



# PROJECT MANUAL

for:

**SEELEY FIRE AND COOLING CENTER**

**NOVEMBER 23, 2022**

Funded by:

**California Department of Housing and Community Development (HCD)  
Through Its  
Community Development Block Grant (CDBG) Program  
CDBG Grant No. 18-CDB6-12924  
HCD Project No. SR49337**



Prepared by:

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**1. ADVERTISEMENT FOR BIDS**

**County of Imperial  
155 S. 11<sup>th</sup> Street  
El Centro, CA 92243**

Separate sealed BIDS for the construction of the **Seeley Fire Station and Cooling Center** will be received by the **Office of the Clerk of the Board of Supervisors** located at **940 W. Main Street, Suite 209, El Centro, CA 92243** until **10:00 a.m.** (prevailing local time) on **Thursday, December 22, 2022**, and then at the **Board of Supervisors Chambers** will be publicly opened and read aloud.

The PLANS, SPECIFICATIONS, AND CONTRACT DOCUMENTS may be examined at the following locations:

Imperial County Department of Public Works  
155 S. 11<sup>th</sup> Street  
El Centro, CA 92243  
Phone: (442) 265-1818  
Fax: (442) 265-1858

Copies of the CONTRACT DOCUMENTS may be obtained at the office of the **Imperial County Department of Public Works 155 S. 11<sup>th</sup> Street, El Centro, CA 92243** upon the nonrefundable payment of **\$400.00** for each set.

A **Pre-Bid Conference** for prospective BIDDERS will be held at Imperial County Workforce and Economic Development located at 2799 S. 4th Street, El Centro, CA 92243 at **10:00 am** (prevailing local time), on **Wednesday, December 07, 2022**. To become a qualified Bidder, all contract documents shall be purchased from the **Imperial County Department of Public Works**. The contract documents can be purchased in the department’s office or obtained from the department’s website: [www.publicworks.imperialcounty.org](http://www.publicworks.imperialcounty.org).

Bidders are notified that this construction project is financed by the California Department of Housing and Community Development (HCD) through its Community Development Block Grant (CDBG) and is subject to the rules and regulations of the Housing and Community Development Act of 1974 and all amendments thereof. Neither the United States nor any departments, agencies, or employees is, or will be, a part of this Invitation for Bids or any resulting contract.

The Contractor and Subcontractors on this project must comply with HUD contract provisions 24 CFR part 85.36(i), the Federal Davis-Bacon and Related Acts, California Department of Regulations Wage Determinations and California Labor Codes pertaining to Public Works projects, Nondiscrimination, Equal Employment Opportunity, Affirmative Action, Section 3 requirements, Anti-Kickback Act, and Federal Occupational Safety and Health Act as set forth in the Contract Bid Documents. This municipality is an equal employment opportunity employer; businesses owned by women or minorities are strongly encouraged to bid.

The female and minority goals are applicable to the Contractor's aggregate onsite construction work force whether or not part of that work force is performing work on a federal or federally assisted construction contract or subcontract as follows:

<b>Time- tables</b>	<b>Goals for female participation in each trade</b>
From December 30, 1980, until further notice	6.9%
<b>Time- tables</b>	<b>Goals for minority participation for each trade</b>
From November 3, 1980, until further notice	16.2% - Imperial County – Non SMSA Counties 16.9% - San Diego County – SMSA Counties



Until further notice, the above goals for minority utilization in each construction craft and trade shall be included in all Federal or Federally assisted construction contracts and subcontracts in excess of \$10,000 to be performed in the respective geographical areas. The goals are applicable to each nonexempt Contractor's total on-site construction work force, regardless of whether or not part of that work force is performing work on a Federal, Federally assisted, or non-Federally related project, contract, or subcontract.

All potential contractors and subcontractors must have and maintain an active SAM.gov registration in order to submit a bid for this project.

The Contractor shall comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations and relevant orders of the Secretary of Labor. In projects involving construction where federal funding exceeds \$200,000 and any individual contract or subcontract exceeds \$100,000, the Contractor shall have incorporated into their contract the Section 3 Clause and comply with the provisions of Section 3 of the Housing and Urban Development Act of 1968, as amended (12 U.S.C. 1701u), and regulations at 24 CFR Part 135.

The Contract executed between the General Contractor and the Awarding agency and the General Contractor and any subcontractor at any tier, for the performance of work on the public works project shall contain the complete verbiage as found in the contract between the Imperial County and the General Contractor including at a minimum a copy of the provisions of California Labor Codes, Sections 1726, 1771, 1775, 1776, 1777.5, 1813, and 1815.

**Pursuant to Public Contract Code Section 22300, the successful Bidder may submit certain securities in lieu of the County retaining a portion of progress payments during the Project.**

Notice is hereby given that, pursuant to Section 1773 of the Labor Code of the State of California, the Owner has obtained from the Director of the Department of Industrial Relations the general prevailing rate of per diem wages and the general prevailing rate for holidays and overtime work for each craft, classification, or type of worker required to execute the Contract. A copy of said prevailing rate of per diem wages is on file in the principal office of the Owner, to which reference is hereby made for further particulars. Said prevailing rate of per diem wages will be made available to any interested party upon request, and a copy thereof shall be posted at each job site.

**Prohibition Against Contracting with Debarred Contractors and Subcontractors: Contractor is prohibited from performing work on a public works project pursuant to Section 1777.1 or 1777.7 of the Labor Code. County shall not enter into any agreement with any Contractor without the prior determination that the Contractor, and its subcontractors, are eligible to receive Community Development Block Grant Funds and are not listed on the Federal Consolidated List of Debarred, Suspended and Ineligible Contractors.**

In order to comply with HUD Section 3 requirements set forth in 24 CFR 135 of the Code of Federal Regulations, Section 3 Business Concerns are solicited to bid on this contract as prime contractors and are encouraged to make inquiries regarding potential subcontracting opportunities to Section 3 Business Concerns.”

Prospective Bidders shall be licensed Contractors in the State of California and shall be skilled and regularly engaged in the general class or type of work called for under the Contract. Each Bidder shall have a Class B California Contractor’s license. All subcontractors shall have a Class A, B or C California Contractors License appropriate for the work to be completed.

**Pursuant to California Civil Code Section 9550, the successful bidder shall, before commencement of work, furnish a payment bond to and approved by the County, if the public works contract exceeds twenty-five thousand dollars (\$25,000) in the amount of 100% of the contract amount. The successful Bidder shall also provide a performance bond in the amount of 100% of the contract amount.**

10-04-28  
(Date)

  
Blanca Acosta, Clerk of the Board of Supervisors  
Imperial County, California

**2. INSTRUCTIONS TO BIDDERS**

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**ARTICLE 1 - DEFINED TERMS**

- 1.01 Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
  - A. Issuing Office - The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered: **Imperial County Department of Public Works, 155 South 11<sup>th</sup> Street, El Centro, CA 92243. Phone: (442) 265-1818 Fax: (442) 265-1858**

**ARTICLE 2 - COPIES OF BIDDING DOCUMENTS**

- 2.01 Complete sets of the Bidding Documents in the number and for the payment, of **four hundred dollars (\$400.00)** may be obtained from the Issuing Office. **The payment is nonrefundable.**
- 2.02 Complete sets of Bidding Documents must be purchased from **Imperial County Department of Public Works** pursuant to the preparation of Bids. Neither the Owner nor the Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 The Owner and the Engineer in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

**ARTICLE 3 – QUALIFICATIONS AND REQUIREMENTS OF BIDDERS**

- 3.01 To demonstrate Bidder’s qualifications to perform the Work, within **five (5) days** of the Owner’s request, the Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data as may be called for below. The bidder certifies that all statements and information are true and accurate.
- 3.02 All types of business entity formations, including sole proprietorships and non-profit organizations, are considered entities under the federal regulations and must be registered in SAM.gov. All entities, except for individual person, that receive subawards directly from recipients of those awards must have and maintain an active SAM registration. Contractors, and subcontractors, must be registered with SAM at the time of bid submittal.

**ARTICLE 4 - EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE**

4.01 *Subsurface and Physical Conditions*

- A. The Supplementary Conditions identify:
  - 1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that the Engineer has used in preparing the Bidding Documents.
  - 2. Those drawings of physical conditions in or relating to existing surface and subsurface structures at or contiguous to the Site (except Underground Facilities) that the Engineer has used in preparing the Bidding Documents.
- B. Copies of reports and drawings referenced in Paragraph 4.01.A will be made available by the Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions has been identified and established in paragraph 4.02 of the Supplementary Conditions. The Bidder is responsible for any interpretation or conclusion that the Bidder draws from any “technical data” or any other data, interpretations, opinions, or information contained in such reports as shown or indicated on such drawings.

4.02 *Underground Facilities*

- A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to the Owner and the Engineer by the Owners of such Underground Facilities, including the Owner, or others.

