consultant fees, transportation costs, *et cetera*) if the Contractor at any time requests an inspection of any portion of the Work and: (i) it is reasonably apparent that such portion of the Work is not complete and ready for inspection; (ii) in the reasonable opinion of the District, Architect, Project Manager or Inspector of Record, the Contractor is using the inspection as a means to define or determine the scope of such Work or the scope of the uncompleted portions of such Work; (iii) in the reasonable opinion of the District, Architect, Project Manager and/or Inspector of Record, the Contractor is using the inspection as a means to accelerate the Work of any Subcontractor; (iv) the Work fails to pass the inspection due to any negligence or misconduct of the Contractor or any Subcontractor or other person or entity on, at or in the vicinity of the Project Site on account of the Work; (v) Work noted as incomplete and/or unsatisfactory during a prior inspection is not reasonably complete and/or satisfactory upon re-inspection; or (vi) the Work is not ready for inspection and it is reasonably apparent that, for any other reason, the Contractor did not request the inspection in good faith. Any such costs shall be charged to the Contractor and/or deducted from amounts otherwise payable to the Contractor pursuant to the Contract.

18.9 Acceptance of the Completed Project. After the entirety of the Project has received final walk-through inspection approval, the completed Project must be accepted by action of the District Board. The District will cause a "Notice of Completion" for the Project to be recorded within ten days after the date the District Board takes such action to accept the Project (herein, the "Project Acceptance Date").

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PART 19
CLOSE-OUT OF THE WORK

19.1 Close-Out Submittals are Prerequisite to Final Payment. Within ten days of receiving notice in accordance with Section 18.5 of these General Provisions that the Work is substantially complete ("Substantial Completion Date"), the Contractor must submit to the Project Manager all documents and other things required pursuant to this Part 19 that are within or associated with the scope of the Work, or are otherwise to be provided in connection with the Work. The requirements of this Part 19 shall be deemed and construed to be in addition to, and not in lieu of, any and all other close-out requirements set forth in the Contract Documents. Notwithstanding anything to the contrary, the District shall not be required to make the final payment to the Contractor in accordance with the Contract unless and until the Contractor submits to the Project Manager all documents and other things required pursuant to this Part 19.

19.2 Record Drawings and Specifications. The Contractor must obtain final approval of the Record Drawings and Specifications from the Architect, Project Manager and Inspector of Record. After obtaining such approval, the Contractor must employ a competent draftsperson to: (i) transfer the as-built information to Drawings on electronic files using the most current version of AutoCAD or other commonly-used program as directed or approved by the Architect; and (ii) prepare a complete set of as-built Drawings on transparent sepia or, if approved by the Architect, reproducible bond paper. Upon completing the electronic as-built Drawings and the sepia as-built Drawings, the Contractor must submit to the Project Manager: (i) three copies of the Record Drawings and Specifications approved by the Inspector of Record that have been certified by the Contractor as being complete and fully and accurately representing the as-built condition of the Work; (ii) an archive-quality "CD" containing the as-built Drawings as electronic files; and (iii) the complete set of sepia or bond-paper copies of the as-built Drawings.

19.3 Project-Related Documents. The Contractor must prepare and submit to the Project Manager two sets of archive-quality CDs, each identical and each containing indexed electronic copies of any and all Contract Documents, Addenda, Change Orders, Architect Field Directives, Construction Change Directives, other documents that modify the Contract, approved shop drawings, product data sheets, samples, other submittals of the Contractor, RFIs, RFPs, Change Order Requests, Claims, correspondence, and other documents generated during the course of the Work or otherwise in connection with the Work.

19.4 Equipment Operations and Maintenance Manuals.

19.4.1 Required Contents. The Contractor must obtain and submit to the Project Manager four complete sets of: (i) manufacturer's manuals and/or instructions for operation, maintenance and repair of any and all systems, equipment, assemblies, and similar things incorporated into the Work, including, without limitation, any parts lists; (ii) any and all reports and other information resulting from any required commissioning, testing, balancing, *et cetera*, of such systems, equipment and other things; (iii) information (including, without limitation, contractor's license numbers, business license numbers, current addresses, telephone and facsimile numbers, and e-mail addresses) identifying any and all Subcontractors and/or vendors associated with the purchase, installation, commissioning, testing and/or guarantee of such systems, equipment and other things; (iv) manufacturer guarantees and/or warranties for such systems, equipment, assemblies and other things; (v) assignments of all guaranties and warranties from Subcontractors, materialmen and other persons and entities that furnished any labor, materials, services, goods or other things in connection with the Work; and (vi) any other associated information required by the Contract Documents.

19.4.2 Required Format. The Contractor must have each set of the documents described in Subsection 19.4.1 of these General Provisions collated into one or more white-colored three-ring binders, in a logical and sequential order, with each manual or other section of information marked with labeled tabs, and an index of the tabs included in the front of each binder. To the extent possible, all information relating to any one system, piece of equipment, or other thing must be grouped together in a logical manner. The spine of each binder also must have a label that specifies the project title and number, identifies the contents of the binders as "Equipment Operations and Maintenance Manuals," specifies the set and binder number (e.g., "Set 1, Binder 1," "Set 1, Binder 2," *et cetera*).

19.4.3 Required Correction and Certification. The Contractor must certify in writing that each set of binders is complete, accurate, and covers all of the Work, and such certification must be included immediately after the index page in each binder, and must be separately tabbed and indexed. Upon receipt, the Project Manager shall review the binders. If the Project Manager determines that the binders are not complete or otherwise must be corrected, the Project Manager will return all sets of the binders to the Contractor for correction. The Contractor must correct, re-certify, and return all four sets of binders to the Project Manager within five days.

19.5 Special Guarantees and Warranties. The Contractor must submit to the Project Manager, to the extent not included in the submittals required pursuant to Section 19.4 of these General Provisions, any and all: (i) special guaranties and warranties required by the Contract Documents; and (ii) assignments of guaranties and warranties from Subcontractors, materialmen and others required by the Contract Documents. The Contractor must label, tab and otherwise organize such information so that the systems, equipment and/or other things to which they apply can easily and unambiguously be identified.

19.6 Identification-Tag Log. The Contractor must submit to the Project Manager a log or schedule of any and all equipment, valves, pipes, connections, meters and/or other things that are required by the Contract Documents or any applicable law, rule, regulation, ordinance or other governmental requirement to be tagged or labeled. The Contractor must label, tab and otherwise organize such information so that the systems, equipment and/or other things to which they apply can easily and unambiguously be identified.

19.7 Keys for Doors, Panels, Cabinets, Et Cetera. If not expressly set forth in the Contract Documents in any particular case, the Contractor must submit to the Project Manager two sets of keys for each door, access panel, cabinet, gate, equipment cover, and other thing having any locking mechanism and/or capable of being locked. Each key must be securely attached to a fob or have some other means of securely attaching a label, other than attaching a label directly to the key. The description on the fob or label of each key must adequately identify the key, and all keys must be logged on a keying schedule or index that will permit the District to easily and unambiguously identify the doors, equipment and/or other things that are opened or operated by the keys. If the Specifications provide for electronic "key card" or similar systems, the Contractor must comply with all requirements of the Contract Documents or the Project Manager relating to identifying, logging or scheduling, and providing key cards or similar items to the District.

19.8 Tools, Spare Parts, Et Cetera. The Contractor must submit to the Project Manager any and all tools, spare parts, "attic" stock, *et cetera*, required pursuant to the Contract Documents. The Contractor must label, tab and otherwise organize such items so that the systems, equipment and/or other things to which they apply can easily and unambiguously be identified. In the event any spare parts, attic stock, or other item(s) reasonably would be too large, too heavy or in too great a quantity, to physically submit to the

Project Manager, the Contractor must, subject to approval by the Project Manager, specify, on a log or schedule, all such items and their respective storage locations on the Project Site, and provide four copies of such log or schedule to the Project Manager.

19.9 DSA Close-Out Materials. The Contractor must, as applicable, obtain, complete and/or prepare, and must submit to the Project Manager, any and all forms, records and/or other documents required by the DSA in connection with close-out by the DSA of the Work and/or the Project. If the Contractor has questions as to what DSA requirements are applicable, the Contractor may contact the DSA or may request through the Project Manager that the Architect advise the Contractor as to DSA requirements. However, in no event shall the District, Architect, Project Manager or the Inspector of Record be responsible or liable for inaccurate or incorrect information provided to the Contractor if the Architect provided such information in good faith.

19.10 Other Contract Document Close-Out Requirements. The Contractor, to the extent not already described in this Part 19, must as applicable obtain, complete and/or prepare, and must submit to the Project Manager, any and all close-out submittals and/or information required pursuant to any other requirement of the Contract Documents.

19.11 Contractor Guarantee. The Contractor must provide to the Project Manager an executed copy of the "Contractor Guarantee" form included in the Required Project Forms.

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PART 20
CONTRACTOR GUARANTEE OF WORK

20.1 No Waiver of District Rights. In no event shall any payment to the Contractor, provision of the Contract Documents, Notice of Completion, or use or occupancy of any portion of the Work or the Project, be deemed or construed: (i) to relieve the Contractor of any responsibility and/or liability for any defective or improper systems, equipment, materials or other things incorporated into the Work or for faulty workmanship in performing the Work; (ii) to constitute acceptance by the District, without recourse, of any Work not performed in accordance with the Contract Documents and all laws, rules, regulations, ordinances and other governmental and quasi-governmental requirements applicable to the Work; or (iii) to constitute a waiver of any right the District has to hold the Contractor responsible and/or liable for any such Work.

20.2 Contractor's General Guarantee of Work. In addition to any other guarantees or warranties of the Contractor pursuant to the Contract Documents, the Contractor hereby guarantees that, during the applicable Guarantee Period: (i) all Work shall have been performed in accordance with all requirements of the Contract Documents and shall be free of defective or improper systems, materials and other things, and free of faulty workmanship; and (ii) if it is determined during the applicable Guarantee Period that any Work does not conform to the requirements of the foregoing clause (i), the Contractor will repair, replace or otherwise correct the affected portion of the Work as provided in this Part 20 ("Contractor Guarantee"). Without limiting the foregoing, the Contractor Guarantee shall be deemed and construed to guarantee against any and all defects that may arise from any error or fault in any design(s) for which the Contractor was responsible in accordance with the Contract Documents, including, without limitation, any design provided by or through any Subcontractor or other person or entity in connection with the Work. No failure by the Inspector of Record or any other party to inspect or properly inspect any portion of the Work shall be deemed or construed to limit or otherwise condition the Contractor's responsibilities and/or liabilities pursuant to the Contractor Guarantee.

20.3 Limitations on Contractor Guarantee. The Contractor Guarantee does not guarantee against damage to the Work: (i) caused by the District or any persons or entities other than the Contractor or any Subcontractor or other person or entity on, at or in the vicinity of the Project Site on account of the Work; (ii) resulting from a lack of reasonable maintenance after the Substantial Completion Date; or (iii) resulting from changes to the Work performed by any persons or entities for whom the Contractor is not directly or indirectly responsible, unless the changes were performed in accordance with the Contract Documents and/or instructions or directions provided by the Contractor.

20.4 Applicable Guarantee Periods. Except as the Contract Documents otherwise provide, the Contractor Guarantee shall be and remain in effect at all times during the period ("Guarantee Period") that commences on the Substantial Completion Date and ends on the sooner of: (i) the date that is one year after the Project Acceptance Date; or (ii) the date that is two years after the Substantial Completion Date. The foregoing definition of the Guarantee Period shall be deemed and construed to apply to the Work generally, and shall not be deemed or construed to supersede or limit any provision of the Contract Documents that specifically requires a longer Guarantee Period. In no event shall any applicable Guarantee Period serve as a limitation with respect to latent defects in the Work, which remain subject to applicable statute(s) of limitation.

20.5 Specific Guarantee Periods for HVAC and Roofing. The Guarantee Period for all heating, ventilation and air conditioning equipment, controls, *et cetera*, shall start when such portion of the Work first

commences and shall end on the sooner of: (i) the date that is two years after the Project Acceptance Date; or (ii) three years after the Substantial Completion Date. The Guarantee Period for all roofing materials, membranes, sheet-metal, *et cetera*, shall start when such portion of the Work first commences and shall end on the date that is five years after the Substantial Completion Date.

20.6 Manufacturer and Other Third-Party Guarantees. The Contractor Guarantee shall be deemed and construed to apply to the Work generally, and in no event: (i) shall the Contractor Guarantee be deemed or construed to limit, in any manner, any manufacturer or other third-party guarantee or warranty (including, without limitation, any that have a longer applicable Guarantee Period); or (ii) shall any such manufacturer or other third-party guarantee or warranty relieve the Contractor from its responsibilities and/or liabilities pursuant to the Contractor Guarantee. At all times while the Contractor Guarantee is in effect during an applicable Guarantee Period, but not thereafter, the Contractor must assist the District in processing any manufacturer and other third-party guarantee or warranty claims with respect to systems, equipment, materials and/or other things incorporated into the Project as part of the Work.

20.7 Guarantee Work by Contractor. Not later than ten days after written notice from the District, the Contractor, at no cost to the District, must repair, replace or otherwise correct: (i) any defective, improper or otherwise faulty Work that is discovered or revealed during any applicable Guarantee Period; and (ii) any systems, equipment, materials and/or other things damaged, destroyed or otherwise disturbed as a consequence of the repair, replacement or other correction of the defective, improper or faulty Work (collectively, "Guarantee Work"). All such Guarantee Work must result in a repair, replacement or other correction that satisfies all requirements of the Contract Documents or otherwise must be completed in accordance with District requirements. The Contractor must coordinate all Guarantee Work with the District in order to avoid interfering with District operations and/or endangering any person(s) at the Project Site. If the Contractor timely commences any Guarantee Work, but the Guarantee Work reasonably cannot be completed within ten days of notice from the District, the District shall permit a reasonable time for completion of the Guarantee Work, but not in excess of twenty days. The Contractor must provide written notice to the District upon completing any Guarantee Work.

20.8 District Performance of Guarantee Work. The District may at any time cause any required Guarantee Work to be performed, as reasonably determined by the District, if: (i) the Contractor has failed to undertake and/or complete the Guarantee Work within the time permitted pursuant to Section 20.7 of these General Provisions; or (ii) as reasonably determined by the District, an Emergency situation exists and the delay that would result from providing notice to the Contractor and permitting the Contractor to perform the Guarantee Work would endanger or further endanger any person(s) or property. The costs of any such Guarantee Work incurred by the District shall be assessed against the Contractor, and shall accrue interest at the maximum legal rate permitted in the State. In no event shall the District causing any Guarantee Work to be performed in accordance with this Section 20.8 be deemed or construed to limit or otherwise condition the responsibilities and/or liabilities of the Contractor pursuant to the Contractor Guarantee.