4.03 *Hazardous Environmental Condition*

- A. The Supplementary Conditions identify those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that the Engineer has used in preparing the Bidding Documents.
- B. Copies of reports and drawings referenced in Paragraph 4.03.A will be made available by the Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which the Bidder is entitled to rely as provided in Paragraph 4.06 of the General Conditions has been identified and established in Paragraph 4.06 of the Supplementary Conditions. The Bidder is responsible for any interpretation or conclusion that the Bidder draws from any “technical data” or any other data, interpretations, opinions, or information contained in such reports as shown or indicated on such drawings.

- 4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the Scope of the Work appear in Paragraph 4.06 of the General Conditions.
- 4.05 On request, the Owner will provide the Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as the Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. The Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.
- 4.06 Reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by the Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. On request, the Owner will provide to each Bidder for examination access to or copies of Contract Documents (other than portions thereof related to price) for such other work.
- 4.07 It is responsibility of each Bidder before submitting a Bid to:
- A. Examine and carefully study the Bidding Documents, the other related data identified in the Bidding Documents, and any Addenda;
  - B. Visit the Site and become familiar with and satisfy the Bidder as to the general, local, and site conditions that may affect cost, progress, and performance of the Work;
  - C. Become familiar with and satisfy the Bidder as to all Federal, State, and Local Laws and Regulations that may affect cost, progress, or performance of the Work;
  - D. Carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in Paragraph 4.02 of the General Conditions, and (2) reports and drawings of Hazardous Environmental Conditions at the Site which have been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions;
  - E. Obtain and carefully study (or accept consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto;
  - F. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for the performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;
  - G. Become aware of the general nature of the work to be performed by the Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;

- H. Correlate the information known to the Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;
  - I. Promptly give the Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that the Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by the Engineer is acceptable to the Bidder; and
  - J. Determine that the Bidding Documents are generally sufficient to indicate and convey an understanding of all terms and conditions for the performance of the Work.
- 4.08 The submission of a Bid will constitute an incontrovertible representation by the Bidder that the Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that the Bidder has given the Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that the Bidder has discovered in Bidding Documents and the written resolutions thereof by the Engineer are acceptable to the Bidder, and that the Bidding Documents are generally sufficient to indicate and convey an understanding of all terms and conditions for performing and furnishing the Work.

#### **ARTICLE 5 - PRE-BID CONFERENCE**

- 5.01 A **Pre-Bid Conference** will be held at **10:00 am** on **Wednesday, December 07, 2022**, at the **Imperial County Workforce and Economic Development** office located at **2799 S. 4th Street, El Centro, CA 92243**. Representatives of the Owner, Architect and Engineer will be present to discuss the Project. Attendance is non-mandatory. A site visit will immediately follow. The Engineer will transmit to all prospective Bidders of record such Addenda as the Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

#### **ARTICLE 6 - SITE AND OTHER AREAS**

- 6.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by the Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by the Contractor.

#### **ARTICLE 7 - INTERPRETATIONS AND ADDENDA**

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to the Engineer in writing. Interpretations or clarifications considered necessary by the Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by the Engineer as having received the Bidding Documents. **Questions regarding this project must be submitted in writing by Friday, December 09, 2022**. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by the Owner or the Engineer.

#### **ARTICLE 8 - BID SECURITY**

- 8.01 A Bid must be accompanied by a Bid Security made payable to the Owner in an amount of **ten percent (10%)** of Bidder's maximum Bid price and in the form of a certified check or a Bid Bond (EJCDC No. C-430, 2002 Edition) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.
- 8.02 The Bid Security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid Security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within **ten (10) days** after the Notice of Award, the Owner may annul the Notice of Award and the Bid Security of that Bidder will be forfeited. The Bid security of other Bidders whom the Owner believes to have a reasonable chance of receiving the award may be retained by the Owner until the earlier of **seven (7) days** after the Effective Date of the Agreement or **sixty-one (61) days** after the Bid Opening, whereupon the Bid Security furnished by such Bidders will be returned.
- 8.03 The Bid Security of other Bidders whom the Owner believes do not have a reasonable chance of receiving the award will be returned within **seven (7) days** after the Bid Opening.

#### **ARTICLE 9 - CONTRACT TIME**

- 9.01 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

#### **ARTICLE 10 - LIQUIDATED DAMAGES**

- 10.01 Provisions for liquidated damages are set forth in the Agreement.

#### **ARTICLE 11 - SUBSTITUTE AND "OR-EQUAL" ITEMS**

- 11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or those substitute materials and equipment approved by the Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function and quality to be met by any proposed substitute or "or-equal" item. No item of material or equipment will be considered by the Engineer as a substitute unless a written request for approval has been submitted by Bidder and has been received by the Engineer at least **fifteen (15) days** prior to the date for receipt of Bids. Each request shall conform to the requirements of Paragraph 6.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon the Bidder. The Engineer's decision of approval or disapproval of a proposed item will be final. If the Engineer approves any proposed substitute item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

#### **ARTICLE 12 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS**

- 12.01 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to the Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within **five (5) days** after the Bid Opening, submit to the Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by the Owner. If the Owner or the Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, the Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, without an increase in the Bid.

- 12.02 If the apparent Successful Bidder declines to make any such substitution, the Owner may award the Contract to the next lowest responsible Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid Security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which the Owner and the Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to the Owner and the Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06 of the General Conditions.
- 12.03 The Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom the Contractor has reasonable objection.
- 12.04 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in Supplement Conditions 6.06.

### **ARTICLE 13 - PREPARATION OF BID**

- 13.01 The Bid Form is included with the Bidding Documents. Additional copies may be obtained from the Engineer.
- 13.02 All blanks on the Bid form shall be completed by printing in ink or by typewriter and the Bid shall be signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each, *Bid Item, Deductive Alternate, and Unit Price Item* listed therein, or the words "No Bid", "No Change" or "Not Applicable".
- 13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporation business address and state of incorporation shall be provided on the Bid Form.
- 13.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The business address of the partnership shall be provided on the Bid Form.
- 13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the business address of the firm must be provided on the Bid Form.
- 13.06 A Bid by an individual shall show the Bidder's name and business address.
- 13.07 A Bid by a joint venture shall be executed by each joint venture partner in the manner indicated on the Bid form. The business address of the joint venture must be provided on the Bid Form.
- 13.08 All names shall be typed or printed in ink below the signatures.
- 13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers and dates of which shall be filled in on the Bid form.
- 13.10 The address and telephone number and email address for communication regarding the Bid shall be shown.
- 13.11 The Bid shall contain evidence of the Bidder's authority and qualification to do business in the State of California. Bidder's state contractor license number for the state of the Project shall also be shown on the Bid Form. Bidders shall possess a valid State of California Contractors "B" License at the day and time of the opening of proposals. The license shall be valid during the contract period.

**ARTICLE 14 - BASIS OF BID; COMPARISON OF BIDS**

14.01 Unit Price and Lump Sum amounts

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Schedule of Values for which a unit price applies and a lump sum amount for the bid items that a lump sum amount applies.
- B. The total of all bid prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price for each unit price item of work and the sum of the lump sum amounts. The Final Quantities and Contract Price will be determined in accordance with Paragraph 11.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in the favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

**ARTICLE 15 - SUBMITTAL OF BID**

15.01 With each copy of the Bidding Documents, a Bidder is furnished one (1) separate unbound copy of the Bid Form, and the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with all the attachments outlined in Article 7 of the Bid Form.

15.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Advertisement or Invitation to Bid and shall be enclosed in an opaque sealed envelope plainly marked with the Project Title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to the Owner at the address in Article 1.01 of the Bid Form.

**Project Title: Seeley Fire and Cooling Center**

**Owner's Address: Office of the Clerk of the Board of Supervisors  
c/o Imperial County Department of Public Works  
940 W. Main Street, Suite 209  
El Centro, CA 92243**

**ARTICLE 16 - MODIFICATION OR WITHDRAWAL OF BID**

16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

16.02 If within **twenty-four (24) hours** after Bids are opened any Bidder files a duly signed written notice with the Owner and promptly thereafter demonstrates to the reasonable satisfaction of the Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid Security will be returned. Thereafter, if the Work is rebid or negotiated, that Bidder will be disqualified from further bidding on the Work. This provision to withdraw a Bid without forfeiting the Bid Security does not apply to Bidder's errors in judgment in preparing the Bid.



**ARTICLE 17 - OPENING OF BIDS**

17.01 The Bids will be opened at the time and place indicated in the Advertisement for Bids and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the Bids and Deductive Alternates will be made available to the Bidders after the opening of the Bids.

**ARTICLE 18 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE**

18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form.

**ARTICLE 19 - EVALUATION OF BIDS AND AWARD OF CONTRACT**

19.01 The Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. The Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. The Owner may also reject the Bid of any Bidder if the Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. The Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one (1) Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

19.03 In evaluating the Bids, the Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

19.04 In evaluating Bidders, the Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.

19.05 The Owner may conduct such investigations as the Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities to perform the Work in accordance with the Contract Documents.

19.06 If the Contract is to be awarded, the Owner will award the Contract to the responsible Bidder who's Bid, conforming with all the material terms and conditions of the Instructions to Bidders, is lowest, price and other factors considered. **The Award shall be made to the lowest responsive, responsible Bidder. The lowest responsive, responsible Bidder shall be determined by: (1) lowest overall cost to the Owner, (2) evaluation of Bidder's experience and, (3) a Bidder's proposal that complies with all of the requirements prescribed in this document.**

**ARTICLE 20 - CONTRACT SECURITY AND INSURANCE**

20.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth the Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to the Owner, it must be accompanied by such bonds.

**ARTICLE 21 - SIGNING OF AGREEMENT**

21.01 When the Owner gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents which are identified in the Agreement as attached thereto. Within **seven (7) days** thereafter, the Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. **Within ten (10) days thereafter, the Owner shall deliver one (1) fully signed counterpart to the Successful Bidder with five (5) complete sets of the “Issued for Construction” Drawings with appropriate identification.**

21.02 This Contract is expected to be funded in part with funds provided by the **California Department of Housing and Community Development (HCD) through its Community Development Block Grant (CDBG) Program**. Refer to Article 18 of the General Conditions for information on the Federal Requirements.

21.03 Concurrence by HCD in the award of the Contract is required before the Contract is effective.

**ARTICLE 22 - SALES AND USE TAXES**

22.01 The Contractor shall pay all sales, use and other taxes as specified in Paragraph 6.10 of the General Conditions.

**ARTICLE 23- WORKERS’ COMPENSATION REQUIREMENTS**

23.01 As required by Section 1860 of the California Labor Code and in accordance with the provisions of Section 3700 of the Labor Code, every Contractor will be required to secure the payment of workers’ compensation to its employees.

23.02 In accordance with Section 1861 of the California Labor Code, the Contractor shall furnish the Owner with a statement as follows: “I am aware of the provisions of 3700 of the Labor Code which requires every employer to be insured against liability for worker’s compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.”

23.03 Notice is hereby given that, pursuant to 1773 of the Labor Code of the State of California, the Owner has obtained from the Director of the Department of Industrial Relations the general prevailing rate of per diem wages and the general prevailing rate for holidays and overtime work for each craft, classification, or type of worker required to execute the Contract. A copy of said prevailing rate of per diem wages is on file in the principal office of the Owner, to which reference is hereby made for further particulars. Said prevailing rate of per diem wages will be made available to any interested party upon request, and a copy thereof shall be posted at each job site.

**ARTICLE 24 – SUBCONTRACTOR LISTING LAW**

24.01 In accordance with Section 4104 of the California Public Contract Code, each Bidder, in his or her Bid, shall set forth 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.

- 24.02 In accordance with Section 4107 of the California Public Contract Code, no Contractor whose Bid is accepted shall without consent of the OWNER either: (a) substitute a person as a Subcontractor in place of the Subcontractor listed in the original Bid; or (b) permit a 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 or her original Bid did not designate a Subcontractor.
- 24.03 Penalties for failure to comply with the foregoing sections of the California Public Contract Code are set forth in Sections 4106, 4110, and 4111 of the Public Contract Code. A prime contractor violating this law violates his or her contract and the awarding authority may exercise the option, in its own discretion, of (1) canceling his or her contract or (2) assessing the prime contractor a penalty in an amount of not more than **ten percent (10%)** of the amount of the subcontract involved, and this penalty shall be deposited in the fund out of which the prime contract is awarded. In any proceedings under this section the prime contractor shall be entitled to a public hearing and to **five (5) days'** notice of the time and place thereof.

#### **ARTICLE 25 – FUNDING REQUIREMENTS**

- 25.01 Bidders are to base their bids on the project funding being provided in whole or in part by the California Department of Housing and Community Development (HCD) through its Community Development Block Grant (CDBG) which will review and approve the contract award, contract agreement, partial and final payments, and contract change orders.
- 25.02 Payment and retainage will comply with the contract agreement section 6.02 "Progress Payments; Retainage." **Bidders are notified that this contract does not permit retainage to be placed in escrow nor to be invested for the benefit of the Contractor.**
- 25.03 Intentionally left blank
- 25.04 Bidders are notified of the requirement for affirmative action to ensure equal employment opportunity (Executive Order No. 11246) as set forth in the Equal Opportunity Requirements found in paragraph 18.10 of the General Conditions.

**ARTICLE 26 — SUBSTITUTION OF SECURITY**

~~26.01 Upon the Contractor's request, the COUNTY will make payment of funds withheld from progress payments to ensure performance under the contract pursuant to the requirements of California Public Contracts Code, section 22300, if the Contractor deposits in escrow with COUNTY, or with a bank acceptable to COUNTY, securities eligible for investment under Government Code Section 16430 or bank savings and loan certifications of deposit, subject to the following conditions:~~

- ~~a) The Contractor shall bear the expense of the COUNTY and the escrow agent, and the COUNTY and the bank, in connection with the escrow deposit made.~~
- ~~b) Securities or certificates of deposit to be placed in escrow shall be of a value at least equivalent to the amount of retention to be paid to the Contractor pursuant to this Article.~~
- ~~c) The Contractor shall enter into an escrow agreement satisfactory to the COUNTY, which agreement shall include provisions governing, inter alia:
  - ~~1) the amount of securities to be deposited,~~
  - ~~2) the providing of powers of attorney or other documents necessary for the transfer of the securities to be deposited,~~
  - ~~3) conversion of cash to provide funds to meet defaults by the Contractor including, but not limited to, termination of the Contractor's control over the work, stop notice filed pursuant to law or other amounts to be kept or retained under the provisions of the contract,~~
  - ~~4) decrease in value of securities on deposit,~~
  - ~~5) the termination of the escrow upon completion of the contract.~~~~
- ~~d) The Contractor shall obtain the written consent of the surety to such agreement.~~

### 3. WAGE REQUIREMENTS

Notice is hereby given that, pursuant to 1773 of the Labor Code of the State of California, the Owner has obtained from the Director of the Department of Industrial Relations the general prevailing rate of per diem wages and the general prevailing rate for holidays and overtime work for each craft, classification, or type of worker required to execute the Contract. A copy of said prevailing rate of per diem wages is on file in the principal office of the Owner, to which reference is hereby made for further particulars. Said prevailing rate of per diem wages will be made available to any interested party upon request, and a copy thereof shall be posted at each job site.

Prospective Bidders may obtain the general wage rates directly from the State of California Department of Industrial Relations at their web site at [www.dir.ca.gov](http://www.dir.ca.gov) or by requesting a CD from the State. The Contractor shall keep an up-to-date listing of the general prevailing wage rates posted at the jobsite at all times.

This Public Works project is a multi-agency funded project and requires compliance with both California's Department of Industrial Relations requirements and the California Labor Codes for a Public Works project and the federal, Davis Bacon and Related Acts. This includes the current wage decisions. Bidders are notified that the higher of either the Davis-Bacon or the State prevailing wage rate shall apply.

The California lock in date for the wage decisions is the date of the bid advertising thus requiring compliance with California, Imperial County 2022-2 (IMP-2022-2) and various pre-determined increases.

All contractors and subcontractors who bid on a public works project must register and pay an annual fee to the California Department of Industrial Relations. All contractors and subcontractors must furnish electronic payroll records directly to the Labor Commissioner (aka California Division of Labor Standards Enforcement). These new requirements will apply to all public works that are subject to the prevailing wage requirements of the California Labor Code, without regard to the funding source.

#### **Statutory Penalty for Failure to Pay Minimum Wage**

- A. In accordance with 1775 of the California Labor Code, the Contractor shall as a penalty to the State of political subdivision on whose behalf a Contract is made or awarded, forfeit **fifty dollars (\$50.00)** for each calendar day or portion thereof, for each worker paid less than the stipulated prevailing rate for any public work done under the Contract by the Contractor or by any Subcontractor under the Contractor.

#### **Statutory Penalty for Unauthorized Overtime Work**

- A. In accordance with 1813 of the California Labor Code, the Contractor shall as a penalty to the State or political subdivision on whose behalf the Contract is made or awarded, forfeit **twenty-five dollars (\$25.00)** for each worker employed in the execution of the Contract by the Contractor or by any Subcontractor for each calendar day during which said worker is required or permitted to work more than eight hours in any one calendar day and forty hours in any one calendar week in violation of 1810-1815 of the California Labor Code.

#### **Apprenticeship Requirements**

- A. CONTRACTOR agrees to comply with 1777.5, 1777.6 and 1777.7 of the California Labor Code relating to the employment of apprentices. The responsibility for compliance with these provisions is fixed with the prime Contractor for all apprenticeship occupations. Under these sections of the law, contractors and Subcontractors must employ apprentices in apprenticeship occupations, where journeymen in the craft are employed on the public work, in a ratio of not less than one (1) apprentice hour for each five (5) journeymen

hours (unless an exemption is granted in accordance with 1777.5) and contractors and Subcontractors shall not discriminate among otherwise qualified employees as indentured apprentices on any public work solely on the ground of race, religious creed, color, national origin, ancestry, sex, or age, except as provided in 3077 of the Labor Code. Only apprentices, as defined in 3077, which provides that an apprentice must be at least sixteen (16) years of age, who are in training under apprenticeship standards and who have signed written apprentice agreements will be employed on public works in apprenticeship occupations.