20.9 Two-Year Extended Guarantee Period After Guarantee Work. Regardless of whether any Guarantee Work is performed pursuant to Section 20.7 or Section 20.8 of these General Provisions, the applicable Guarantee Period shall be extended by the amount of time necessary to result in the Guarantee Period remaining in effect for a period of two years after the date the Guarantee Work is completed and accepted by the District. Any such extended Guarantee Period shall be applicable to: (i) the system, equipment, material and/or other thing that was repaired, replaced, or otherwise corrected; and (ii) any other of the same or substantially similar systems, equipment, materials and/or other things incorporated

into the Work. The foregoing shall not be deemed or construed to result in the shortening of any Guarantee Period otherwise applicable to the Work or any portion of the Work.

20.10 Warranty of Title to Work. The Contractor further warrants that title to all systems, equipment, materials and other things incorporated into Work (and, as expressly agreed by the District in writing, any such things purchased by the Contractor and to be owned by the District prior to incorporation as described in Sections 21.5 or 21.6 of these General Provisions) will pass to the District upon receipt of payment by Contractor, free and clear of all claims, liens, stop notices, security interests, charges, *et cetera* (for purposes of this Section 20.10, each a "lien"). To the extent provided in Part 23 of these General Provisions, the Contractor shall: (i) indemnify, defend and hold harmless the District against and with respect to any and all such liens; and (ii) pay any judgment for which the District is held responsible, and all related costs and expenses, including, without limitation, any attorneys' fees, arising from any actions or other legal proceedings brought to enforce any such liens. The foregoing shall not be deemed or construed to: (i) prohibit the Contractor from asserting any Claim in accordance with the Contract Documents; or (ii) require that the Contractor deliver to the District title to any utility metering devices or similar equipment owned by any public or private utility company or service and installed as part of the Work for purposes of providing permanent utilities or services to or for the Project.

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PART 21
PROGRESS PAYMENTS AND FINAL PAYMENT

21.1 Maximum Amount Payable to Contractor. The Contract Price, as adjusted in accordance with the provisions of the Contract Documents, shall be the maximum amount payable to the Contractor for performance of the Work or, in any case, pursuant to the Contract.

21.2 Contractor Must Propose a Schedule of Values.

21.2.1 Within ten days of the date of the Notice of Award or prior to the Commencement Date, whichever is sooner, the Contractor must submit to the District, Architect, Project Manager and Inspector of Record a proposed schedule of the values allocated to the various portions of the Work ("Schedule of Values"), which must, among other things:

(i) list the true actual cost (in dollars) of each separate activity and item included within the Work for which payment will be requested;

(ii) specify the amounts (in dollars) of overhead, profit, any costs of "general conditions" for which the Contractor is responsible, and similar cost-items allocated to each activity and item included in the Work;

(iii) separately itemize rough and finish work for the basic trades;

(iv) specify individual dollar amounts for "large dollar" purchases, including, without limitation, systems, equipment, materials and/or other things to be incorporated into the Work;

(v) allocate a dollar amount equal to not less than five percent of the Contract Price to the close-out activities specified in Part 19 of these General Provisions; and

(vi) consistent with the approved Master Construction Schedule, specify the projected total dollar amounts payable to the Contractor each month during the course of the Work.

21.2.2 The dollar amounts allocated for overhead, profit, general conditions costs and similar cost-items must, as noted above, be allocated in the Schedule of Values to each particular activity and item; provided that the District, in its sole discretion, may consent to general conditions costs being allocated on a pro-rata basis over the time for completion of the critical-path construction of the Work, as such critical path is set forth in the Master Construction Schedule. However, at any time the District reasonably determines that the progress of the critical-path portion of the Work is insufficient in comparison to what is specified in the then-applicable Master Construction Schedule, the District may adjust the payment of general conditions costs to match the percentage of the Work then complete, including, without limitation, retaining appropriate portion(s) of payments otherwise due to the Contractor.

21.2.3 The Contractor must not "front-load" the Schedule of Values by allocating increased or otherwise false dollar amounts to activities and/or items required to be performed in the early stages of the Work, and the District, in its sole discretion, may use the values allocated in the Schedule of Values as costs of activities and/or items that are eliminated from the scope of the Work.

21.2.4 The Contractor must submit its proposed Schedule of Values with: (i) such documentary or other supporting evidence as reasonably supports and substantiates the allocations of values to the various portions of the Work; and (ii) a listing of all Subcontractors, materialmen, and other persons and entities that will be providing any labor, materials, equipment or other things for incorporation into the Work, including name, address, telephone number, facsimile number, e-mail address, State contractor license number and/or business license number, classification or type of work, material or other thing being provided, and total cost.

21.2.5 The Contractor must submit the Schedule of Values and other information required pursuant to this Section 21.2 on such forms or software programs (e.g., Microsoft Project, Prolog, Expedition or Primavera) as approved in advance by the Project Manager.

21.3 Contractor Must Obtain Approval of Schedule of Values. The primary purpose of the Schedule of Values is to serve as one basis for reviewing each Progress Payment Request submitted by the Contractor. Therefore, the Schedule of Values is subject to reasonable approval by the District, Architect, Project Manager and Inspector of Record, and the District shall not be required to make any payment to the Contractor unless and until the Contractor has obtained approval of an acceptable Schedule of Values. Upon receiving the proposed Schedule of Values, the District, Architect, Project Manager and Inspector of Record shall review the Schedule of Values to determine if it: (i) encompasses all of the various portions of the Work; (ii) appropriately itemizes all activities and/or items included within the scope of the Work; and (iii) constitutes a fair and accurate allocation of the values of the various elements of the Work. The District, Architect, Project Manager and/or Inspector of Record may require that the Contractor modify the Schedule of Values as they determine are reasonably necessary. If the Schedule of Values is returned to the Contractor for any such modifications, the Contractor must modify and resubmit the Schedule of Values within two days. If the Contractor objects to any such required modification, the Contractor must, within such two-day period, provide any additional information to the District, Architect, Project Manager and Inspector of Record that the Contractor believes supports and substantiates that the modification is not necessary. The Architect's decision regarding any such disputed modification shall be final and binding.

21.4 Contractor Must Monitor and Update Schedule of Values. The Contractor must update the Schedule of Values from time to time as reasonably necessary during the course of the Work, but in no event less than once per month or less than fourteen days prior to when amounts allocated in the Schedule of Values are to become due and payable. In each such update, the Contractor must identify and account for any changes in the Schedule of Values arising from delays, changes in the Work required by any Construction Change Directives or Change Orders, changes in the Master Construction Schedule, *et cetera*. The Contractor must submit each update to the Schedule of Values for approval in accordance with the requirements set forth in Section 21.3 of these General Provisions that are applicable to the initial proposed Schedule of Values.

21.5 Payment for On-Site Materials Not Incorporated into Work. Notwithstanding anything to the contrary, the District shall not be required to pay the Contractor for any systems, equipment, materials or other things that have been purchased by the Contractor and stored on, at or in the vicinity of the Project Site, but not incorporated into the Work. However, if the Contractor so requests, the District, in its sole discretion and subject to consultation with the Architect, Project Manager and/or Inspector of Record, may agree to pay for any such things purchased by the Contractor and properly and securely stored on the Project Site. In such event, title to such things shall be deemed and construed to pass to the District as provided in Section 20.10 of these General Provisions, but in no event shall any such agreement by the District constitute

acceptance of any system, equipment, material or other thing that does not conform to all requirements of the Contract Documents. Regardless of whether or not the District purchases any system, equipment, material or other thing in accordance with this Section, the Contractor shall at all times retain full responsibility, liability and risk of loss for any and all such things stored on, at or in the vicinity of the Project Site, but not incorporated into the Work (including, without limitation, for any applicable insurance deductible or if, for any reason, such things are not covered by insurance) and for completing the Work in accordance with all applicable requirements of the Contract Documents.

21.6 Payment for Specially Manufactured Items Stored Off-Site. Notwithstanding anything to the contrary, the District shall not be required except as provided in this Section 21.6 to pay the Contractor for any systems, equipment, materials or other things that have been purchased by the Contractor and stored off of the Project Site. The Contractor shall retain full responsibility and liability for any such things at all times, and for completing the Work in accordance with all applicable requirements of the Contract Documents. However, if the Contractor so requests, the District, in its sole discretion and subject to consultation with the Architect, Project Manager and/or Inspector of Record, may agree to pay for custom-made or special order items (including, without limitation, structural steel, electrical panels, *et cetera*) stored off of the Project Site, but only if the Contractor provides documentary evidence acceptable to the District that:

(i) the total cost of the items, plus the cost of any other systems, equipment, materials or other things stored off of the Project Site for which the District has paid, does not exceed $100,000 or such greater amount as agreed by the District in its sole discretion;

(ii) the items are stored in a bonded warehouse that adequately protects the items from diversion, destruction, theft and damage; are segregated from other systems, equipment materials, and other things in the warehouse; and are conspicuously labeled or marked as intended for use on the Project;

(iii) the District has the right to inspect the items and the storage location at any reasonable time;

(iv) the Contractor has insured the items for their full replacement value, the District is named as an additional insured, and all other terms of the insurance are acceptable to the District;

(v) the Contractor's surety has consented to the Contractor being paid for the items prior to the items being delivered to the Project Site; and

(vi) upon payment by the District, title to the items shall pass to the District, as evidenced by recorded financing statements, UCC searches, *et cetera*.

21.7 Contractor Must Arrange Progress Payment Review Meetings. The Contractor must arrange to meet at the Project Site with the Project Manager and the Inspector of Record in advance, but not more than five days in advance, of submitting each Progress Payment Request (other than the final Progress Payment Request), to review and discuss the Work for which the Contractor intends to seek payment in such Progress Payment Request (each a "Progress Payment Review Meeting"). The Project Manager will provide notice of the date and time of each Progress Payment Review Meeting to the District and Architect, and either or both may also attend the Progress Payment Review Meeting. The Contractor must provide to the meeting attendees, at the beginning of each Progress Payment Review Meeting, a comprehensive list of the

Work that the Contractor intends to include within the scope of the Progress Payment Request. Upon request, the Contractor must show such Work to the meeting attendees (including, without limitation, items not yet incorporated into the Work, but for which the Contractor intends to seek payment) and respond to relevant questions. If the District, Architect, Project Manager or Inspector of Record requests additional documentary or other support of the proposed Progress Payment Request, the Contractor must submit such documentary or other support with the Progress Payment Request submitted in accordance with Section 21.8 of these General Provisions. Such documentary or other support may include, without limitation, purchase invoices, rental receipts, delivery slips, certified payroll records, *et cetera*.

21.8 Contractor Submittal of Progress Payment Requests.

21.8.1 Timing and Content of Progress Payment Request.

21.8.1.1 Not later than the seventh day of each month during the course of the Work or within such other time period as may be specified in the Special Provisions, the Contractor must submit to the Architect a written request for payment on account of the Work completed during (or, if not previously compensated, prior to) the immediately preceding month (each a "Progress Payment Request"). A Progress Payment Request must not include amounts attributable to Work not yet performed, and the payment amounts requested for completed Work must be consistent with values assigned to such Work in the Schedule of Values. Each Progress Payment Request must be submitted on a copy of the "Progress Payment Request" form included in the Required Project Forms or using such other form as may be specified in the Special Provisions.

21.8.1.2 The Contractor must specify in each Progress Payment Request form:

(i) the total amount of the payment requested for the Work covered by the Progress Payment Request;

(ii) the portion of the requested payment amount attributable to each of the activities and items, as set forth in the Schedule of Values, included in the Work covered by the Progress Payment Request;

(iii) the portion of the requested payment amount attributable to each Subcontractor, materialman, and other person or entity that has furnished labor, material and/or equipment in connection with the Work covered by the Progress Payment Request; and

(iv) the total balance due to each such Subcontractor, materialman and other person or entity after payment, if any, is made to them on account of the Progress Payment Request.

21.8.1.3 As additional information intended to assist in review of Progress Payment Requests, and regardless of the Schedule of Values not including values allocated on a pro-rata basis unless the District consents, the Contractor must with each Progress Payment Request provide a reasonable, good-faith written estimate, in relation to all Work required pursuant to the Contract Documents, of:

(i) the cumulative percentage of the Work completed as of the end of the payment period covered by the Progress Payment Request;

(ii) the cumulative percentage of the Contract Amount allocable to the Work completed as of the end of the payment period covered by the Progress Payment Request; and

(iii) the cumulative percentage of each of the overhead, profit, general conditions costs, and similar cost-items allocable to the Work completed as of the end of the payment period covered by the Progress Payment Request.

21.8.1.4 No Progress Payment Request shall be deemed or construed to constitute a complete and valid request for progress payment unless and until: (i) the Progress Payment Request satisfies the foregoing requirements of this Subsection 21.8.1; (ii) the Contractor submits to the Architect the Progress Payment Request and all materials required pursuant to Subsection 21.8.2 (or, if applicable, Subsection 21.8.3) of these General Provisions; and (iii) the Contractor provides copies of the Progress Payment Request and all such materials as specified in Subsection 21.8.4 of these General Provisions.

21.8.2 Materials to be Submitted with Progress Payment Request. The Contractor must submit, with each Progress Payment Request, all of the following:

(i) an updated Master Construction Schedule showing changes from the last previously updated and approved Master Construction Schedule;

(ii) an updated Schedule of Values covering the payment period, as adjusted on account of any updates to the Master Construction Schedule made during the payment period;

(iii) a cumulative list of all systems, equipment, materials and other things stored off of the Project Site for which the District has paid (or upon payment, will have paid) as authorized pursuant to Sections 21.5 or 21.6 of these General Provisions as of the end of the payment period, which, for each such thing, must also identify the storage location and cost of the thing;

(iv) copies of all permits or other governmental licenses and approvals relating to the Work that were obtained or issued during the payment period;

(v) all information and the certification required pursuant to Subsection 3.9.3 of these General Provisions relating to as-built Work implemented during the payment period;

(vi) if specifically requested by the Project Manager, copies of certified payroll records covering the period since the prior Progress Payment Request;

(vii) conditional and unconditional waivers and releases as required pursuant to Section 21.9 of these General Provisions; and

(viii) an executed copy of the "Certification of Progress Payment Request" form included in the Required Project Forms.