### **Payroll Records**

- A. Contractor shall keep accurate payroll records on forms provided by the Division of Labor Standards Enforcement, or alternatively, the Contractor shall keep accurate payroll records containing the same information. Said information shall include, but not be limited to, a record of the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and actual per diem wages paid to each journeyman, apprentice, or worker employed by the Contractor. Such record shall be made available for inspection at all reasonable hours, and a copy shall be made available to employee or his authorized representative, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards in compliance with California Labor Code, Section 1776. Upon written notice from the OWNER or the Division of Labor Standards Enforcement, the Contractor shall, within **ten (10) days**, file with the Owner a certified copy of the payroll records. The Contractor shall cause an identical clause to be included in every subcontract for the Work.

### **Davis-Bacon and Related Acts**

- A. This project requires compliance with the Davis-Bacon and Related Acts and adherence to the current U.S. Department of Labor Wage Decision. The Contractor and subcontractors must comply with the minimum rates for wages for laborers and mechanics as determined by the Secretary of Labor in accordance with the provisions of the Davis-Bacon Act (DBA) CA20190002 Mod 7 08-28-2020, as specified in 29 CFR Parts 1, 3, 5, 6 and 7, and Related Acts. The Contract provisions and related matters set forth in 29 CFR Part 5-Section 5.5 are hereby made a part of this Contract. Attention is called to the fact that not less than the minimum salaries and wages set forth in the Contract Documents must be paid on this project. The Wage Decision, including modification, must be posted by the Contractor on the job site.
- B. It is mandatory for covered contractors and subcontractors performing work on Federally financed or assisted construction contracts to respond to the information collection contained in 29 C.F.R. §§ 3.3, 5.5(a). The Copeland Act (40 U.S.C. § 3145) contractors and subcontractors performing work on Federally financed or assisted construction contracts to "furnish weekly a statement with respect to the wages paid each employee during the preceding week." U.S. Department of Labor (DOL) regulations at 29 C.F.R. § 5.5(a)(3)(ii) require contractors to submit weekly a copy of all payrolls to the Federal agency contracting for or financing the construction project, accompanied by a signed "Statement of Compliance" indicating that the payrolls are correct and complete and that each laborer or mechanic has been paid not less than the proper Davis-Bacon prevailing wage rate for the work performed. DOL and federal contracting agencies receiving this information review the information to determine that employees have received legally required wages and fringe benefits.

This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

The awarding body must post or require the prime Contractor to post job site notices prescribed by regulation. (*See* 8 Calif. Code Reg. §16451(d) for the notice that previously was required for projects monitored by the CMU.)

All contractors and subcontractors must furnish electronic certified payroll records directly to the Labor Commissioner (aka California Division of Labor Standards Enforcement).

"General Decision Number: CA20220002 11/04/2022

Superseded General Decision Number: CA20210002

State: California

Construction Types: Building, Heavy (Heavy and Dredging) and Highway

County: Imperial County in California.

BUILDING CONSTRUCTION PROJECTS; DREDGING PROJECTS (does not include hopper dredge work); HEAVY CONSTRUCTION PROJECTS (does not include water well drilling); HIGHWAY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

<p>If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:</p>	<ul style="list-style-type: none"> <li>. Executive Order 14026 generally applies to the contract.</li> <li>. The contractor must pay all covered workers at least \$15.00 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2022.</li> </ul>
<p>If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:</p>	<ul style="list-style-type: none"> <li>. Executive Order 13658 generally applies to the contract.</li> <li>. The contractor must pay all covered workers at least \$11.25 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2022.</li> </ul>

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Modification Number	Publication Date
0	01/07/2022
1	01/14/2022
2	01/21/2022
3	02/11/2022
4	02/25/2022
5	04/29/2022
6	07/22/2022
7	07/29/2022
8	08/05/2022
9	08/12/2022
10	08/19/2022
11	09/02/2022
12	09/30/2022
13	10/07/2022
14	10/14/2022
15	10/21/2022
16	11/04/2022

ASBE0005-002 07/04/2022

	Rates	Fringes
Asbestos Workers/Insulator (Includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems).....	\$ 49.58	25.27
Fire Stop Technician (Application of Firestopping Materials for wall openings and penetrations in walls, floors, ceilings and curtain walls).....	\$ 32.09	19.66

ASBE0005-004 07/04/2022

	Rates	Fringes
Asbestos Removal worker/hazardous material handler (Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials from mechanical systems, whether they contain asbestos or not)....	\$ 23.52	13.37

BRCA0004-002 05/01/2021

	Rates	Fringes
BRICKLAYER; MARBLE SETTER.....	\$ 50.84	18.81

BRCA0018-004 06/01/2021

	Rates	Fringes
MARBLE FINISHER.....	\$ 35.90	14.11
TILE FINISHER.....	\$ 30.47	12.52
TILE LAYER.....	\$ 43.09	18.31



BRCA0018-010 09/01/2021

	Rates	Fringes
TERRAZZO FINISHER.....	\$ 35.43	14.10
TERRAZZO WORKER/SETTER.....	\$ 43.61	14.63

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 CARP0213-001 07/01/2021

	Rates	Fringes
CARPENTER		
(1) Carpenter, Cabinet Installer, Insulation Installer, Hardwood Floor Worker and acoustical installer.....	\$ 51.60	16.28
(2) Millwright.....	\$ 52.10	16.48
(3) Piledrivermen/Derrick Bargeman, Bridge or Dock Carpenter, Heavy Framer, Rock Bargeman or Scowman, Rockslinger, Shingler (Commercial).....	\$ 51.73	16.28
(4) Pneumatic Nailer, Power Stapler.....	\$ 51.85	16.28
(5) Sawfiler.....	\$ 51.69	16.28
(6) Scaffold Builder.....	\$ 42.80	16.28
(7) Table Power Saw Operator.....	\$ 51.70	16.28

FOOTNOTE: Work of forming in the construction of open cut sewers or storm drains, on operations in which horizontal lagging is used in conjunction with steel H-Beams driven or placed in pre- drilled holes, for that portion of a lagged trench against which concrete is poured, namely, as a substitute for back forms (which work is performed by piledrivers): \$0.13 per hour additional.

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 CARP0213-002 07/01/2021

	Rates	Fringes
Diver		
(1) Wet.....	\$ 834.40	16.28
(2) Standby.....	\$ 445.84	16.28
(3) Tender.....	\$ 437.84	16.28
(4) Assistant Tender.....	\$ 413.84	16.28

Amounts in ""Rates' column are per day

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 CARP0213-004 07/01/2021

	Rates	Fringes
Drywall		
DRYWALL INSTALLER/LATHER....	\$ 51.60	16.28
STOCKER/SCRAPPER.....	\$ 22.16	8.62

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 CARP0721-001 07/01/2021

	Rates	Fringes
Modular Furniture Installer.....	\$ 21.85	7.15

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ELEC0569-002 08/31/2020

	Rates	Fringes
Electricians (Electrical contracts of \$500,000 or less)		
Cable Splicer.....	\$ 48.40	3%+14.88
Tunnel Work.....	\$ 54.36	3%+14.88
Electrician.....	\$ 47.65	3%+14.88
Tunnel Work.....	\$ 53.61	3%+14.88
Electricians: (Electrical contracts of \$500,000 and over)		
Cable Splicer.....	\$ 51.40	3%+14.88
Tunnel Work.....	\$ 57.36	3%+14.88
Electrician.....	\$ 50.65	3%+14.88
Tunnel Work.....	\$ 56.61	3%+14.88

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ELEC0569-005 06/01/2021

	Rates	Fringes
Sound & Communications		
Sound Technician.....	\$ 35.20	13.84
SCOPE OF WORK Assembly, installation, operation, service and maintenance of components or systems as used in closed circuit television, amplified master television distribution, CATV on private property, intercommunication, burglar alarm, fire alarm, life support and all security alarms, private and public telephone and related telephone interconnect, public address, paging, audio, language, electronic, background music system less than line voltage or any system acceptable for class two wiring for private, commercial, or industrial use furnished by leased wire, frequency modulation or other recording devices, electrical apparatus by means of which electricity is applied to the amplification, transmission, transference, recording or reproduction of voice, music, sound, impulses and video. Excluded from this Scope of Work - transmission, service and maintenance of background music. All of the above shall include the installation and transmission over fiber optics.		
SOUND TECHNICIAN: Terminating, operating and performing final check-out		

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ELEC0569-006 06/06/2022

Work on street lighting; traffic signals; and underground systems and/or established easements outside of buildings

	Rates	Fringes
Traffic signal, street light and underground work		
Utility Technician #1.....	\$ 38.67	9.11
Utility Technician #2.....	\$ 30.10	8.85

STREET LIGHT & TRAFFIC SIGNAL WORK:

UTILITY TECHNICIAN #1: Installation of street lights and traffic signals, including electrical circuitry, programmable controller, pedestal-mounted electrical meter

enclosures and laying of pre-assembled cable in ducts. The layout of electrical systems and communication installation including proper position of trench depths, and radius at duct banks, location for manholes, street lights and traffic signals.