21.8.3 Final Progress Payment Request. Notwithstanding the requirements set forth in Subsection 21.8.1.1 of these General Provisions relating to the timing for submitting Progress Payment Requests, the Contractor may submit a final Progress Payment Request to the Architect only after the District Board has accepted all of the Work in accordance with Section 18.9 of these General Provisions. The Contractor must specify in the final Progress Payment Request that Contractor is seeking final payment in the form of a release of all Retention. The Contractor must, as applicable, submit with the final Progress

Payment Request all of the materials specified in clauses (iv) through (viii), inclusive, of Subsection 21.8.2 of these General Provisions.

21.8.4 Copies of Progress Payment Requests and Supporting Materials. At the same time that it submits any Progress Payment Request to the Architect pursuant to this Section 21.8, the Contractor must submit to each of the District, Project Manager, and Inspector of Record, a copy of the Progress Payment Request and all materials required pursuant to Subsection 21.8.2 (or, if applicable, Subsection 21.8.3) of these General Provisions.

21.9 Requirement for Progress Payment Waivers and Releases. With each Progress Payment Request that it submits in accordance with this Part 21 (other than for the final Construction Progress Payment), the Contractor must also submit an executed copy of the "Conditional Waiver and Release (Progress Payment)" form included in the Required Project Forms, and, except as provided in this Section 21.9, an executed copy of the "Unconditional Waiver and Release (Progress Payment)" form included in the Required Project Forms, for each of the Contractor and each Subcontractor, materialman or other person or entity that provided any labor, services, materials or equipment in connection with the Work described in the Progress Payment Request. A person's or entity's Conditional Waiver and Release (Progress Payment) must conditionally waive all lien and stop notice rights against the District, the Project Site and the Project, with respect to all payments to be made to such person or entity on account of the Progress Payment Request. A person's or entity's Unconditional Waiver and Release (Progress Payment) must unconditionally and irrevocably waive all lien and stop notice rights against the District, the Project Site and the Project, with respect to all payments actually made to such person or entity on account of any prior Progress Payment Request. The Contractor must submit an Unconditional Waiver and Release (Progress Payment) for any person or entity in connection with a Progress Payment Request only if such person or entity was paid any funds on account of any prior Progress Payment Request for which the person or entity has not already submitted an Unconditional Waiver and Release (Progress Payment). Each Conditional Waiver and Release (Progress Payment) and Unconditional Waiver and Release (Progress Payment) must be duly-executed and must contain an original signature of the person who has executed it.

21.10 Summary of Public Contract Code Section 20104.50. The State Legislature enacted Public Contract Code Section 20104.50 to ensure that contractors on certain public works projects are timely paid for their services on such projects. If a local public agency fails to pay an undisputed and properly submitted payment request within thirty days, the agency must pay interest at the legal rate set forth in subdivision (a) of Section 685.010 of the Code of Civil Procedure. Each agency must review payment requests as soon as practicable to determine if they are proper and suitable for payment. If a payment request is not proper, the agency must return it to the contractor within seven days, specifying in writing the reasons why it is not proper. If the agency returns an improper payment request to the contractor more than seven days after receipt, the number of days available to the agency to make payments without incurring interest will be reduced by the number of days by which the agency exceeds the seven-day return requirement. The provisions of this Part 21 encompass, among other things, the requirements of Public Contract Code Section 20104.50

21.11 Contractor Compliance a Condition Precedent. Upon receipt from the Contractor of a complete and valid Progress Payment Request, the District, Architect, Project Manager and Inspector of Record will concurrently commence review of the Progress Payment Request. However, notwithstanding the foregoing or anything else to the contrary, the District shall not be required to process or make any payment pursuant to any Progress Payment Request if the Contractor, at such time, has not complied with any lawful

and otherwise proper direction(s) of the District, Architect, Project Manager or Inspector of Record that relates to the Work, the Project Site or the Project.

21.12 Review by Project Manager and Inspector of Record. Within three days after receiving a Progress Payment Request as described in Section 21.11 of these General Provisions, the Project Manager and Inspector of Record will each provide written notice to the District and Architect regarding whether they approve or disapprove the Progress Payment Request, in whole or in part. The foregoing requirement is not jurisdictional, and the Contractor shall have no recourse if the Project Manager and/or Inspector of Record fail to provide notice within the three-day period. If the Project Manager and/or Inspector of Record approve any Progress Payment Request in its entirety, they will sign the Progress Payment Request and submit it and the notice to the District and the Architect. If the Project Manager and/or Inspector of Record approve only a portion of any Progress Payment Request, they will note the limitation on approval on the Progress Payment Request, sign it, and submit it and the notice to the District and the Architect. If the Project Manager and/or Inspector of Record disapprove any Progress Payment Request, in whole or in part, they will submit it and the notice to the District and the Architect, with a separate reasonably-detailed description of the reason(s) for recommending such disapproval.

21.13 Architect Decisions Regarding Progress Payment Requests.

21.13.1 Architect Review of Recommendations. The Architect shall review any recommendations from the Project Manager and/or Inspector of Record provided pursuant to Section 21.12 of these General Provisions. If the Project Manager and/or Inspector of Record recommend disapproval of all or a portion of any Progress Payment Request, the Architect, to the extent it deems reasonably necessary, will: (i) review the reasons the Project Manager and/or Inspector of Record have recommended disapproval; (ii) request additional information from the District, Project Manager, Inspector of Record, Contractor and/or any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work; and/or (iii) undertake such other actions as will permit the Architect to determine if there is any justifiable reason for such disapproval. The Architect's decision regarding whether any justifiable reason exists to disapprove all or a portion of a Progress Payment Request shall be final and binding.

21.13.2 Notice of Approval or Disapproval. Within seven days after receipt from the Contractor of a complete and valid Progress Payment Request, or as soon thereafter as reasonably practicable, the Architect will provide written notice to the District, Project Manager, Inspector of Record and the Contractor regarding whether the Architect approves or disapproves the Progress Payment Request, in whole or in part.

21.13.3 Certification of Payment Upon Approval. If the Architect approves any Progress Payment Request in whole or in part, the Architect will concurrently submit to the District a written certification of the amount(s), based on the percentage of completion of the Work as of the date of the Progress Payment Request, that is payable to the Contractor on account of such Work ("Certification of Payment"). Each Certification of Payment will certify, to the best of the Architect's knowledge, information, and belief, and based on the Architect's observations and inspections, and data in the Architect's possession, that all Work covered by the Progress Payment Request has been completed in accordance with the Contract Documents.

21.13.4 Rejection and Resubmittal of Progress Payment Requests. If the Architect disapproves all or any portion of any Progress Payment Request, then, with the notice required pursuant to

Subsection 21.13.2 of these General Provisions, the Architect will return the Progress Payment Request to the Contractor with a written statement setting forth the reason(s) why it was rejected. The Contractor may correct the deficiencies in any disapproved Progress Payment Request and resubmit it without delay, but otherwise in accordance with Section 21.8 of these General Provisions. In applicable cases, the Architect will provide to the District, with the Certification of Payment for a resubmitted Progress Payment Request, a written notice specifying the number of days by which the Architect exceeded the seven-day return requirement.

21.14 Withholding of Retention from Payments to Contractor. In addition to any amount(s) withheld from any Construction Progress Payment in accordance with Section 21.15 of these General Provisions, the District shall withhold from each Construction Progress Payment (other than the final Construction Progress Payment) an amount equal to five percent of the total payment amount specified in the applicable Certification of Payment as security for adequate performance under the Contract ("Retention"). Notwithstanding the foregoing, after the Work is at least fifty percent complete, if the District Board determines that the Work is satisfactorily progressing, the District Board, in its sole discretion, may pay some or all of the remaining Construction Progress Payments (other than the final Construction Progress Payment) in full to the Contractor. Subject to the District's right to withhold some or all of the Retention pursuant to Section 21.15 of these General Provisions or otherwise as provided by the Contract or applicable law, the District will pay the Retention to the Contractor, as the final Construction Progress Payment, pursuant to Section 21.17 of these General Provisions. The District shall not be required to pay any interest on any Retention withheld pursuant to this Section 21.14. Upon request and at the sole cost and expense of the Contractor, the District will permit substitution of securities in lieu of the District withholding Retention, as provided in Public Contract Code Section 22300. Subject to any restrictions in Public Contract Code Section 22300, the District shall have the right to direct or approve any or all such securities.

21.15 Additional Deductions and Withholdings.

21.15.1 Authority and Reasons. The District, in its sole discretion, may, as applicable, deduct or withhold from any Construction Progress Payment (including, without limitation, the final Construction Progress Payment), or from any other amount payable to the Contractor pursuant to the Contract, any amount(s) the District determines is(are) reasonably necessary if there is reasonable evidence that any one or more of the following situations exists:

(i) the Contractor has failed to perform any portion of the Work, or perform any other of its obligations pursuant to the Contract, in accordance with the Contract Documents;

(ii) the Contractor has failed to correct any defective or otherwise improper portions of the Work within a reasonable time after notice or other time required pursuant to the Contract Documents;

(iii) the Contractor has failed to perform any portion of the Work in accordance with the Master Construction Schedule or any milestones set forth therein, or some or all of the Work most likely cannot be completed within the required time(s);

(iv) the Contractor most likely will not be able to complete all remaining Work for the unpaid balance of the Contract Price;

(v) the Contractor has failed to perform any portion of the Work, or otherwise perform any obligation in connection with the Work, in accordance with any applicable law, rule, regulation, ordinance or

other governmental requirement, and the District or any federal, State, or local governmental agency has given notice that a penalty will, therefore, be assessed against the Contractor;

(vi) the Contractor has failed to timely pay all amounts due to any Subcontractor, materialman or other person or entity that has provided labor, materials, services, goods or other things in connection with the Work; or any such person or entity has filed, or most likely will file, a claim, stop notice, or lien in connection with the Work;

(vii) the Contractor has failed to pay prevailing wages as required;

(viii) the Contractor is responsible or liable, as provided by the Contract Documents, for reimbursing costs and/or expenses incurred or advanced in connection with the Work by the District or any Subcontractor, materialman or other person or entity, including, without limitation, any testing and/or inspection costs arising from failed tests or inspections;

(ix) the Contractor has failed to furnish or to timely furnish any information, documentation or other things required pursuant to the Contract Documents, including, without limitation, updates of the Schedule of Values, shop drawings, product data sheets, samples, verified reports, *et cetera*;

(x) the Contractor has included false or erroneous statements or estimates in any documents or certification required pursuant to the Contract Documents, including, without limitation, any Change Order estimates and Progress Payment Requests;

(xi) as provided in the Contract Documents or otherwise, the Contractor is responsible or liable, or most likely is responsible or liable, for damages, costs, expenses and/or other amount(s) incurred by the District or any of its contract representatives, or any Subcontractor, materialman or other person or entity, in connection with the Work or the Project; or

(xii) the District has assessed liquidated damages against the Contractor.

21.15.2 Amount and Application. The District may withhold such amount(s) pursuant to Subsection 21.15.1 of these General Provisions as the District deems reasonably necessary and appropriate to protect the District or any of its contract representatives, or any Subcontractors, any materialmen and/or any other persons or entities, from any and all liabilities arising from or in connection with any one or more of the situations described in Subsection 21.15.1 of these General Provisions or as otherwise provided in the Contract Documents. The District, in its reasonable discretion, may apply any such withheld amount(s) to pay in connection with, or to otherwise satisfy or correct, any situation described in Subsection 21.15.1 of these General Provisions, or may hold such funds until such time as the Contractor resolves any and all such situations. In using any withheld amount(s) to pay or otherwise satisfy or correct any such situation, the District, to the extent necessary, shall be deemed and construed to be an agent of the Contractor, and any and all such payments shall be deemed and construed to have been paid on account of the Contract Price and shall in the same amount reduce any future payments to the Contractor pursuant to the Contract. The District shall not be required to obtain any judicial determination in regard to any situation described in Subsection 21.15.1 of these General Provisions, or in regard to any obligation in connection therewith to so pay or use any withheld amount(s). The District shall not be liable to Contractor for withholding any funds or making any payments (or for payment of interest on the amount(s) of either) done or made in good faith. The District will provide to the Contractor an accounting of any and all amount(s) withheld pursuant to this

Section 21.15 and retained and/or expended by the District pursuant to this Subsection 21.15.2. At such time as all reason(s) for withholding any funds pursuant to this Section 21.15 have been resolved or corrected, the District shall release to the Contractor, if then due pursuant to the Contract, any of such funds remaining after expenditures by the District pursuant to this Subsection 21.15.2. Notwithstanding anything to the contrary, if the District has withheld funds from the Contractor because it assessed damages or other costs against the Contractor in accordance with the Contract, or because the funds were otherwise due from the Contractor to the District in accordance with the Contract, the District shall be entitled to interest at the maximum legal rate.

21.16 District Payment of Construction Progress Payments. After receipt from the Architect of a Certification of Payment for a Progress Payment Request submitted by the Contractor, the District shall pay to the Contractor an amount equal to the amount certified in the Certification of Payment less any amounts withheld in accordance with Sections 21.14 and/or 21.15 of these General Provisions (each a "Construction Progress Payment"). The District shall pay each such Construction Progress Payment (other than the final Construction Progress Payment) to the Contractor within thirty days after receipt from the Contractor of the complete Progress Payment Request; provided, however, that the District shall make the Construction Progress Payment to the Contractor an appropriate number of days less than thirty days if the Certification of Payment relates to a complete Progress Payment Request that was disapproved, but returned to the Contractor more than seven days after receipt. If the District fails to timely pay an undisputed Construction Progress Payment to the Contractor, the unpaid amount shall accrue interest, at the legal rate specified in Code of Civil Procedure Section 685.010, for each day the payment is late. The District will pay the final Construction Progress Payment to the Contractor as provided in Section 21.17 of these General Provisions.

21.17 Final Payment of Retention. The District shall release and pay to the Contractor any and all Retention, as the final Construction Progress Payment, less any amount(s) the District deems necessary to withhold pursuant to Section 21.15 of these General Provisions, not sooner than 35 days after a Notice of Completion for the Work is recorded, but not later than 60 days after the first to occur of: (i) the District records a Notice of Completion for the Work; or (ii) "completion" of the Work is deemed to have occurred in accordance with Public Contract Code Section 7107. If some or all of the Retention is held in the form of securities, the District shall release such securities in accordance with the foregoing. As a condition precedent to the District's obligation to make the final payment, the Contractor must submit with its final Progress Payment Request an executed copy of the "Conditional Waiver and Release (Final Payment)" form included in the Required Project Forms for each of the Contractor and each Subcontractor, materialman or other person or entity that provided any labor, services, materials or equipment in connection with the Work. Each Conditional Waiver and Release (Final Payment) must be duly-executed and must contain an original signature of the person who has executed it. In the event the District releases Retention to the Contractor because completion is deemed to have occurred in accordance with Public Contract Code Section 7107, the Contractor shall not thereby be deemed or construed to have been released from its obligations pursuant to the Contract, but the Contractor may terminate the Contract for cause at any time after the prerequisites set forth in Section 22.10 of these General Provisions have been satisfied.