UTILITY TECHNICIAN #2: Distribution of material at jobsite, installation of underground ducts for electrical, telephone, cable TV land communication systems. The setting, leveling, grounding and racking of precast manholes, handholes and transformer pads.

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 ELEC1245-001 06/01/2022

	Rates	Fringes
LINE CONSTRUCTION		
(1) Lineman; Cable splicer..\$ 64.40		22.58
(2) Equipment specialist (operates crawler tractors, commercial motor vehicles, backhoes, trenchers, cranes (50 tons and below), overhead & underground distribution line equipment).....\$ 50.00		21.30
(3) Groundman.....\$ 38.23		20.89
(4) Powderman.....\$ 51.87		18.79

HOLIDAYS: New Year's Day, M.L. King Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and day after Thanksgiving, Christmas Day

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 ELEV0018-001 01/01/2022

	Rates	Fringes
ELEVATOR MECHANIC.....\$ 61.34		36.885+a+b

FOOTNOTE:

- a. PAID VACATION: Employer contributes 8% of regular hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for 6 months to 5 years of service.
- b. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Friday after Thanksgiving, and Christmas Day.

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 ENGI0012-003 07/01/2020

	Rates	Fringes
OPERATOR: Power Equipment (All Other Work)		
GROUP 1.....\$ 48.25		27.20
GROUP 2.....\$ 49.03		27.20
GROUP 3.....\$ 49.32		27.20
GROUP 4.....\$ 50.81		27.20
GROUP 5.....\$ 48.96		25.25
GROUP 6.....\$ 51.03		27.20
GROUP 8.....\$ 51.14		27.20
GROUP 9.....\$ 49.29		25.25
GROUP 10.....\$ 51.26		27.20

GROUP 11.....	\$ 49.41	25.25
GROUP 12.....	\$ 51.43	27.20
GROUP 13.....	\$ 51.53	27.20
GROUP 14.....	\$ 51.56	27.20
GROUP 15.....	\$ 51.64	27.20
GROUP 16.....	\$ 51.76	27.20
GROUP 17.....	\$ 51.93	27.20
GROUP 18.....	\$ 52.03	27.20
GROUP 19.....	\$ 52.14	27.20
GROUP 20.....	\$ 52.26	27.20
GROUP 21.....	\$ 52.43	27.20
GROUP 22.....	\$ 52.53	27.20
GROUP 23.....	\$ 52.64	27.20
GROUP 24.....	\$ 52.76	27.20
GROUP 25.....	\$ 52.93	27.20

OPERATOR: Power Equipment  
(Cranes, Piledriving &  
Hoisting)

GROUP 1.....	\$ 49.60	27.20
GROUP 2.....	\$ 50.38	27.20
GROUP 3.....	\$ 50.67	27.20
GROUP 4.....	\$ 50.81	27.20
GROUP 5.....	\$ 51.03	27.20
GROUP 6.....	\$ 51.14	27.20
GROUP 7.....	\$ 51.26	27.20
GROUP 8.....	\$ 51.43	27.20
GROUP 9.....	\$ 51.60	27.20
GROUP 10.....	\$ 52.60	27.20
GROUP 11.....	\$ 53.60	27.20
GROUP 12.....	\$ 54.60	27.20
GROUP 13.....	\$ 55.60	27.20

OPERATOR: Power Equipment  
(Tunnel Work)

GROUP 1.....	\$ 50.10	27.20
GROUP 2.....	\$ 50.88	27.20
GROUP 3.....	\$ 51.17	27.20
GROUP 4.....	\$ 51.31	27.20
GROUP 5.....	\$ 51.53	27.20
GROUP 6.....	\$ 51.64	27.20
GROUP 7.....	\$ 51.76	27.20

PREMIUM PAY:

\$3.75 per hour shall be paid on all Power Equipment Operator work on the following Military Bases: China Lake Naval Reserve, Vandenberg AFB, Point Arguello, Seely Naval Base, Fort Irwin, Nebo Annex Marine Base, Marine Corp Logistics Base Yermo, Edwards AFB, 29 Palms Marine Base and Camp Pendleton

Workers required to suit up and work in a hazardous material environment: \$2.00 per hour additional. Combination mixer and compressor operator on gunite work shall be classified as a concrete mobile mixer operator.

SEE ZONE DEFINITIONS AFTER CLASSIFICATIONS

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Bargeman; Brakeman; Compressor operator; Ditch Witch, with seat or similar type equipment; Elevator operator-inside; Engineer Oiler; Forklift operator (includes loed, lull or similar types under 5 tons; Generator operator; Generator, pump or compressor plant operator; Pump operator; Signalman; Switchman

GROUP 2: Asphalt-rubber plant operator (nurse tank operator); Concrete mixer operator-skip type; Conveyor operator; Fireman; Forklift operator (includes loed, lull or similar types over 5 tons; Hydrostatic pump operator; oiler crusher (asphalt or concrete plant); Petromat laydown machine; PJU side dum jack; Screening and conveyor machine operator (or similar types); Skiploader (wheel type up to 3/4 yd. without attachment); Tar pot fireman; Temporary heating plant operator; Trenching machine oiler

GROUP 3: Asphalt-rubber blend operator; Bobcat or similar type (Skid steer); Equipment greaser (rack); Ford Ferguson (with dragtype attachments); Helicopter radioman (ground); Stationary pipe wrapping and cleaning machine operator

GROUP 4: Asphalt plant fireman; Backhoe operator (mini-max or similar type); Boring machine operator; Boxman or mixerman (asphalt or concrete); Chip spreading machine operator; Concrete cleaning decontamination machine operator; Concrete Pump Operator (small portable); Drilling machine operator, small auger types (Texoma super economic or similar types - Hughes 100 or 200 or similar types - drilling depth of 30' maximum); Equipment greaser (grease truck); Guard rail post driver operator; Highline cableway signalman; Hydra-hammer-aero stomper; Micro Tunneling (above ground tunnel); Power concrete curing machine operator; Power concrete saw operator; Power-driven jumbo form setter operator; Power sweeper operator; Rock Wheel Saw/Trencher; Roller operator (compacting); Screed operator (asphalt or concrete); Trenching machine operator (up to 6 ft.); Vacuum or much truck

GROUP 5: Equipment Greaser (Grease Truck/Multi Shift).

GROUP 6: Articulating material hauler; Asphalt plant engineer; Batch plant operator; Bit sharpener; Concrete joint machine operator (canal and similar type); Concrete planer operator; Dandy digger; Deck engine operator; Derrickman (oilfield type); Drilling machine operator, bucket or auger types (Calweld 100 bucket or similar types - Watson 1000 auger or similar types - Texoma 330, 500 or 600 auger or similar types - drilling depth of 45' maximum); Drilling machine operator; Hydrographic seeder machine operator (straw, pulp or seed), Jackson track maintainer, or similar type; Kalamazoo Switch tamper, or similar type; Machine tool operator; Maginnis internal full slab vibrator, Mechanical berm, curb or gutter (concrete or asphalt); Mechanical finisher operator (concrete, Clary-Johnson-Bidwell or similar); Micro tunnel system (below ground); Pavement breaker operator (truck mounted); Road oil mixing machine operator; Roller operator (asphalt or finish), rubber-tired earth moving equipment (single engine, up to and including 25 yds. struck); Self-propelled tar pipelining machine operator; Skiploader operator (crawler and wheel type, over 3/4 yd. and up to and including 1-1/2 yds.); Slip form pump operator (power driven hydraulic lifting device for concrete forms); Tractor operator-bulldozer, tamper-scraper (single engine, up to 100 h.p. flywheel and similar types, up to and including D-5 and similar types); Tugger hoist operator (1 drum); Ultra high pressure waterjet cutting tool system operator; Vacuum blasting machine operator

GROUP 8: Asphalt or concrete spreading operator (tamping or finishing); Asphalt paving machine operator (Barber Greene

or similar type); Asphalt-rubber distribution operator; Backhoe operator (up to and including 3/4 yd.), small ford, Case or similar; Cast-in-place pipe laying machine operator; Combination mixer and compressor operator (gunite work); Compactor operator (self-propelled); Concrete mixer operator (paving); Crushing plant operator; Drill Doctor; Drilling machine operator, Bucket or auger types (Calweld 150 bucket or similar types - Watson 1500, 2000 2500 auger or similar types - Texoma 700, 800 auger or similar types - drilling depth of 60' maximum); Elevating grader operator; Grade checker; Gradall operator; Grouting machine operator; Heavy-duty repairman; Heavy equipment robotics operator; Kalamazoo balliste regulator or similar type; Kolman belt loader and similar type; Le Tourneau blob compactor or similar type; Loader operator (Athey, Euclid, Sierra and similar types); Mobark Chipper or similar; Ozzie padder or similar types; P.C. slot saw; Pneumatic concrete placing machine operator (Hackley-Presswell or similar type); Pumpcrete gun operator; Rock Drill or similar types; Rotary drill operator (excluding caisson type); Rubber-tired earth-moving equipment operator (single engine, caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. up to and including 50 cu. yds. struck); Rubber-tired earth-moving equipment operator (multiple engine up to and including 25 yds. struck); Rubber-tired scraper operator (self-loading paddle wheel type-John Deere, 1040 and similar single unit); Self-propelled curb and gutter machine operator; Shuttle buggy; Skiploader operator (crawler and wheel type over 1-1/2 yds. up to and including 6-1/2 yds.); Soil remediation plant operator; Surface heaters and planer operator; Tractor compressor drill combination operator; Tractor operator (any type larger than D-5 - 100 flywheel h.p. and over, or similar-bulldozer, tamper, scraper and push tractor single engine); Tractor operator (boom attachments), Traveling pipe wrapping, cleaning and bending machine operator; Trenching machine operator (over 6 ft. depth capacity, manufacturer's rating); trenching Machine with Road Miner attachment (over 6 ft depth capacity): Ultra high pressure waterjet cutting tool system mechanic; Water pull (compaction) operator