21.18 District Issuance of Joint Checks. The District, in its sole discretion, may determine that it is necessary or advisable to issue any payment to the Contractor in the form of a joint check made payable to the Contractor and any of its Subcontractors, materialmen, or other persons or entities. The joint check payees shall be responsible for the allocation and disbursement of such funds between them. Except as may be required by law, the District shall have no obligation to pay, or to ensure the payment of, any Subcontractor, materialman, or other person or entity that has furnished any labor, materials, services,

goods or other things in connection with the Work. In no event shall the issuance by the District of any joint check be deemed or construed to: (i) constitute an understanding or agreement between the District and any such Subcontractor, materialman, or other person or entity, regardless of the number of joint checks issued; (ii) constitute an obligation of the District to any such Subcontractor, materialman, or other person or entity; or (iii) constitute or create any cause of action against the District by the Contractor or any such Subcontractor, materialman, or other person or entity.

21.19 District Does Not Waive Rights by Inspecting, Approving or Paying. In no circumstances shall any inspection and/or approval of any portion of the Work, any error or inaccuracy in any estimate or Schedule of Values, any processing of any Progress Payment Request, any issuance of a Certification of Payment, or any payment to the Contractor of any Construction Progress Payment (including, without limitation, the final Construction Progress Payment), be deemed or construed to constitute:

(i) a release by the District of the Contractor from any of its obligations pursuant to the Contract;

(ii) a representation by the District that any information submitted by the Contractor to substantiate any payment amount is accurate or was verified;

(iii) a representation by the District that payments to Subcontractors, materialmen and others as required were verified or confirmed;

(iv) a representation by the District that the Work complies in all respects with the requirements of the Contract Documents;

(v) a representation by the District that the means, methods, techniques, sequences or procedures used in performing the Work were reviewed and/or approved;

(vi) an approval by the District of any means, methods, techniques, sequences or procedures used in the Work;

(vii) an approval by the District of the use of any invention, appliance, process, article, device, or material, in violation of any royalty, patent or other rights of any person or entity;

(viii) an acceptance by the District of any Work that does not conform to the requirements of the Contract Documents;

(ix) a waiver by the District of any right(s) it has to enforce the Contractor's obligations pursuant to the Contract, whether or not prior to final payment pursuant to Section 21.17 of these General Provisions; or

(x) a release by the District of the Contractor or its surety or sureties from responsibility for damages arising from the Work.

21.20 Contractor Must Timely Pay Subcontractors. If any portion of any payment to Contractor pursuant to Section 21.16, Section 21.17, or other provision of the Contract Documents, is attributable to Work for which any Subcontractor, materialman, or other person or entity is entitled to payment, the Contractor must use such funds received from the District to pay such Subcontractor, materialman, or other

person or entity to the extent of its interest in such funds. Unless agreed otherwise in writing, the Contractor must pay each such Subcontractor, materialman and other person and entity within ten days after the Contractor receives payment from the District or as otherwise required by law. If the Contractor has withheld Retention from any Subcontractor, materialman or other person or entity, then, subject to other applicable law, within seven days after receiving payment of some or all of the Retention withheld by the District, the Contractor must pay each such Subcontractor, materialman, or other person or entity their respective shares of the amount(s) received from the District. The Contractor must include the foregoing requirements in each Subcontract, in order to ensure that lower-tier Subcontractors, materialmen and other persons and entities are paid within the time periods specified in this Section 21.20.

21.21 Stop Notices and Liens. The Contractor has sole responsibility and liability for ensuring that no person or entity files or otherwise imposes or causes to be imposed any stop notice or lien on or in relation to the Project Site or any portion of the Work or the Project on account of any labor, services, materials, equipment or other thing that the Contractor furnishes or causes to be furnished in connection with the Work. If any such stop notice or lien is filed or otherwise imposed, and if the stop notice or lien has merit or is valid, the Contractor shall be responsible and liable for all costs and expenses incurred by the District in connection with the stop notice or lien, including, without limitation, any attorney's fees and expenses. Any such costs and expenses shall be charged to the Contractor and/or deducted from amounts otherwise payable to the Contractor pursuant to the Contract.

21.22 Unconditional Waivers and Releases After Final Payment. As a continuing obligation of the Contractor after final payment pursuant to Section 21.17 of these General Provisions, the Contractor must deliver to the District, within fourteen days following such final payment, an executed copy of the "Unconditional Waiver and Release (Final Payment)" form included in the Required Project Forms for each of the Contractor and each Subcontractor, materialman and other person or entity that provided any labor, services, materials or equipment in connection with the Work. Each such Unconditional Waiver and Release (Final Payment) must be duly-executed and must contain an original signature of the person who has executed it. Without limiting any other rights the District may have, in the event the Contractor defaults on its obligations pursuant to this Section, the District, in its sole discretion, may initiate proceedings to declare the Contractor a non-responsible bidder for a period of up to five years from the date of such declaration.

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PART 22
TERMINATION AND OTHER REMEDIES

22.1 Cause for Termination of Contractor's Right to Perform Work. The Contractor shall be in default of its obligations pursuant to the Contract, and the District may terminate the Contractor's right to perform the Work for cause, if:

(i) the Contractor refuses or fails to perform the Work or any component thereof in accordance with the Contract Documents;

(ii) the Contractor refuses or fails to perform any portion of the Work within the time required pursuant to the Master Construction Schedule and thereby adversely affects the critical-path construction of the Project;

(iii) the Work is not, or reasonably will not be, fully completed within the Contract Time;

(iv) the Contractor persistently or repeatedly refuses or fails to supply enough properly skilled workers and/or proper materials;

(v) the Contractor persistently or repeatedly is absent from the Project Site without reasonable excuse;

(vi) the Contractor fails to timely and fully pay any Subcontractors, materialmen, or other persons or entities the funds to which they are entitled in connection with the Work;

(vii) the Contractor or any Subcontractor, materialman or other person or entity that furnishes labor, materials, services or other things in connection with the Work unreasonably, persistently or repeatedly disregards any one or more laws, ordinances, rules, regulations, or orders of governmental entities with competent jurisdiction;

(viii) the Contractor becomes the subject of any voluntary or involuntary bankruptcy proceeding, the Contractor assigns any significant portion of its assets for the benefit of its creditors, any court determines or declares that the Contractor is bankrupt or insolvent, or a trustee or receiver is appointed to manage or otherwise control the Contractor's assets; or

(ix) the Contractor or any Subcontractor, materialman or other person or entity that furnishes labor, materials, services or other things in connection with the Work violates any of the material provisions of the Contract.

Section 22.2 Opportunity to Cure and Termination for Cause. At any time the Contractor has defaulted on its obligations pursuant to the Contract in any one or more of the ways specified in Section 22.1 of these General Provisions, the District may provide written notice to the Contractor and its surety of the District's intention to terminate the Contractor's right to perform the Work ("Notice of Intent to Terminate for Cause"), stating in reasonable detail the reasons for the termination. The Contractor shall have ten days from receipt of a Notice of Intent to Terminate for Cause to resolve, correct or cure the reasons for termination specified in the Notice of Intent to Terminate for Cause, or to make arrangements satisfactory to the District for such resolution, correction or cure, and if the Contractor does not, the District may terminate the Contractor's right to perform the Work by providing a written notice of termination ("Notice of

Termination for Cause") to the Contractor and its surety. A termination pursuant to this Section shall be effective immediately upon receipt by the Contractor of the Notice of Termination for Cause. Notwithstanding a termination pursuant to this Section, the Contractor and its surety shall continue to be responsible and liable, in accordance with the Contract Documents and applicable law: (i) for any and all defects in quality, damage to property, injury to any person, and other matters arising from the Work performed prior to the termination; (ii) for the costs to perform all Work remaining after the termination; and (iii) for any and all damages incurred by the District as a result of the Contractor's default and/or termination pursuant to this Section.

22.3 Surety and District Rights to Perform Work After Termination for Cause. In the event the District issues a Notice of Termination for Cause, the Contractor's surety shall have the right to take over and perform the Contract. If the surety does not (i) give the District written notice of surety's intention to take over and commence performance of the Contract within ten days of receipt of the Notice of Termination for Cause and (ii) commence performance of the Contract within twenty days after receipt of the Notice of Termination for Cause, then the District may elect to take over and proceed to complete the Work, by separate contract or by any other means or method the District deems advisable.

22.4 District Performance of Work After Termination for Cause. In no event after receipt of a Notice of Intent to Terminate for Cause shall the Contractor remove from the Project Site, or suffer or permit the removal from the Project Site of, any tools, equipment, vehicles, materials, supplies, appliances, plants, or other items owned, leased or rented by the Contractor and used or employed in connection with the Work. In the event the District elects to take over the Work as specified in Section 22.3 of these General Provisions, then: (i) the District may, without liability for so doing, take possession of and use in completing the Work all such tools, equipment, vehicles, materials, supplies, appliances, plants, or other items on or at the Project Site used or employed in connection with the Work and owned, leased or rented by the Contractor; (ii) at the District's election, any or all of the Subcontracts shall be deemed to have been assigned to the District; and (iii) the Contractor and its surety shall be liable to the District for any costs or other damages incurred by the District attributable to or arising from the District taking over the Work as provided in this Section. **THE CONTRACTOR MUST ENSURE THAT EACH OF ITS CONTRACTS WITH ITS SUBCONTRACTORS AND SURETIES INCLUDES SUCH PROVISIONS AS ARE NECESSARY TO EFFECTUATE THE REQUIREMENTS OF THIS SECTION 22.4, HOWEVER, NO FAILURE TO DO SO WILL INVALIDATE SUCH REQUIREMENTS**.

22.5 Contractor Compensation After Termination for Cause. In the event the Contractor's right to perform the Work is terminated pursuant to Section 22.2 of these General Provisions, the Contract shall remain in effect. However, in such event, the Contractor shall not be entitled to receive any further payment pursuant to the Contract: (i) until the Project has been fully completed and accepted in accordance with Section 18.9 of these General Provisions; and (ii) only if the total of the cost to the District to complete the Work plus any damages as described in Section 22.2 of these General Provisions is less than the unpaid portion of the Contract Price as adjusted in accordance with the Contract. If the total of such costs and damages exceeds such unpaid portion of the Contract Price, the Contractor (or its surety) shall pay the difference to the District within thirty days of receiving an invoice for such amount from the District.

22.6 Termination for Convenience of Contractor's Right to Perform Work. The District, for any reason and without need for cause, may terminate the Work in whole or, from time to time, in part, regardless of the circumstances resulting in termination. By way of example and not limitation, the District may determine that termination is necessary because funding or other approvals have been rescinded,

necessary funding is or becomes unavailable, the Project is substantially damaged or destroyed, a governmental authority stops the Work for an indeterminate amount of time, a ruling by a court or governmental agency significantly and adversely affects the Project, or the Work is stopped or is made impractical or infeasible for some other reason. In the event of any such determination, the District shall provide written notice to the Contractor of the termination ("Notice of Termination for Convenience"). District termination pursuant to this Section 22.6 of any or all of the Work shall not be deemed or construed to relieve the Contractor's surety of its obligations in regard to any just claims arising out of or relating to the Work. Notwithstanding a termination pursuant to this Section, the Contractor and its surety shall continue to be responsible and liable, in accordance with the Contract Documents and applicable law for any and all defects in quality, damage to property, injury to any person, and other matters arising from the Work performed prior to the termination.

22.7 Contractor Must Cease Work Upon Termination for Convenience. Upon receipt of a Notice of Termination for Convenience, the Contractor shall immediately proceed to: (i) stop all Work to the extent specified in the Notice of Termination for Convenience; (ii) complete any portion of the Work as specified in the Notice of Termination for Convenience in a least-cost/shortest-time manner while still maintaining the quality required pursuant to the Contract Documents; (iii) leave the terminated portion of the Work (to the extent already completed) in a safe and clean condition so that it will not pose any threat to the health or safety of any persons; (iv) terminate all Subcontracts to the extent those provide for the terminated portions of the Work, except such Subcontracts as specified in the Notice of Termination for Convenience that shall be deemed to be assigned to the District; and (v) place no further orders and make no further contracts with Subcontractors, except as necessary to complete portions of the Work not terminated.

22.8 Documenting Costs After Termination for Convenience. Within fourteen days after the effective date of a termination for convenience pursuant to Section 22.6 of these General Provisions, the Contractor must submit to the District all documentation required pursuant to Section 21.8 of these General Provisions to substantiate all costs incurred by the Contractor for labor, materials and equipment through the effective date of the termination. In addition, within twenty-one days after the effective date of any such termination, the Contractor must submit to the District such documentation as reasonably details and substantiates costs reasonably incurred by the Contractor solely as a result of the termination for convenience. All of the foregoing documentation must: (i) describe the costs incurred with particularity; and (ii) be conspicuously identified as "Termination costs incurred as a result of termination for convenience pursuant to Section 22.6 of the General Provisions of the Contract."

22.9 Compensation After Termination for Convenience. In the event of a termination for convenience pursuant to Section 22.6 of these General Provisions, subject to receipt of reasonable substantiating documentation as described in Section 22.8 of these General Provisions, the District shall pay to the Contractor an amount equal to the total of: (i) all actual costs incurred by the Contractor in accordance with the provisions of the Contract Documents attributable to the terminated portion of the Work that was satisfactorily completed by the Contractor, but not previously paid by the District; (ii) a reasonable allowance for profit on the actual costs established pursuant to the foregoing clause (i), provided that the Contractor establishes to the satisfaction of the District that it is reasonably probable the Contractor would have made a profit on such portion of the Work, but in no event shall such allowance exceed ten percent of the actual costs established pursuant to the foregoing clause (i); and (iii) a reasonable allowance for administrative and demobilization costs incurred by the Contractor, but in no event shall such allowance exceed five percent of the actual costs established pursuant to the foregoing clause (i). Notwithstanding anything to the contrary, in no event shall the total amount payable to the Contractor pursuant to this Section 22.9 exceed the

proportionate amount of the Contract Price attributable to the terminated portion of the Work satisfactorily completed prior to termination, consistent with the then-most recent approved Schedule of Values.