#### GROUP 9: Heavy Duty Repairman

GROUP 10: Drilling machine operator, Bucket or auger types (Calweld 200 B bucket or similar types-Watson 3000 or 5000 auger or similar types-Texoma 900 auger or similar types-drilling depth of 105' maximum); Dual drum mixer, dynamic compactor LDC350 (or similar types); Monorail locomotive operator (diesel, gas or electric); Motor patrol-blade operator (single engine); Multiple engine tractor operator (Euclid and similar type-except Quad 9 cat.); Rubber-tired earth-moving equipment operator (single engine, over 50 yds. struck); Pneumatic pipe ramming tool and similar types; Prestressed wrapping machine operator; Rubber-tired earth-moving equipment operator (single engine, over 50 yds. struck); Rubber tired earth moving equipment operator (multiple engine, Euclid, caterpillar and similar over 25 yds. and up to 50 yds. struck), Tower crane repairman; Tractor loader operator (crawler and wheel type over 6-1/2 yds.); Woods mixer operator (and similar Pugmill equipment)

GROUP 11: Heavy Duty Repairman - Welder Combination, Welder - Certified.

GROUP 12: Auto grader operator; Automatic slip form operator; Drilling machine operator, bucket or auger types (Calweld, auger 200 CA or similar types - Watson, auger 6000 or similar types - Hughes Super Duty, auger 200 or similar types - drilling depth of 175' maximum); Hoe ram or similar with compressor; Mass excavator operator less than 750 cu. yards; Mechanical finishing machine operator; Mobile form traveler operator; Motor patrol operator (multi-engine); Pipe mobile machine operator; Rubber-tired earth-moving equipment operator (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck); Rubber-tired self-loading scraper operator (paddle-wheel-auger type self-loading - two (2) or more units)

GROUP 13: Rubber-tired earth-moving equipment operator operating equipment with push-pull system (single engine, up to and including 25 yds. struck)

GROUP 14: Canal liner operator; Canal trimmer operator; Remote-control earth-moving equipment operator (operating a second piece of equipment: \$1.00 per hour additional); Wheel excavator operator (over 750 cu. yds.)

GROUP 15: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine-up to and including 25 yds. struck)

GROUP 16: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 17: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 50 cu. yds. struck); Tandem tractor operator (operating crawler type tractors in tandem - Quad 9 and similar type)

GROUP 18: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, up to and including 25 yds. struck)

GROUP 19: Rotex concrete belt operator (or similar types); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 cu. yds. struck); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, up to and including 25 yds. struck)

GROUP 20: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, over 50 yds. struck); Rubber-tired

earth-moving equipment operator, operating in tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 21: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

GROUP 22: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, up to and including 25 yds. struck)

GROUP 23: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck); Rubber-tired earth-moving equipment operator, operating with the tandem push-pull system (multiple engine, up to and including 25 yds. struck)

GROUP 24: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 25: Concrete pump operator-truck mounted; Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

#### CRANES, PILEDIVING AND HOISTING EQUIPMENT CLASSIFICATIONS

GROUP 1: Engineer oiler; Fork lift operator (includes loed, lull or similar types)

GROUP 2: Truck crane oiler

GROUP 3: A-frame or winch truck operator; Ross carrier operator (jobsite)

GROUP 4: Bridge-type unloader and turntable operator; Helicopter hoist operator

GROUP 5: Hydraulic boom truck; Stinger crane (Austin-Western or similar type); Tugger hoist operator (1 drum)

GROUP 6: Bridge crane operator; Cretor crane operator; Hoist operator (Chicago boom and similar type); Lift mobile operator; Lift slab machine operator (Vagtborg and similar types); Material hoist and/or manlift operator; Polar gantry crane operator; Self Climbing scaffold (or similar type); Shovel, backhoe, dragline, clamshell operator (over 3/4 yd. and up to 5 cu. yds. mrc); Tugger hoist operator

GROUP 7: Pedestal crane operator; Shovel, backhoe, dragline, clamshell operator (over 5 cu. yds. mrc); Tower crane repair; Tugger hoist operator (3 drum)



GROUP 8: Crane operator (up to and including 25 ton capacity); Crawler transporter operator; Derrick barge operator (up to and including 25 ton capacity); Hoist operator, stiff legs, Guy derrick or similar type (up to and including 25 ton capacity); Shovel, backhoe, dragline, clamshell operator (over 7 cu. yds., M.R.C.)

GROUP 9: Crane operator (over 25 tons and up to and including 50 tons mrc); Derrick barge operator (over 25 tons up to and including 50 tons mrc); Highline cableway operator; Hoist operator, stiff legs, Guy derrick or similar type (over 25 tons up to and including 50 tons mrc); K-crane operator; Polar crane operator; Self erecting tower crane operator maximum lifting capacity ten tons

GROUP 10: Crane operator (over 50 tons and up to and including 100 tons mrc); Derrick barge operator (over 50 tons up to and including 100 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 50 tons up to and including 100 tons mrc), Mobile tower crane operator (over 50 tons, up to and including 100 tons M.R.C.); Tower crane operator and tower gantry

GROUP 11: Crane operator (over 100 tons and up to and including 200 tons mrc); Derrick barge operator (over 100 tons up to and including 200 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 100 tons up to and including 200 tons mrc); Mobile tower crane operator (over 100 tons up to and including 200 tons mrc)

GROUP 12: Crane operator (over 200 tons up to and including 300 tons mrc); Derrick barge operator (over 200 tons up to and including 300 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 200 tons, up to and including 300 tons mrc); Mobile tower crane operator (over 200 tons, up to and including 300 tons mrc)

GROUP 13: Crane operator (over 300 tons); Derrick barge operator (over 300 tons); Helicopter pilot; Hoist operator, stiff legs, Guy derrick or similar type (over 300 tons); Mobile tower crane operator (over 300 tons)

#### TUNNEL CLASSIFICATIONS

GROUP 1: Skiploader (wheel type up to 3/4 yd. without attachment)

GROUP 2: Power-driven jumbo form setter operator

GROUP 3: Dinkey locomotive or motorperson (up to and including 10 tons)

GROUP 4: Bit sharpener; Equipment greaser (grease truck); Slip form pump operator (power-driven hydraulic lifting device for concrete forms); Tugger hoist operator (1 drum); Tunnel locomotive operator (over 10 and up to and including 30 tons)

GROUP 5: Backhoe operator (up to and including 3/4 yd.); Small Ford, Case or similar; Drill doctor; Grouting machine operator; Heading shield operator; Heavy-duty repairperson; Loader operator (Athey, Euclid, Sierra and similar types); Mucking machine operator (1/4 yd., rubber-tired, rail or track type); Pneumatic concrete placing machine operator

(Hackley-Presswell or similar type); Pneumatic heading shield (tunnel); Pumpcrete gun operator; Tractor compressor drill combination operator; Tugger hoist operator (2 drum); Tunnel locomotive operator (over 30 tons)

GROUP 6: Heavy Duty Repairman

GROUP 7: Tunnel mole boring machine operator

#### ENGINEERS ZONES

\$1.00 additional per hour for all of IMPERIAL County and the portions of KERN, RIVERSIDE & SAN BERNARDINO Counties as defined below:

That area within the following Boundary: Begin in San Bernardino County, approximately 3 miles NE of the intersection of I-15 and the California State line at that point which is the NW corner of Section 1, T17N,m R14E, San Bernardino Meridian. Continue W in a straight line to that point which is the SW corner of the northwest quarter of Section 6, T27S, R42E, Mt. Diablo Meridian. Continue North to the intersection with the Inyo County Boundary at that point which is the NE corner of the western half of the northern quarter of Section 6, T25S, R42E, MDM. Continue W along the Inyo and San Bernardino County boundary until the intersection with Kern County, as that point which is the SE corner of Section 34, T24S, R40E, MDM. Continue W along the Inyo and Kern County boundary until the intersection with Tulare County, at that point which is the SW corner of the SE quarter of Section 32, T24S, R37E, MDM. Continue W along the Kern and Tulare County boundary, until that point which is the NW corner of T25S, R32E, MDM. Continue S following R32E lines to the NW corner of T31S, R32E, MDM. Continue W to the NW corner of T31S, R31E, MDM. Continue S to the SW corner of T32S, R31E, MDM. Continue W to SW corner of SE quarter of Section 34, T32S, R30E, MDM. Continue S to SW corner of T11N, R17W, SBM. Continue E along south boundary of T11N, SBM to SW corner of T11N, R7W, SBM. Continue S to SW corner of T9N, R7W, SBM. Continue E along south boundary of T9N, SBM to SW corner of T9N, R1E, SBM. Continue S along west boundary of R1E, SMB to Riverside County line at the SW corner of T1S, R1E, SBM. Continue E along south boundary of T1s, SBM (Riverside County Line) to SW corner of T1S, R10E, SBM. Continue S along west boundary of R10E, SBM to Imperial County line at the SW corner of T8S, R10E, SBM. Continue W along Imperial and Riverside county line to NW corner of T9S, R9E, SBM. Continue S along the boundary between Imperial and San Diego Counties, along the west edge of R9E, SBM to the south boundary of Imperial County/California state line. Follow the California state line west to Arizona state line, then north to Nevada state line, then continuing NW back to start at the point which is the NW corner of Section 1, T17N, R14E, SBM

\$1.00 additional per hour for portions of SAN LUIS OBISPO, KERN, SANTA BARBARA & VENTURA as defined below:

That area within the following Boundary: Begin approximately 5 miles north of the community of Cholame, on the Monterey County and San Luis Obispo County boundary at the NW corner of T25S, R16E, Mt. Diablo Meridian. Continue south along the west side of R16E to the SW corner of T30S, R16E, MDM. Continue E to SW corner of T30S, R17E, MDM. Continue S to SW corner of T31S, R17E, MDM. Continue E to SW corner of T31S, R18E, MDM. Continue S along West side of R18E, MDM as it crosses into San

Bernardino Meridian numbering area and becomes R30W. Follow the west side of R30W, SBM to the SW corner of T9N, R30W, SBM. Continue E along the south edge of T9N, SBM to the Santa Barbara County and Ventura County boundary at that point which is the SW corner of Section 34.T9N, R24W, SBM, continue S along the Ventura County line to that point which is the SW corner of the SE quarter of Section 32, T7N, R24W, SBM. Continue E along the south edge of T7N, SBM to the SE corner to T7N, R21W, SBM. Continue N along East side of R21W, SBM to Ventura County and Kern County boundary at the NE corner of T8N, R21W. Continue W along the Ventura County and Kern County boundary to the SE corner of T9N, R21W. Continue North along the East edge of R21W, SBM to the NE corner of T12N, R21W, SBM. Continue West along the north edge of T12N, SBM to the SE corner of T32S, R21E, MDM. [T12N SBM is a think strip between T11N SBM and T32S MDM]. Continue North along the East side of R21E, MDM to the Kings County and Kern County border at the NE corner of T25S, R21E, MDM, continue West along the Kings County and Kern County Boundary until the intersection of San Luis Obispo County. Continue west along the Kings County and San Luis Obispo County boundary until the intersection with Monterey County. Continue West along the Monterey County and San Luis Obispo County boundary to the beginning point at the NW corner of T25S, R16E, MDM.

\$2.00 additional per hour for INYO and MONO Counties and the Northern portion of SAN BERNARDINO County as defined below:

That area within the following Boundary: Begin at the intersection of the northern boundary of Mono County and the California state line at the point which is the center of Section 17, T10N, R22E, Mt. Diablo Meridian. Continue S then SE along the entire western boundary of Mono County, until it reaches Inyo County at the point which is the NE corner of the Western half of the NW quarter of Section 2, T8S, R29E, MDM. Continue SSE along the entire western boundary of Inyo County, until the intersection with Kern County at the point which is the SW corner of the SE 1/4 of Section 32, T24S, R37E, MDM. Continue E along the Inyo and Kern County boundary until the intersection with San Bernardino County at that point which is the SE corner of section 34, T24S, R40E, MDM. Continue E along the Inyo and San Bernardino County boundary until the point which is the NE corner of the Western half of the NW quarter of Section 6, T25S, R42E, MDM. Continue S to that point which is the SW corner of the NW quarter of Section 6, T27S, R42E, MDM. Continue E in a straight line to the California and Nevada state border at the point which is the NW corner of Section 1, T17N, R14E, San Bernardino Meridian. Then continue NW along the state line to the starting point, which is the center of Section 18, T10N, R22E, MDM.

REMAINING AREA NOT DEFINED ABOVE RECIEVES BASE RATE

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 ENGI0012-004 08/01/2020

Rates Fringes

OPERATOR: Power Equipment  
 (DREDGING)

(1) Leverman.....	\$ 56.40	30.00
(2) Dredge dozer.....	\$ 50.43	30.00
(3) Deckmate.....	\$ 50.32	30.00

(4) Winch operator (stern winch on dredge).....	\$ 49.77	30.00
(5) Fireman-Oiler, Deckhand, Bargeman, Leveehand.....	\$ 49.23	30.00
(6) Barge Mate.....	\$ 49.84	30.00

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IRON0229-001 01/01/2022

	Rates	Fringes
IRONWORKER		
Fence Erector.....	\$ 39.83	25.31
Ornamental, Reinforcing and Structural.....	\$ 44.75	33.95

PREMIUM PAY:

\$6.00 additional per hour at the following locations:

China Lake Naval Test Station, Chocolate Mountains Naval Reserve-Niland, Edwards AFB, Fort Irwin Military Station, Fort Irwin Training Center-Goldstone, San Clemente Island, San Nicholas Island, Susanville Federal Prison, 29 Palms - Marine Corps, U.S. Marine Base - Barstow, U.S. Naval Air Facility - Sealey, Vandenberg AFB

\$4.00 additional per hour at the following locations:

Army Defense Language Institute - Monterey, Fallon Air Base, Naval Post Graduate School - Monterey, Yermo Marine Corps Logistics Center

\$2.00 additional per hour at the following locations:

Port Hueneme, Port Mugu, U.S. Coast Guard Station - Two Rock

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LABO0300-005 08/01/2022

	Rates	Fringes
Asbestos Removal Laborer.....	\$ 39.23	23.28

SCOPE OF WORK: Includes site mobilization, initial site cleanup, site preparation, removal of asbestos-containing material and toxic waste, encapsulation, enclosure and disposal of asbestos- containing materials and toxic waste by hand or with equipment or machinery; scaffolding, fabrication of temporary wooden barriers and assembly of decontamination stations.

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LABO0345-001 07/01/2022

	Rates	Fringes
LABORER (GUNITE)		
GROUP 1.....	\$ 48.50	21.37
GROUP 2.....	\$ 47.55	21.37
GROUP 3.....	\$ 44.01	21.37

FOOTNOTE: GUNITE PREMIUM PAY: Workers working from a Bosn'n's Chair or suspended from a rope or cable shall

receive 40 cents per hour above the foregoing applicable classification rates. Workers doing gunite and/or shotcrete work in a tunnel shall receive 35 cents per hour above the foregoing applicable classification rates, paid on a portal-to-portal basis. Any work performed on, in or above any smoke stack, silo, storage elevator or similar type of structure, when such structure is in excess of 75'-0" above base level and which work must be performed in whole or in part more than 75'-0" above base level, that work performed above the 75'-0" level shall be compensated for at 35 cents per hour above the applicable classification wage rate.

GUNITE LABORER CLASSIFICATIONS

GROUP 1: Rodmen, Nozzlemen

GROUP 2: Gunmen

GROUP 3: Reboundmen

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LAB01184-001 07/01/2022

	Rates	Fringes
Laborers: (HORIZONTAL DIRECTIONAL DRILLING)		
(1) Drilling Crew Laborer...	\$ 40.69	18.25
(2) Vehicle Operator/Hauler.	\$ 40.86	18.25
(3) Horizontal Directional Drill Operator.....	\$ 42.71	18.25
(4) Electronic Tracking Locator.....	\$ 44.71	18.25
Laborers: (STRIPING/SLURRY SEAL)		
GROUP 1.....	\$ 41.90	21.32
GROUP 2.....	\$ 43.20	21.32
GROUP 3.....	\$ 45.21	21.32
GROUP 4.....	\$ 46.95	21.32

LABORERS - STRIPING CLASSIFICATIONS

GROUP 1: Protective coating, pavement sealing, including repair and filling of cracks by any method on any surface in parking lots, game courts and playgrounds; carstops; operation of all related machinery and equipment; equipment repair technician

GROUP 2: Traffic surface abrasive blaster; pot tender - removal of all traffic lines and markings by any method (sandblasting, waterblasting, grinding, etc.) and preparation of surface for coatings. Traffic control person: controlling and directing traffic through both conventional and moving lane closures; operation of all related machinery and equipment

GROUP 3: Traffic delineating device applicator: Layout and application of pavement markers, delineating signs, rumble and traffic bars, adhesives, guide markers, other traffic delineating devices including traffic control. This category includes all traffic related surface preparation (sandblasting, waterblasting, grinding) as part of the application process. Traffic protective delineating system installer: removes, relocates, installs, permanently

affixed roadside and parking delineation barricades, fencing, cable anchor, guard rail, reference signs, monument markers; operation of all related machinery and equipment; power broom sweeper