22.10 Termination by the Contractor for Cause. The Contractor may terminate the Contract, by providing written notice to the District, in the event: (i) as a result of factors beyond the Contractor's control and not arising from any fault, omission, act or negligence of the Contractor or any Subcontractor, materialman or other person or entity that has furnished or is to furnish any labor, materials, services or other things in connection with the Work, there has been a cessation or suspension of all Work for a period of more than one-hundred and twenty consecutive days, and the District has not provided to the Contractor within such period a notice to resume the Work, a Notice of Intent to Terminate for Cause, or a Notice of Termination for Convenience; or (ii) after notice and reasonable opportunity to cure, the District fails to pay the Contractor any substantial undisputed sums due to the Contractor in accordance with the Contract Documents. In the event of a termination by the Contractor pursuant to this Section 22.10, subject to receipt of reasonable substantiating documentation as described in Section 22.11 of these General Provisions, the District shall pay to the Contractor an amount equal to the total of all actual costs incurred by the Contractor in accordance with the provisions of the Contract Documents attributable to the portion of the Work that the Contractor satisfactorily completed prior to termination, but not previously paid by the District. If a termination by the Contractor pursuant to this Section 22.10 is the result of a failure by the District to pay any substantial undisputed sum as described above, or otherwise is solely the fault of or caused by the District or any of its contract representatives, then, subject to receipt of reasonable substantiating documentation as described in Section 22.11 of these General Provisions, the District also shall pay to the Contractor: (i) a reasonable allowance for profit on the actual costs established pursuant to this Section, provided that the Contractor establishes to the satisfaction of the District that it is reasonably probable the Contractor would have made a profit on such portion of the Work, but in no event shall such allowance exceed ten percent of such actual costs; and (ii) a reasonable allowance for administrative and demobilization costs incurred by the Contractor, but in no event shall such allowance exceed five percent of the actual costs established pursuant to this Section. Notwithstanding anything to the contrary, in no event shall the total amount payable to the Contractor pursuant to this Section 22.10 exceed the proportionate amount of the Contract Price attributable to the portion of the Work satisfactorily completed prior to termination, consistent with the then-most recent approved Schedule of Values. In the event of termination by the Contractor pursuant to this Section 22.10, the Contractor shall have no Claim(s) against the District except with respect to Work that the Contractor performed prior to termination. Notwithstanding a termination pursuant to this Section, the Contractor and its surety shall continue to be responsible and liable, in accordance with the Contract Documents and applicable law for any and all defects in quality, damage to property, injury to any person, and other matters arising from the Work performed prior to the termination.

22.11 Documenting Costs After Termination by Contractor for Cause. Within fourteen days after the effective date of a termination by the Contractor for cause pursuant to Section 22.10 of these General Provisions, the Contractor must submit to the District all documentation required pursuant to Section 21.8 of these General Provisions to substantiate all costs incurred by the Contractor for labor, materials and equipment through the effective date of the termination. All of the foregoing documentation must: (i) describe the costs incurred with particularity; and (ii) be conspicuously identified as "Termination costs incurred as a result of termination by Contractor for cause pursuant to Section 22.10 of the General Provisions of the Contract."

22.12 Remedies for Default Other Than Termination. In the event the Contractor is in default of its obligations pursuant to the Contract in any one or more of the ways specified in Section 22.1 of these

General Provisions, the District, in its sole discretion and after notice as provided in this Section 22.12, shall have the right to cure or otherwise correct the default(s), by any reasonable means or method the District deems advisable, without terminating the Contract or the Contractor's right to perform the other portions of the Work. If the District so intends to cure or otherwise correct any default(s) by the Contractor, the District shall provide written notice to the Contractor and its surety. If, within five days of receiving such notice (or, in the event of an Emergency or situation involving an existing or potential safety hazard, within such shorter period of time as set forth in the notice), the Contractor fails to adequately cure or otherwise correct the default(s), or fails to make arrangements satisfactory to the District for such adequate cure or other correction, the District shall have the right to cure or otherwise correct the default(s), by separate contract or by any other reasonable means or method the District deems advisable (including, without limitation, supplementing the workforce of the Contractor or any Subcontractor with additional workers and/or equipment), for the account of and at the expense of the Contractor. If the District is required to expend funds in connection with any such cure or other correction, such amounts shall accrue interest at the maximum legal rate from the date(s) expended to the date(s) the District is reimbursed, whether reimbursed directly by the Contractor or its surety. Such amounts shall be charged to the Contractor and/or deducted from amounts payable to the Contractor pursuant to the Contract. The rights of the District pursuant to this Section 22.12 are in addition to, not in lieu of, any other rights and remedies the District may have pursuant to law, equity or contract, and in no circumstances shall the rights of the District pursuant to this Section 22.12 be deemed or construed to limit or constitute a waiver by the District of any such rights or remedies. Neither the Contractor nor its surety shall have any recourse against the District with respect to any cure(s) and/or other correction(s) undertaken and completed by the District in good faith.

22.13 Declaring Contractor a Non-Responsible Bidder. Without limiting any other rights the District may have, in the event the Contractor defaults on its obligations pursuant to the Contract in any one or more of the ways specified in Section 22.1 of these General Provisions, the District, in its sole discretion, may initiate proceedings to declare the Contractor a non-responsible bidder for a period of up to five years from the date of such declaration.

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PART 23
INDEMNIFICATION OF DISTRICT AND OTHERS

23.1 Indemnification of District and its Representatives. Subject to the provisions of Section 23.4 of these General Provisions, the Contractor shall indemnify, defend, and hold-harmless the District, Architect, Project Manager, and Inspector of Record, and each of them individually (each a "District Indemnitee") from and against any and all claims, demands, actions, other proceedings, liens, judgments, damages, losses, costs, expenses (including, without limitation, attorneys' fees), and other liabilities of any nature: (i) arising from personal injury (including death) or property damage that occurs in connection with the performance of the Work by the Contractor or any Subcontractor or other person or entity; (ii) arising from any act or omission by the Contractor or any Subcontractor, materialman or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work; and (iii) as expressly required pursuant to these General Provisions and other Contract Documents. Without limiting the foregoing, the Contractor shall be required to indemnify, defend and hold the District Indemnitees harmless from and against all claims, demands, actions, other proceedings, liens, judgments, damages, losses, costs, expenses and/or other liabilities arising from, among other things: (i) loss of use of any property; (ii) any failure or alleged failure by the Contractor or any Subcontractor or other person or entity that furnishes any labor, materials, services, goods or other things in connection with the Work to comply with the Contract Documents or any applicable law, ordinance, rule, regulation or other governmental requirement; (iii) any other loss, damage, expense, *et cetera*, sustained by any person or entity in connection with the performance of the Work; (iv) any dispute between Contractor and any Subcontractor, materialman, surety, or other person or entity, including, without limitation, any payment, stop notice, or lien disputes; (v) any breach or alleged breach of any express or implied warranty by the Contractor or any Subcontractor, materialman, or other person or entity that furnishes any labor, materials, services, or other things in connection with the Work; and (vi) infringement or alleged infringement of any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the Contract, including its use by the District, unless specifically stated otherwise in the Contract Documents

23.2 Contractor Defense of District and its Representatives. The Contractor, at its sole cost and expense, shall defend each and every claim, demand, action, and other proceeding within the scope of Section 23.1 of these General Provisions initiated against any District Indemnitee, regardless of whether the District Indemnitee may be the sole party named in the claim, demand, action or other proceeding. Any such defense must be conducted by knowledgeable and experienced legal counsel selected and retained by the Contractor at its cost. If the District or any of its officers, employees, or agents is named in any claim, demand, action or other proceeding, the defense counsel must be reasonably acceptable to the District. Without limiting anything else in any indemnity provisions of the Contract, the Contractor shall also pay the full cost to the District of the monitoring of, and, if necessary, the participation in, the defense of any District Indemnitee by the District's legal counsel. Without jeopardizing or compromising any of its other rights pursuant to Section 23.1 of these General Provisions or other provisions of the Contract, the District may settle any claim, demand, action or other legal proceeding on terms determined by the District Board to be reasonable and in the best interests of the District and/or any District Indemnitee. As part of its obligations pursuant to Section 23.1 of these General Provisions and this Section 23.2, and with respect to any claim, demand, action or other proceeding within the scope of such Sections, within thirty days of receiving an invoice from the District, the Contractor shall reimburse the District for any and all: (i) judgments paid by the District; (ii) amounts paid by the District in settling such claim, demand, action or other proceeding; and (iii) any other legal or other costs and expenses reasonably incurred by the District in connection with such claim,

demand, action or other proceeding. If the Contractor fails to pay any such amount(s) within the required time, the unpaid amount(s) shall accrue interest at the legal rate.

23.3 Indemnification of Officers, Employees, and Agents of District Indemnitees. For purposes of each and every obligation of the Contractor set forth in these General Provisions and other Contract Documents to indemnify, defend and/or hold-harmless any party, the reference to the indemnified party (including, without limitation, the District, Architect, Project Manager and Inspector of Record, as applicable) shall be deemed and construed to require that the Contractor also indemnify, defend and hold-harmless, to the same extent, the officers, employees, agents, consultants and other representatives of the party.

23.4 Limitation on Contractor Indemnification Obligations. Notwithstanding anything to the contrary, the Contractor shall not be responsible or liable pursuant to Sections 23.1, 23.2 or 23.3 of these General Provisions, or any other indemnification provisions set forth in the Contract Documents, to the extent that a claim, demand, action, other proceeding, lien, judgment, damage, loss, cost, expense, or other liability is attributable to the active negligence or willful misconduct of the District, in which event the District and the Contractor shall be responsible and liable on a comparative basis.

23.5 Contractor Must Ensure Subcontractors Indemnify District. The Contractor must include provisions in each Subcontract requiring that the Subcontractor also indemnify, defend and hold-harmless the District Indemnitees to the same extent required of the Contractor pursuant to this Part 23 of these General Provisions.

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PART 24
CLAIMS AND LEGAL PROCEEDINGS

24.1 Requirements and Procedures for Filing Claims Are Mandatory. This Part 24 establishes mandatory requirements and procedures applicable to the filing by the Contractor of any and each demand for: (i) extension of time; (ii) 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 to which the claimant is not otherwise entitled; or (iii) an amount the payment of which is disputed by the District (each a "Claim"). **IF THE CONTRACTOR FAILS TO FILE ANY CLAIM IN STRICT ACCORDANCE WITH CERTAIN REQUIREMENTS AND PROCEDURES DESCRIBED IN THIS PART 24, THE CONTRACTOR SHALL BE DEEMED AND CONSTRUED TO HAVE FORFEITED AND WAIVED ANY AND ALL RIGHTS TO ASSERT THE CLAIM ON ANY BASIS OR TO INITIATE AND PURSUE ANY LEGAL ACTION OR OTHER PROCEEDING BASED ON ANY FACTS AND/OR CIRCUMSTANCES FORMING A BASIS FOR THE CLAIM.**

24.2 Mandatory Time Limits for Filing of Claims. The Contractor must file each Claim within fourteen days of the date the Contractor first becomes aware or reasonably should have first become aware of any basis for the Claim. In addition, the Contractor must file any Claim prior to when the District issues final payment to the Contractor pursuant to Section 21.17 of these General Provisions, and the District shall reject any Claim filed thereafter as null and void. **IF THE CONTRACTOR FAILS TO FILE A CLAIM WITHIN THE PERMITTED FOURTEEN-DAY PERIOD AND PRIOR TO FINAL PAYMENT, THE CONTRACTOR SHALL BE DEEMED AND CONSTRUED TO HAVE FORFEITED AND WAIVED ANY AND ALL RIGHTS TO ASSERT THE CLAIM ON ANY BASIS OR TO INITIATE AND PURSUE ANY LEGAL ACTION OR OTHER PROCEEDING BASED ON ANY FACTS AND/OR CIRCUMSTANCES FORMING A BASIS FOR THE CLAIM.**

24.3 Content of Claims and Substantiating Materials. Each Claim must consist of: (i) a cover letter that sets forth a summary of the basis or bases for the Claim (including, without limitation, dates of relevant occurrences, the particular persons involved or that have relevant knowledge, the specific remedy and/or compensation the Contractor is seeking, and, if applicable, the total amount of the Claim and a breakdown of the total amount into general categories of costs incurred by the Contractor); (ii) a reasonably detailed analysis of the contractual bases for the Claim (including, without limitation, identifying all provisions of the Contract Documents relevant to the Claim), the legal bases for the Claim, and any other bases or justifications for the Claim asserted by the Contractor, with cross-references to documents submitted in support of the Claim; and (iii) all documents that support the Contractor's position(s) as described in the Claim, including, by way of example and not as a limitation, any Specifications, Drawings, cost analyses, daily reports, *et cetera*. A Claim must include all information that the Contractor desires to be considered in connection with the review, analysis, and rejection or approval of the Claim.

24.4 Mandatory Certification of Claims Subject to Penalty of Perjury. The Contractor must submit each Claim with a written certification by the Contractor stating that: (i) the Contractor has reviewed the Claim and is filing it in a good-faith belief that the Contractor is entitled to the remedy and/or compensation described in the Claim; (ii) each document and item of other supporting information (whether an original or copy) submitted with the Claim is authentic (i.e., not altered or modified in any manner), accurate and complete; (iii) the Claim accurately sets forth, the total amount of the District's monetary and/or other liability for the Claim; and (iv) the Contractor acknowledges that the filing of false and/or fraudulent claims may result in fines and/or imprisonment pursuant to Government Code Sections 12650 *et seq.* and Penal Code Section 72. An Authorized Contractor Officer must sign each such certification under penalty of perjury and the signature must be notarized. **IF THE CONTRACTOR FAILS TO SUBMIT THE**

REQUIRED CERTIFICATION WITH ANY CLAIM, THE CONTRACTOR SHALL BE DEEMED AND CONSTRUED TO HAVE FORFEITED AND WAIVED ANY AND ALL RIGHTS TO ASSERT THE CLAIM ON ANY BASIS OR TO INITIATE AND PURSUE ANY LEGAL ACTION OR OTHER PROCEEDING BASED ON ANY FACTS AND/OR CIRCUMSTANCES FORMING A BASIS FOR THE CLAIM.

24.5 Prerequisites for Filing Delay Claims. **NO CLAIM FILED BY THE CONTRACTOR THAT DEMANDS AN EXTENSION OF THE CONTRACT TIME AND/OR AN INCREASE IN THE CONTRACT PRICE BASED ON A DELAY IN THE WORK SHALL BE VALID, AND THE DISTRICT SHALL NOT BE REQUIRED TO CONSIDER ANY SUCH CLAIM, UNLESS THE CONTRACTOR DEMONSTRATES PRIOR COMPLIANCE WITH ALL APPLICABLE REQUIREMENTS OF SECTIONS 13.10 THROUGH 13.13, INCLUSIVE, OF THESE GENERAL PROVISIONS.** If the District disapproves a Change Order Request submitted in accordance with Section 13.13 of these General Provisions, the period in which the Contractor may file a related Claim shall commence upon receipt by the Contractor of notice of such disapproval.

24.6 Method of Filing Claims. The Contractor must file each complete Claim (i.e., each Claim that satisfies the requirements of Sections 24.1 through 24.5, inclusive, of these General Provisions) by delivering it to the District, with copies to the Architect, Project Manager, and Inspector of Record, via personal delivery (signature of receiving person requested) or certified or registered U.S. Mail (postage pre-paid and signature of receiving person requested).

24.7 Procedures Applicable to Claims Seeking $375,000 or Less. Each Claim within the scope of Public Contract Code Section 20104(b)(2) that seeks an amount less than or equal to $375,000 shall be resolved in accordance with the procedures set forth in Public Contract Code Section 20104 *et seq*. ("PCC Claims Procedures"), as those may be amended from time to time, and the PCC Claims Procedures are incorporated herein by this reference. In summary, the PCC Claims Procedures specify requirements and procedures for filing a claim, for requesting additional information, and for responding to the claim, as well as for disputing the response to the claim. Different timelines and procedures apply for claims of less than $50,000 and for claims of $50,000 to $375,000. In addition, the PCC Claims Procedures specify requirements for civil actions filed to resolve claims. The PCC Claims Procedures do not apply to tort claims or alter time periods for filing of tort claims in accordance with the Government Code. For additional information, the Contractor should refer to Public Contract Code Section 20104 *et seq*. **NOTHING IN THIS SECTION 24.7 OR IN THE PCC CLAIMS PROCEDURES SHALL BE DEEMED OR CONSTRUED TO SUPERSEDE THE REQUIREMENTS OF SECTIONS 24.1 THROUGH 24.6, INCLUSIVE, OF THESE GENERAL PROVISIONS, WHICH ARE APPLICABLE TO EACH AND EVERY CLAIM ARISING FROM THE WORK OR THE CONTRACT.**

24.8 District Requests for Additional Information. At all times that a Claim is pending, the District, Architect and/or Project Manager may request (including for purposes of the PCC Claims Procedures when those are applicable) that the Contractor provide additional information relevant to the Claim that is believed reasonably necessary or convenient for analysis or evaluation of the Claim. The Contractor shall provide such additional information as soon as reasonably possible, but in no event later than fourteen days after receiving the District's request, and any time period in which the District is to respond to the Claim shall be extended by the amount of time required for the Contractor to provide the requested information.

24.9 Procedures for Initial Review of Claim by Architect. Except if and as expressly provided by the PCC Claims Procedures when those are applicable, the Architect, in consultation with the Project Manager and the Inspector of Record, will review each Claim and, within twenty days after the Claim was filed, take one or more of the following preliminary actions: (i) request that the Contractor provide additional

information pursuant to Section 24.8 of these General Provisions; (ii) if necessary due to the complexity and/or number of issues described in the Claim, provide information to the Contractor as to when the Architect anticipates being able to complete its review pursuant to this Section 24.9; (iii) recommend that the District disapprove the Claim in whole or in part, stating reasons for rejection; (iv) recommend that the District approve the Claim; or (v) suggest a compromise of the Claim. Regardless of whether a Claim is processed pursuant to the PCC Claims Procedures, the District may, but is not obligated to, notify the Contractor's surety of the nature and amount of the Claim and request the surety's assistance in resolving the Claim.

24.10 Approval of Claim After Initial Architect Review. If the District approves a Claim, in whole or in part, upon recommendation of the Architect pursuant to Section 24.9 of these General Provisions, the Architect will provide notice of such approval to the Contractor and will, thereafter, prepare or obtain and process a Change Order that appropriately documents the resolution of the Claim.

24.11 Disapproval of Claim After Initial Architect Review. If the District disapproves a Claim, in whole or in part, upon recommendation of the Architect pursuant to Section 24.9 of these General Provisions, the Architect will provide notice of such disapproval to the Contractor. Subject to the provisions of Section 24.15 of these General Provisions, to the extent the District disapproves a Claim, in whole or in part, without initiating informal efforts to resolve the Claim in accordance with Section 24.12 of these General Provisions, the Contractor may pursue any remedy available to the Contractor in accordance with the Contract.

24.12 Initiation of Mandatory Informal Claim-Resolution Efforts. In the sole discretion of the District, if the Architect has recommended that the District reject a Claim, in whole or in part, or has suggested a compromise of the Claim, the District may, by giving written notice, initiate informal efforts to resolve the Claim. In such event, the Project Manager will schedule a mandatory meeting of the Contractor and the District, Architect, Project Manager and Inspector of Record, to occur within ten days of the District's notice or as soon thereafter as practicable. The District and the Contractor may bring to such meeting any documents or other materials related to the basis or bases for the Claim and any individual(s) they believe necessary or convenient for purposes of such informal efforts. The individuals present at the meeting shall make good-faith efforts to resolve the Claim. If the District and the Contractor are unable to resolve the Claim during the meeting, but agree that further informal efforts would be productive, they may schedule additional meetings or discussions for purposes of continuing the efforts to resolve the Claim. If, not less than thirty days after the initial meeting, either the District or the Contractor concludes that additional informal efforts to resolve the Claim would be unavailing, that party shall provide written notice to the other party. In the event of such notice, neither the District nor the Contractor shall be required to continue informal attempts to resolve the Claim. Except if and as expressly limited by the PCC Claims Procedures when those are applicable, if the District has initiated informal Claim-resolution efforts in connection with a Claim filed by the Contractor, completion by the Contractor of such informal efforts as provided in this Section 24.12 shall be a condition precedent to the Contractor initiating any action, arbitration, or other legal proceeding arising from the Claim.

24.13 Documentation of Compromise. If the District and Contractor agree, as a result of informal Claim-resolution efforts or otherwise, to a compromise or other resolution of a Claim, the Architect will prepare or obtain and process a Change Order, or the District and Contractor shall enter into another appropriate written agreement, that appropriately documents the resolution of the Claim.

24.14 Architect Ruling if Claim Remains Unresolved. Except if and as provided by the PCC Claims Procedures when those are applicable, if the District and the Contractor fail to agree, after informal Claim-resolution efforts or otherwise, to a compromise or other resolution of a Claim or portion thereof, the Architect, in consultation with the District, Project Manager and Inspector of Record, will issue a written ruling on the Claim to the District and the Contractor. The Architect will issue its ruling within thirty days of the notice given pursuant to Section 24.12 of these General Provisions that terminated the informal efforts to resolve the Claim. The Architect's ruling will set forth the Architect's determination in regard to each separate basis for the Claim described in the Claim, and any associated adjustments to the Contract Price and/or Contract Time. Regardless of whether issued pursuant to this Section or the PCC Claims Procedures, the Architect's ruling on a Claim shall be final. Subject to the provisions of Section 24.15 of these General Provisions, if the Contractor disagrees with the Architect's ruling, the Contractor may pursue any remedy available to the Contractor in accordance with the Contract.

24.15 Conditions Precedent to Initiating Subsequent Actions. Except if and as expressly limited by the PCC Claims Procedures when those are applicable, the disapproval of a Claim, in whole or in part, pursuant to Section 24.11 of these General Provisions if the District has not initiated informal Claim-resolution efforts, or a ruling on the Claim by the Architect pursuant to Section 24.14 of these General Provisions after completion of informal Claim-resolution efforts, whichever applies, shall be a condition precedent to the initiation by the Contractor of any action, arbitration or other proceeding relating to or arising from the matters addressed in the Claim. Such condition precedent shall be deemed and construed to apply to all Claims arising from the performance of the Work, including, without limitation, Claims regarding the extent to which the Work has been completed and/or the necessity, adequacy, quality, or quantity of such Work. Notwithstanding the foregoing, the Contractor shall not be required to comply with such condition precedent if, within thirty days after written notice from the Contractor to the District, Architect and Project Manager, they have failed to cure or correct any of the following: (i) the Architect has failed to take any action within the extended time determined in accordance with Section 24.8 of these General Provisions, plus any other authorized extensions; (ii) the Architect has failed to take any action pursuant to Section 24.9 of these General Provisions within twenty days or such extended time as indicated pursuant to clause (ii) of the first sentence of Section 24.9 of these General Provisions, plus any other authorized extensions; (iii) the Architect has failed to take any action within an agreed time limit; or (iv) the District, because it is a public entity, has a statutory obligation or right pursuant to applicable law to impose or assess remedies and/or penalties (e.g. penalties for Labor Code violations).

24.16 Contractor Must Continue Work While Claims Pending. Neither the existence of any dispute, nor the filing or other initiation of any Claim or related action, arbitration or other legal proceeding, shall be deemed or construed to constitute a valid basis for the Contractor to stop, delay or change the Work. The Contractor must diligently continue with all Work as required by the Contract Documents (including, without limitation, as set forth in any Architect Field Directives) and in accordance with all milestones set forth in the Master Construction Schedule, regardless of whether: (i) any dispute exists or any Claim, action, arbitration or other legal proceeding has been filed or otherwise initiated; or (ii) the District disapproves any Claim. In the event a Claim is not resolved to the Contractor's satisfaction, the Contractor's sole remedy shall be to initiate an action or other legal proceedings as permitted pursuant to the Contract, but only, as described in Section 24.18 of these General Provisions, after the Project has been completed or the Contract has been terminated.

24.17 Resolving Disputes Through Binding Arbitration. In the event of a dispute, the District and the Contractor may agree in writing to resolve any Claim through binding arbitration. In such event, the

District and Contractor shall attempt within thirty days thereafter to agree on the arbitrator who will conduct the arbitration. If the parties cannot so agree, they shall request that the presiding judge of the Superior Court for the County designate an arbitrator with experience in public works construction. The District and the Contractor each shall pay one-half of the cost of the arbitration. The arbitrator shall establish procedures and rules to be followed in conducting the arbitration, which, at a minimum, shall specify that the arbitrator must adhere to and apply all substantive statutory, regulatory, administrative and decisional law that is applicable to the dispute. If a party petitions to confirm, correct, or vacate the award as provided by Chapter 4 of Title 9 of the Code of Civil Procedure (commencing with Section 1285), the prevailing party shall be entitled, as part of its costs to be fixed by the court, reasonable attorneys' fees and expenses incurred in connection with such proceedings. The surety that issued the Performance Bond and/or Payment Bond shall be made a party to any such arbitration and shall be fully bound by any decision of the arbitrator.

24.18 Resolving Disputes in Court of Competent Jurisdiction. If any Claim is not resolved in accordance with the procedures set forth in this Part 24 after compliance by the Contractor with all such procedures as required, then, except if and as limited by the PCC Claims Procedures when those apply, the Contractor may file an action in a court of competent jurisdiction in the County seeking resolution of the Claim through bench trial. No such action may be initiated until after: (i) the entirety of the Project has been fully completed and accepted by the District in accordance with Section 18.9 of these General Provisions; (ii) completion of the Project has occurred as defined in Subsection (c) of Public Contract Code Section 7107; or (iii) the Contract in its entirety has been terminated prior to completion of the Project. AS A CONDITION PRECEDENT TO THE CONTRACTOR'S RIGHT TO FILE ANY SUCH ACTION, WITHIN FIFTEEN DAYS AFTER COMPLETION OF THE PROCEDURES REQUIRED PURSUANT TO THIS PART 24 WITHOUT RESOLUTION OF THE APPLICABLE CLAIM, THE CONTRACTOR MUST PROVIDE WRITTEN NOTICE TO THE DISTRICT THAT THE CONTRACTOR THEREBY RESERVES ITS RIGHTS TO FILE SUCH ACTION. Any statutory limitation on the period for filing of such an action shall be tolled, from the date the procedures required pursuant to this Part 24 are duly completed without resolution of the applicable Claim, until the date an action may be filed in accordance with the foregoing provisions of this Section 24.18.

24.19 Neither Party's Remedies are Limited. Except as expressly stated in these General Provisions or the other Contract Documents, the rights and remedies available in accordance with the Contract are in addition to any rights and remedies available pursuant to applicable law; provided that the exercise of any and all such rights and remedies are subject to procedural requirements made applicable by this Part 24.

24.20 Applicable Law and Venue. The Contract shall be construed in accordance with the laws of the State. Any provision of law purported to be described or specified herein that is incorrectly described or specified shall, nonetheless, be applicable as if correctly described or specified herein. If any action, arbitration, mediation or other proceeding is initiated to enforce or interpret any term of the Contract, such proceeding shall be initiated and conducted only in the County.

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PART 25
MISCELLANEOUS PROVISIONS

25.1 Entire Understanding and Agreement. The Contract, as defined in these General Provisions and as amended in accordance with the Contract Documents, constitutes the final, complete and exclusive statement of the terms of the agreement between the District and the Contractor pertaining to performance of the Work. The Contract supersedes all prior and contemporaneous understandings or agreements of the Parties, oral or written, except as those are included in the Contract. Each of the District and the Contractor acknowledges and agrees that neither the other party, nor its agents or attorneys, has induced the execution of the Contract by making any promise, representation, or warranty whatsoever, express or implied, not set forth in the Contract.

25.2 Provisions Required by Law Deemed Included. Each and every provision required by law to be included in the Contract is hereby deemed to be so included, and the Contract shall be construed and enforced as if all such provisions are so included. If, for any reason, any provision required by law is not included or incorporated into the Contract Documents, or is not correctly included or incorporated into the Contract Documents, then, upon request of either the District or the Contractor, they shall amend the Contract Documents to include or incorporate, or to correctly include or incorporate, such provision.

25.3 Execution of Documents in Counterparts. The District and Contractor may sign the Construction Services Agreement and other Contract Documents in one or more counterparts, which, taken together, shall be deemed and construed to constitute one and the same original instrument. Signature pages may be detached from counterpart originals and combined to physically form one or more copies of the Construction Services Agreement having original signatures of both parties.

25.4 Captions and Headings. Any and all captions or headings for the Parts, Sections, Subsections and other provisions of these General Provisions and the other Contract Documents are provided solely for convenience of the reader and shall not be deemed or construed to establish, define, or limit the content or meaning of such provisions.