GROUP 4: Striper: layout and application of traffic stripes and markings; hot thermo plastic; tape traffic stripes and markings, including traffic control; operation of all related machinery and equipment

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LABO1184-002 07/01/2022

	Rates	Fringes
LABORER (TUNNEL)		
GROUP 1.....	\$ 45.68	23.30
GROUP 2.....	\$ 46.00	23.30
GROUP 3.....	\$ 46.46	23.30
GROUP 4.....	\$ 47.15	23.30
LABORER		
GROUP 1.....	\$ 36.39	21.04
GROUP 2.....	\$ 36.94	21.04
GROUP 3.....	\$ 37.49	21.04
GROUP 4.....	\$ 39.04	21.04
GROUP 5.....	\$ 39.39	21.04

LABORER CLASSIFICATIONS

GROUP 1: Cleaning and handling of panel forms; Concrete screeding for rough strike-off; Concrete, water curing; Demolition laborer, the cleaning of brick if performed by a worker performing any other phase of demolition work, and the cleaning of lumber; Fire watcher, limber, brush loader, piler and debris handler; Flag person; Gas, oil and/or water pipeline laborer; Laborer, asphalt-rubber material loader; Laborer, general or construction; Laborer, general clean-up; Laborer, landscaping; Laborer, jetting; Laborer, temporary water and air lines; Material hose operator (walls, slabs, floors and decks); Plugging, filling of shee bolt holes; Dry packing of concrete; Railroad maintenance, repair track person and road beds; Streetcar and railroad construction track laborers; Rigging and signaling; Scaler; Slip form raiser; Tar and mortar; Tool crib or tool house laborer; Traffic control by any method; Window cleaner; Wire mesh pulling - all concrete pouring operations

GROUP 2: Asphalt shoveler; Cement dumper (on 1 yd. or larger mixer and handling bulk cement); Cesspool digger and installer; Chucktender; Chute handler, pouring concrete, the handling of the chute from readymix trucks, such as walls, slabs, decks, floors, foundation, footings, curbs, gutters and sidewalks; Concrete curer, impervious membrane and form oiler; Cutting torch operator (demolition); Fine grader, highways and street paving, airport, runways and similar type heavy construction; Gas, oil and/or water pipeline wrapper - pot tender and form person; Guinea chaser; Headerboard person - asphalt; Laborer, packing rod steel and pans; Membrane vapor barrier installer; Power broom sweeper (small); Riprap stonepaver, placing stone or wet sacked concrete; Roto scraper and tiller; Sandblaster (pot tender); Septic tank digger and installer(lead); Tank scaler and cleaner; Tree climber, faller, chain saw operator, Pittsburgh chipper and similar type brush shredder; Underground laborer, including caisson bellower

GROUP 3: Buggymobile person; Concrete cutting torch; Concrete pile cutter; Driller, jackhammer, 2-1/2 ft. drill steel or longer; Dri-pak-it machine; Gas, oil and/or water pipeline wrapper, 6-in. pipe and over, by any method, inside and out; High scaler (including drilling of same); Hydro seeder and similar type; Impact wrench multi-plate; Kettle person, pot person and workers applying asphalt, lay-kold, creosote, lime caustic and similar type materials ("applying" means applying, dipping, brushing or handling of such materials for pipe wrapping and waterproofing); Operator of pneumatic, gas, electric tools, vibrating machine, pavement breaker, air blasting, come-alongs, and similar mechanical tools not separately classified herein; Pipelayer's backup person, coating, grouting, making of joints, sealing, caulking, diapering and including rubber gasket joints, pointing and any and all other services; Rock slinger; Rotary scarifier or multiple head concrete chipping scarifier; Steel headerboard and guideline setter; Tamper, Barko, Wacker and similar type; Trenching machine, hand-propelled

GROUP 4: Asphalt raker, lute person, ironer, asphalt dump person, and asphalt spreader boxes (all types); Concrete core cutter (walls, floors or ceilings), grinder or sander; Concrete saw person, cutting walls or flat work, scoring old or new concrete; Cribber, shorer, lagging, sheeting and trench bracing, hand-guided lagging hammer; Head rock slinger; Laborer, asphalt- rubber distributor boot person; Laser beam in connection with laborers' work; Oversize concrete vibrator operator, 70 lbs. and over; Pipelayer performing all services in the laying and installation of pipe from the point of receiving pipe in the ditch until completion of operation, including any and all forms of tubular material, whether pipe, metallic or non-metallic, conduit and any other stationary type of tubular device used for the conveying of any substance or element, whether water, sewage, solid gas, air, or other product whatsoever and without regard to the nature of material from which the tubular material is fabricated; No-joint pipe and stripping of same; Prefabricated manhole installer; Sandblaster (nozzle person), water blasting, Porta Shot-Blast

GROUP 5: Blaster powder, all work of loading holes, placing and blasting of all powder and explosives of whatever type, regardless of method used for such loading and placing; Driller: All power drills, excluding jackhammer, whether core, diamond, wagon, track, multiple unit, and any and all other types of mechanical drills without regard to the form of motive power; Toxic waste removal

#### TUNNEL LABORER CLASSIFICATIONS

GROUP 1: Batch plant laborer; Changehouse person; Dump person; Dump person (outside); Swamper (brake person and switch person on tunnel work); Tunnel materials handling person; Nipper; Pot tender, using mastic or other materials (for example, but not by way of limitation, shotcrete, etc.)

GROUP 2: Chucktender, cabledtender; Loading and unloading agitator cars; Vibrator person, jack hammer, pneumatic tools (except driller); Bull gang mucker, track person; Concrete crew, including rodder and spreader

GROUP 3: Blaster, driller, powder person; Chemical grout jet

person; Cherry picker person; Grout gun person; Grout mixer person; Grout pump person; Jackleg miner; Jumbo person; Kemper and other pneumatic concrete placer operator; Miner, tunnel (hand or machine); Nozzle person; Operating of troweling and/or grouting machines; Powder person (primer house); Primer person; Sandblaster; Shotcrete person; Steel form raiser and setter; Timber person, retimber person, wood or steel; Tunnel Concrete finisher

GROUP 4: Diamond driller; Sandblaster; Shaft and raise work

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LAB01184-004 07/01/2022

	Rates	Fringes
Brick Tender.....	\$ 37.32	21.45

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LAB01414-003 08/03/2022

	Rates	Fringes
LABORER		
PLASTER CLEAN-UP LABORER....	\$ 38.92	23.32
PLASTER TENDER.....	\$ 41.47	23.32

Work on a swing stage scaffold: \$1.00 per hour additional.

Work at Military Bases - \$3.00 additional per hour:  
 Coronado Naval Amphibious Base, Fort Irwin, Marine Corps Air Station-29 Palms, Imperial Beach Naval Air Station, Marine Corps Logistics Supply Base, Marine Corps Pickle Meadows, Mountain Warfare Training Center, Naval Air Facility-Seeley, North Island Naval Air Station, Vandenberg AFB.

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PAIN0036-001 07/01/2020

	Rates	Fringes
Painters: (Including Lead Abatement)		
(1) Repaint (excludes San Diego County).....	\$ 29.59	17.12
(2) All Other Work.....	\$ 33.12	17.24

REPAINT of any previously painted structure. Exceptions: work involving the aerospace industry, breweries, commercial recreational facilities, hotels which operate commercial establishments as part of hotel service, and sports facilities.

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PAIN0036-008 09/01/2022

	Rates	Fringes
DRYWALL FINISHER/TAPER.....	\$ 46.28	23.52

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PAIN0036-013 10/01/2022

	Rates	Fringes
GLAZIER.....	\$ 47.90	20.71



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\* PAIN0036-019 06/01/2022

	Rates	Fringes
SOFT FLOOR LAYER.....	\$ 34.77	17.89

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PLAS0200-004 08/03/2022

	Rates	Fringes
PLASTERER.....	\$ 47.37	19.64

Work at Naval Air Facility Seeley: \$3.00 additional per hour

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PLAS0500-002 07/01/2020

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 38.50	25.91

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PLUM0016-008 09/01/2022

	Rates	Fringes
PLUMBER/PIPEFITTER		
Seeley Naval Air Station....	\$ 65.68	26.26
Work ONLY on new additions and remodeling of bars, restaurants, stores and commercial buildings, not to exceed 5,000 sq. ft. of floor space.....	\$ 53.51	25.28
Work ONLY on strip malls, light commercial, tenant improvement and remodel work.....	\$ 40.95	23.61
All other work except work on new additions and remodeling of bars, restaurant, stores and commercial buildings not to exceed 5,000 sq. ft. of floor space and work on strip malls, light commercial, tenant improvement and remodel work.....	\$ 55.18	26.26

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PLUM0345-001 09/01/2022

	Rates	Fringes
PLUMBER		
Landscape/Irrigation Fitter..	\$ 38.20	25.65
Sewer & Storm Drain Work....	\$ 42.29	23.03

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ROOF0045-001 07/01/2022

	Rates	Fringes
ROOFER.....	\$ 39.90	11.19

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SFCA