25.5 No Third-Party Beneficiaries of Contract. Except to the extent provided by law (e.g., requirements for payment of prevailing wages to workers on the Project), no party other than the District or the Contractor may claim or assert any right or benefit arising from the Contract. Each provision of the Contract Documents shall be deemed and construed to benefit only the District and/or the Contractor unless and only to the extent the provision is included in the Contract specifically as a result of any law intended to benefit any third party. Provisions of the Contract Documents that relate to or permissibly expand on any provision of law intended to benefit any third party, but are not necessary for compliance with that law, shall be deemed and construed as being included in the Contract for the convenience of the Parties and shall not be deemed or construed to benefit any third party or as providing a basis for any claim, demand, action or other proceeding by a third party relating to the Contract.

25.6 Circumscribed Right to Assign Contract. The Contractor may not, without the prior written consent of the District: (i) assign, transfer, pledge, or hypothecate the Contract or any interest therein; or (ii) sublet or lend the use of the Project Site or any portion thereof. Any consent by the District to any of the foregoing prohibited acts shall be deemed and construed to apply only in the particular circumstances for which consent is given and shall not be deemed or construed as consent for any subsequent similar or other circumstances. Except as expressly permitted by the Contract Documents, the Contractor shall not assign the

Contract or any obligations pursuant to the Contract without the prior written consent of the District, which consent the District may grant or deny in its sole discretion. Any attempted or purported assignment by the Contractor of the Contract or any obligations pursuant to the Contract, without such prior written consent, shall be null and void, and the Contractor shall remain responsible for all of its obligations pursuant to the Contract. Subject to the foregoing, the Contract shall inure to the benefit of, and be binding on, the authorized successors and assigns of the Contractor.

25.7 Waiver of Contract Requirements. The failure by either the District or the Contractor at any time(s) to require performance of any requirement of the Contract shall in no manner affect the right at a later time to enforce the same or any other provision of the Contract. Except as expressly provided in the Contract Documents, the forbearance or indulgence by either the District or the Contractor in any regard whatsoever shall not constitute a waiver of the requirement at issue. Until complete performance by a Party of the requirement at issue, the District or Contractor, as applicable, shall be entitled to invoke any remedy available to it in accordance with this Contract, regardless of any such forbearance or indulgence. No requirement of the Contract to be performed by or on behalf of either the District or the Contractor can be waived except by the written consent of the other. Unless expressly provided in any such written waiver, no waiver by either the District or the Contractor of a breach or the performance of any requirement of the Contract shall be deemed to be construed as a continuing waiver of future breaches or future performance of the same or any other requirement.

25.8 Requirements of Contract are Severable. If a court of competent jurisdiction determines, for any reason, that any provision or requirement of the Contract is invalid or unenforceable, such determination shall not invalidate or render unenforceable any other provision or requirement of the Contract. In such event, the remaining provisions and requirements shall be interpreted, to the extent permitted by law, in a manner that is consistent with the intent and purpose underlying the invalid or unenforceable provision or requirement.

25.9 Assignment of Anti-Trust Claims. As provided in Government Code Section 4552, in having submitted its bid for the Work, the Contractor thereby offered and agreed to assign to the District all rights, title and interest in and to all causes of action the Contractor may have under Section 4 of the Clayton Act (15 USC 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 purchase of goods, services, or materials pursuant to the Contract. This assignment shall become effective at the time the District tenders the final Construction Progress Payment to the Contractor, without further acknowledgment by either the District or the Contractor.

25.10 Service of Demands and Other Notices. Unless the Contract Documents expressly provide otherwise with respect to any particular circumstance, demands and other notices required or to be given pursuant to the Contract Documents must be in writing and must be given or served in accordance with this Section 25.10. Each such notice must be sent via: (i) personal delivery (with signature of recipient and recipient's name legibly written on delivery receipt); (ii) facsimile transmission (with transmission confirmation from the sender's machine retained in the sender's files and the original of the notice deposited into United States mail, first-class postage prepaid, within 12 hours after transmission); (iii) registered or certified United States mail (postage pre-paid and return receipt requested); or (iv) FedEx, U.P.S. or other reliable, private delivery service (with signature of recipient obtained on electronic or other delivery receipt). Notices sent to the District must be addressed and delivered to each of the Authorized District Officers identified in the Special Provisions, at the District's main administrative offices, and copies of each such

notice must be sent to the Architect and the Project Manager. Notices sent to the Contractor must be addressed and delivered to either the Job Superintendent or any of the Authorized Contractor Officers. Any such notice shall be deemed given or served only upon receipt by the addressee. The requirements of this Section 25.10 shall not be deemed or construed to apply to communications of the District and/or the Contractor necessary for day-to-day administration of the Contract or performance of the Work or to service of process in accordance with applicable law or rules of court. A Party may change its address, facsimile transmission number, or person to whom attention should be directed, by giving notice as provided in this Section 25.10.

25.11 Public Inquiries and Complaints. If the Contractor or any Subcontractor or other person or entity on, at or in the vicinity of the Project Site on account of the Work receives any inquiry, complaint, or other communication regarding the nature, status, *et cetera*, of the Work or the Project, from any homeowner, business owner, member of the press, or other member of the public, the inquiry, complaint or other communication must be referred to the District for response. The Contractor shall as necessary provide to the District any information in the Contractor's possession or control that is reasonably required for the District to respond to any such inquiry, complaint or other communication.

25.12 District Notice of Third-Party Claims. In accordance with Public Contract Code Section 9201, the District shall timely notify the Contractor if the District receives any third-party claim relating to the Work or the Contract. The District shall be entitled to recover from the Contractor the District's reasonable costs incurred in providing such notification.

(End of General Provisions.)

SPECIAL PROVISIONS

1. ***District Representatives/Project Managers.*** Authorized District Officers for the Project are:
Primary Contact: Hector Gonzalez, Director of Facilities at (951) 232-9207 or via email at art.fritz@puhsd.org
Secondary Contact: Art Fritz, Director of Facilities Services at (951) 941-7557 or via email at art.fritz@puhsd.org

2. ***Architect.*** The Architect for the Project is ***BakerNowicki Design Studio.***

3. ***Commencement and Duration of Work.*** Not sooner than five calendar days after the date of the Notice of Award, the District will issue a Notice to Proceed with the Work to the Contractor. The Contractor must commence performance of the Work on the Commencement Date set forth in the Notice to Proceed. The Contractor shall complete all Work in accordance with any and all schedule milestones established for the Project pursuant to the Master Construction Schedule and other Contract Documents and within a total of ***ninety-six (96)*** **consecutive calendar days** after the Commencement Date. Such milestone periods and time for completion of the Work shall be deemed to include any and all federal and state holidays observed by the Contractor and/or any of its Subcontractors. In submitting its bid, the Contractor is deemed to have accepted and agreed that performance of the Work within such total period and in accordance with all such milestones is reasonable and attainable. The District anticipates, but does not guarantee, that the foregoing will occur in accordance with the following:

District issues Notice of Award: ***March 16, 2016***
Contractor commences Work: ***March 21, 2016***
Contractor completes Work: ***June 24, 2016***

4. ***Project Site Not Immediately Available.*** If the Project Site is not immediately available to the Contractor as of the Commencement Date (e.g., due to coordination with other contractors or priority of work on the Project) the Contractor must use the time prior to commencing the Work for administrative tasks and initial mobilization, and shall coordinate such activities with the Project Manager.

5. ***Strict Scheduling Requirements for Operating Schools.*** The Contractor acknowledges that the District has scheduled the Work for a specific time period, in order to promote the best usage of school facilities, to provide an appropriate learning environment for students, and to avoid interference with the District's educational, recreational and other programs. Contractor further acknowledges that strict compliance with scheduling requirements for the Work is mandatory in order to accomplish the foregoing goals. Therefore, in submitting a bid for the Work, the Contractor is deemed to have agreed that it will have materially breached the contract if it fails to do all things necessary to timely complete the Work, including, without limitation, failing to provide submittals within the time required by the Contract Documents or to provide an adequate workforce or proper and sufficient materials and equipment.

6. ***Time For Submitting Required Contract Forms.*** The Required Contract Forms include various form documents that the Contractor must complete and submit in connection with the execution of the Contract. If the time, situation, or condition for submitting any such form document is not specified in the form, General Provisions or other Contract Documents, or is not readily apparent from context, the Contractor must submit such form within seven days of the date of the Notice of Award or prior to the Commencement Date, whichever is sooner.

7. Sole-Source Items. The District Board has by resolution made findings that the materials, products, things and/or services specified in this Section 7 (each a "Sole-Source Item") are necessary for reasons permitted in accordance with Public Contract Code Section 3400, and no substitutions shall be permitted with respect to any such Sole-Source Item. Each of the following is a Sole-Source Item:

(i) ***Not Applicable***

8. Additive and/or Deductive Alternates. The District requires that separate prices be submitted for each of the additive and/or deductive alternates described generally in this Section 8 and in more detail in the other Bid Documents. Failure of a bidder to submit separate prices for such alternates shall result in its bid being rejected as non-responsive. The required alternates for the Project are as follows:

(i) ***Not Applicable***

9. Minimum Insurance Requirements. The Contractor must obtain and maintain, and must require that each Subcontractor obtain and maintain, Insurance Policies as required pursuant to Part 6 of the General Provisions and having the following minimum coverage amounts:

(i) General Liability (including operations, products and completed operations)
$1,000,000.00 per occurrence for bodily injury, personal injury, and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, the general aggregate limit shall be at $2,000,000.00 or higher.

Umbrella Excess Liability: If CONTRACTOR'S Contract (total bid price) is expected to be more than $5000,000.00 the following excess liability coverage is required:

$4,000,000.00 Over Primary insurance

(ii) Automobile Liability:

$1,000,000.00 per accident for bodily injury and property damage.

(iii) Workers' Compensation:

As required by the State of California

(iv) Employers' Liability

$1,000,000.00 each accident; $1,000,000.00 policy limit bodily injury by disease; $1,000,000.00 each employee bodily injury by disaster.

(v) Contractors Pollution – Asbestos Legal Liability

$1,000,000.00 each occurrence - $2,000,000.00 policy aggregate including errors and omissions.

10. Owner Controlled Insurance Program. The District may implement a program of owner-controlled, wrap-around, or similar insurance coverage ("OCIP"), through a joint-powers insurance cooperative of which the District is a member or otherwise. The OCIP will provide certain insurance coverage in connection with the Project for the District, the Contractor and the Subcontractors. A minimum level of participation by qualified contractors is required for the OCIP. Among other requirements, the Contractor and each Subcontractor must submit an application and qualification information to the OCIP administrator. If applicable, the OCIP requirements are described in detail in Supplementary Special Provisions included in the Contract Documents. The OCIP requirements described in Section 6.2 of the General Provisions and the Supplementary Special Provisions described in this Section 11 shall:

___ be in effect and apply to the Contract.
_X__ NOT be in effect and apply to the Contract.

11. District All-Risk Policy. A District All-Risk Policy, as described in Section 6.3 of the General Provisions, shall:

_X__ be in effect and apply to the Contract.
___ NOT be in effect and apply to the Contract.

12. Applicability of Compliance Monitoring Requirements. Labor-law compliance monitoring by the DIR and/or CMU, as described in the Contract Documents, shall:

___ be in effect and apply to the Work.
_X__ NOT be in effect and apply to the Work.

13. Pre-Construction Labor-Law Conference. The District will conduct a pre-construction conference to discuss labor-law requirements applicable to the Work. **Attendance at the conference is mandatory. The Contractor and each of its listed Subcontractors must attend.** The conference will occur on ***February 10, 2015 at 9:00am at California Military Institute, 755 North A Street, Perris, CA 92570.***

14. Regular Working Hours. For purposes of Section 13.9 of the General Provisions, "Regular Working Hours" shall mean any day including weekends if the contractor deems necessary, inclusive: ***[check whichever applies]***

_X__ between the hours of: _6:30__ a.m. and __4:30_ p.m.
___ commencing at or after such time, and ending by or prior to such time, as may be specified in either an applicable local ordinance or the Mitigation Monitoring Plan adopted by the District pursuant to the California Environmental Quality Act, whichever is more restrictive.

15. Liquidated Damages. If a party is responsible for any liquidated damages in accordance with the General Provisions, the agreed amount of the liquidated damages, for each day or portion thereof, shall be $***1,000.00.***

16. Background Checks. The District has considered the totality of the circumstances concerning the Project and determined that Section 10.3 of the General Provisions shall:

_X__ be in effect and apply to the Contract.
___ NOT be in effect and apply to the Contract.

17. Stormwater Control Requirements. The NPDES and SWPPP requirements set forth in Section 8.13 of the General Provisions shall:

___ be in effect and apply to the Contract.
_X__ NOT be in effect and apply to the Contract.

18. Applicability of DVBE Requirements. The DVBE requirements set forth in Section 10 of the Instructions For Bidders shall:

___ apply to the Contract.
_X__ NOT apply to the Contract.

19. DVBE Advertising. If Section 19 of these Special Provisions makes the DVBE requirements set forth in Section 10 of the Instructions For Bidders applicable to the Contract, the Project Manager will:

___ advertise for DVBE in connection with the Project.
_X__ NOT advertise for DVBE in connection with the Project.

20. Retention. Public Contract Code Section 7201, among other things, permits the District to withhold Retention in excess of five percent if the District Board finds during a properly-noticed and normally-scheduled public hearing conducted prior to bidding of a project that the project is substantially complex and, therefore, requires a higher retention amount, and such finding and the required Retention amount is specified in the bid documents for the project. The District Board or its designee has, in the case of the Project:

___ made a finding, as specified in Section 22 of these Special Provisions, that Retention in excess of five percent is required for the Project.
_X__ NOT made a finding that Retention in excess of five percent is required for the Project.

21. Finding Regarding Retention. If Section 21 of these Special Provisions indicates that the District Board or its designee has made a finding that the Project is substantially complex and, therefore, requires Retention in excess of five percent, such finding is as follows: ***Not Applicable***

22. Required Retention. If Section 21 of these Special Provisions indicates that the District Board or its designee has made a finding that the Project is substantially complex and, therefore, requires Retention in excess of five percent, then, notwithstanding Section 21.14 of the General Provisions, the Retention required for the Project shall be: ***Not Applicable***

23. Copies Furnished By District. The District will provide copies of the Drawings and Specifications to the Contractor at no charge. The Contractor may obtain additional copies of the Drawings and Specifications at its sole cost and expense.

24. Miscellaneous Requirements Applicable to Operating Schools. The following shall apply to the Work if the Project involves work on or at an existing, operating school:

(i) No materials, equipment, *et cetera*, may be delivered to the Project Site between the hours of 7:45 a.m. - 8:30 a.m. or 2:15 p.m. - 2:45 p.m. on any school day.

(ii) No materials and/or personal vehicles may be placed or parked in any fire lane on or adjacent to the Project Site. A construction vehicle or machinery then being used in connection with the Work may be parked in any such fire lane only temporarily and, if unattended, the vehicle or machinery must remain unlocked and the key thereto left in the ignition switch so that it can be moved if necessary, but the Contractor shall at all times remain liable for any injury or damage resulting from unauthorized or improper use of the vehicle or machinery by others.

(iii) Not more than one vehicle per trade will be permitted on the Project Site at any one time. All tools, materials, equipment, *et cetera*, are to be dropped off and vehicles removed from the Project Site immediately. Vehicles used in connection with the Work must be legally parked on public streets in the vicinity of the Project Site, and no such vehicles may be parked in the school parking lot.

(iv) The Contractor must coordinate with the Project Manager all traffic and pedestrian control required for the operations of the Contractor and its Subcontractors and suppliers.

(v) All areas of the Project Site on which the Work is to occur may not be available at the same time, and the Contractor may need to mobilize more than once to complete the Work.

(vi) Existing landscaped areas and plants on and adjacent to the Project Site must be avoided and otherwise protected, and the Contractor shall be responsible for repairing any damage to landscaping, irrigation systems, and plants.

26. Defined Terms. Capitalized terms used, but not defined, in these Special Provisions shall have the meanings ascribed to such terms in other of the Contract Documents.

(End of Special Provisions.)

CONSTRUCTION SERVICES AGREEMENT

This Construction Services Agreement is entered into as of ***March 17, 2016***, by and between the Perris Union High School District ("District"), a California public school district, and ***CONTRACTOR'S NAME*** ("Contractor"). In consideration of their respective rights and obligations pursuant to this Construction Services Agreement, the District and the Contractor agree as follows:

Section 1. ***Project.*** This Construction Services Agreement applies to the following Project: **Bid #022516 California Military Institute HVAC Upgrades**

Section 2. ***Scope of Work.*** The Contractor shall furnish any and all labor, materials, equipment, tools, utilities, temporary facilities, transportation, goods and other services and things necessary for full completion of all construction and other services required in accordance with the Contract Documents for the Project ("Work").

Section 3. ***Component Parts of the Contract.*** This Construction Services Agreement is but one component of the Contract that sets forth the complete understanding and agreement of the District and the Contractor with respect to the performance of the Work. The Contract is composed of all of the Contract Documents, as may be amended in accordance with their provisions, and each such document is hereby incorporated as an operative and effective part of the Contract. The Contract Documents shall be deemed and construed to be complementary and an integrated whole. Any requirement or provision set forth in one Contract Document, but not in one or more of the other Contract Documents, shall be interpreted as if set forth in or applicable to all Contract Documents. The Contract Documents include, but are not limited to, all of the following:

(i) Notice Inviting Bids;
(ii) Instructions for Bidders
(iii) Project Manual – Construction Documents
(iv) Drawings – Construction Documents
(v) Bid Form
(vi) Bid Bond
(vii) Designation of Subcontractors
(viii) Non-Collusion Declaration
(ix) Certification Page
(x) Information Required of Bidders
(xi) Iran Contracting Act Certification Form
(xii) Certification Regarding Contractor Registration
(xiii) General Provisions
(xiv) Special Provisions
(xv) Addenda Nos.
(xvi) Construction Services Agreement
(xvii) Performance Bond
(xviii) Labor & Materials Payment Bond
(xix) Contractor's Certification Regarding Workers' Comp
(xx) Certification of Drug Free Workplace
(xxi) Certification of Asbestos Free Materials
(xxii) Fingerprinting Notice & Agreement
(xxiii) Contractor's Guarantee

Section 4. ***Contract Time.*** The Contractor shall mobilize and commence the Work on the date specified by the District as the date for commencing the Work ("Commencement Date") in the notice from the District directing the Contractor to proceed with the Work ("Notice to Proceed"). The District may defer issuing a Notice to Proceed as provided in the General Provisions. The Contractor must fully complete the Project within the overall number of consecutive days specified in the Special Provisions ("Contract Time") and in accordance with the Master Construction Schedule approved for the Project.

Section 5. ***Contract Price.*** As full consideration for the full and faithful performance by the Contractor of each and all of its obligations pursuant to the Contract, the District shall pay to the Contractor the total amount ("Contract Price") of: ***CONTRACT PRICE*** dollars ($***)***. The Contract Price is subject to increase and/or decrease as provided in the Contract Documents. The District shall pay the Contract Price to the Contractor in accordance with the General Provisions.

Section 6. ***Defined Terms.*** Capitalized terms used, but not defined, in this Construction Services Agreement shall have the meanings ascribed to such terms in other of the Contract Documents.

Section 7. ***Due Authority of Signatories.*** Each person signing this Construction Services Agreement on behalf of a party (either the District or the Contractor) represents and warrants that he or she has been duly authorized by such party to sign, and thereby bind such party to, this Construction Services Agreement and the Contract of which this Construction Services Agreement is a component part.

In witness whereof, the District and the Contractor have executed this Construction Services Agreement by and through signature of their respective duly-authorized representatives, as set forth below.

Perris Union High School District
(District)

By: _____
Print Name: _____
Print Title: _____
Date Signed: _____

_____
(Contractor)

By: _____
Print Name: _____
Print Title: _____
Date Signed: _____

By: _____
Print Name: _____
Print Title: _____
Date Signed: _____

KNOW ALL MEN BY THESE PRESENTS: That WHEREAS, the Perris Union High School District identified as "District", has given to _____ hereinafter designated as the "Principal", a Notice of Intent to Award Contract for the work described as follows:

Bid #022516 California Military Institute HVAC Upgrades

WHEREAS, said Principal is required under the terms of said Notice to furnish a Bond for the faithful performance of such Notice.

NOW THEREFORE, we, the Principal and _____ as Surety, an admitted Surety insurer pursuant to Code of Civil Procedure, Section 995.120, legally doing business in California at _____, are held and firmly bound unto the District, 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 bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if the above bound Principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by and will and truly keep and perform, the covenants, conditions and agreements as defined in the said contract and any alteration thereof made as therein provided, on his or their part, to be kept and performed at the times and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the District, its 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.

As a condition precedent to the satisfactory completion of the Contract, the above obligation shall hold good for a period of one (1) year after the acceptance of the Work by District, during which time if Principal shall fail to make full, complete, and satisfactory repair and replacements and totally protect the District from loss or damage made evident during the period of one (1) year from the date of acceptance of the Work, and resulting from or caused by defective materials or faulty workmanship, the above obligation in penal sum thereof shall remain in full force and effect. However, nothing in this paragraph shall limit the obligation of the surety and the obligation of the Surety shall continue so long as any obligation of Principal remains.

And the said 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, and it 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 the event suit is brought upon this bond by the District and judgment is recovered, the Surety shall pay all costs incurred by the District in such suit, including a reasonable attorneys' fee to be fixed by the court.

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

PRINCIPAL_____

(Corporate Seal)

BY_____

TYPED/PRINTED NAME_____

(Corporate Seal)

TITLE_____

SURETY_____

BY_____

TYPED/PRINTED NAME_____

(Attach Attorney-in Fact Certificate)

TITLE_____

KNOW ALL MEN BY THESE PRESENTS: That WHEREAS, the Perris Union High School District, hereinafter called "District", has awarded to _____ hereinafter designated as the "Principal", a Notice of Intent to Award Contract for the work described as follows:

Bid #022516 California Military Institute HVAC Upgrades

WHEREAS, said principal is required by Division 3, Part IV Title XV, Chapter 7 (commencing at Section 3247) of the California Civil Code to furnish a bond in connection with said contract;

NOW, THEREFORE, we, the Principal and _____ as Surety, an admitted Surety insurer pursuant to Code of Civil Procedure Section 995.120 legally doing business in California at _____, are held and firmly bound unto the District, in the penal sum of _____ DOLLARS ($_____) lawful money of the United States of America for the payment of which sum well and truly to be made, we bind ourselves our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if said Principal, his or its subcontractor, heirs, executors, administrators; successors or assigns, shall fail to pay for any materials, provisions, provender 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 due under the Unemployment Insurance Code, with respect to work or labor, or for amounts due as withholding tax pursuant to Section 18806 of the Revenue and Taxation Code, then said Surety will pay for the same, in or to an amount not exceeding the amount hereinabove set forth, and also will pay in case suit is brought upon this bond, such reasonable attorneys' fees, as shall be fixed by the court, awarded and taxed as provided in Division III, Part 4, Title XV, Chapter 7, (commencing at Section 3247) of the California Civil Code.

This bond shall inure to the benefit of any and all persons, companies, and corporations entitled to file claims under Section 3181 of the Civil code of the State of California, so as to give a right of action to them or their assigns in any suit brought upon this bond.

And the said 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 work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract, or to the work, or to the specifications.

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

PRINCIPAL_____

(Corporate Seal)

BY_____

TYPED/PRINTED NAME_____

(Corporate Seal)

TITLE_____

SURETY_____

BY_____

TYPED/PRINTED NAME_____

(Attach Attorney-in Fact Certificate)

TITLE_____

CONTRACTOR'S CERTIFICATE
REGARDING WORKERS' COMPENSATION

Labor Code Section 3700:

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 in one or more insurers duly authorized to write compensation insurance in the State.
(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/s

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: _____ _____
Contractor

By: _____
Signature

(In accordance with Article 5 (commencing at Section 1860), Chapter 1, Part 7, Division 2 of the Labor code, the above certificate must be signed and filed with the awarding body prior to performing any work under this contract.)

FINGERPRINTING NOTICE AND AGREEMENT

(Education Code Section 45125.1)

Business entities entering into contracts with the DISTRICT must comply with Education Code section 45125.1. Such entities are responsible for ensuring full compliance with the law and should therefore review all applicable statutes and regulations. The following information is provided simply to assist such entities with compliance with the law.

1. Before any employee of a Contractor or Subcontractor may come into contact with students, the employee must be fingerprinted in the manner authorized by the California Department of Justice (DOJ). The DOJ will charge a fee for processing the fingerprint information.

2. No employee who has been convicted of or has criminal proceedings pending for a violent or serious felony may come in contact with any student.

3. No employee may come in contact with any student until the DOJ has notified the Contractor that the employee has not been convicted of a violent or serious felony.

4. The Contractor must certify to the DISTRICT in writing that no employee who may come in contact with students has been convicted of a serious or violent felony. (The certification shall be on a form substantially similar to the form attached hereto.)

5. The Contractor must provide the DISTRICT with a list of those employees who may come in contact with students.

Before any award of a contract shall become effective, the Contractor must do the following:

1.1 Comply with all requirements imposed upon contractors pursuant to California Education Code section 45125.1, and

1.2 Require any and all subcontractors retained pursuant to this bid to comply with all requirements imposed by California Education Code section 45125.1. (Such subcontractors' agreement shall be expressly stated in the subcontract.), or

1.3 Request a waiver of the Department of Justice fingerprint and criminal background investigation [1]

I have read the foregoing and agree to comply with the terms set forth above. I understand that if I am requesting a waiver it may be denied by the DISTRICT and a contract will not be issued to my company.

_____ I can comply with the law if awarded a contract

_____ I will be requesting a waiver if recommended for a contract

Signature: _____ Date: _____

Printed Name: _____ Title: _____

[1]The Contractor may request a waiver of the Department of Justice (DOJ) fingerprint and criminal background investigation for the following reason(s) permitted by Education Code §45125.1 et.Seq.

1. The Contractor and it's employees will have NO Contact with pupils (No school-site services will be provided)
2. The Contractor and it's employees will have OTHER THAN LIMITED CONTACT with pupils but assure that one (1) or more of the following methods are utilized to ensure pupil safety [EC §45125.2(a)]
    a. Installation of a physical barrier at the worksite to limit contact with pupils
    b. Continual supervision and monitoring of all employees of the Contractor by and employ of the Contractor who has not been convicted of a violent felony as ascertained by the DOJ
    c. Surveillance of employees of the Contractor by school personnel.
    d. The services provided by the Contractor are for an EMERGENCY OR EXCEPTIONAL SITUATION, such as when pupil health or safety is endangered or when repairs are needed to make school facilities safe and habitable. [EC §45125.1(b)]

CERTIFICATE REGARDING DRUG-FREE WORKPLACE

This Drug-Free Workplace Certification form is required from all successful bidders pursuant to the requirements mandated by Government code Section 8350 et seq., 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.

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

a) publishing a statement notifying employees that the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited in the person's or organization's workplace and specifying actions which will be taken against employees for violations of the prohibition;

b) establishing a drug-free awareness program to inform employees about all of the following

1) the dangers of drug abuse in the workplace

2) the person's or organization's policy of maintaining a drug-free workplace

3) the availability of drug counseling, rehabilitation and employee-assistance programs;

4) the penalties that may be imposed upon employees for drug abuse violations;

a) requiring that each employee engaged in the performance of the contract or grant be given a copy of the statement required by subdivision (1) 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 substances 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 Section 8350 et. seq.

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

Date: _____ _____

Contractor

_____

Signature

CERTIFICATION OF ASBESTOS-FREE MATERIALS

I, _____
(Name) please print or type (Title)

of _____, do hereby declare that to the best of my knowledge,
(Firm Name)

information, and belief that in completing the work of the **Bid #022516 California Military Institute HVAC Upgrades** for the Perris Union High School District, no manufactured material assembly/device or item of construction will contain, or in itself be composed of, any materials listed by the federal or state EPA or federal or state health agencies as a hazardous material.

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

Name: _____

Title: _____

Date: _____

State of _____ County of _____

On this the _____ day of _____, 20____, before me, _____the

Undersigned Notary Public, personally appeared _____

Personally known to me, _____proved to me on the basis of satisfactory evidence to be the person(s) who executed the

within instrument, and acknowledged that _____ executed it.

WITNESS my hand and official seal.

My commission expires _____
(Notary Public)

CONTRACTOR'S GUARANTEE

To be submitted upon completion of project

We hereby guarantee that the _____, which we have installed for the **Bid #022516 California Military Institute HVAC Upgrades** 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 which may be displaced in connection with such replacement within a period of 1 year year(s) from the date of acceptance of the above-mentioned project by the Perris Union High School District, hereinafter referred to as the "District", ordinary wear and tear and unusual abuse or neglect excepted.

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 one week 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, which will pay the costs and charges therefore upon demand.

_____

CONTRACTOR

Representatives to be contacted for service subject to terms of contract.

NAME_____

ADDRESS_____

_____

PHONE #_____

NOTARY: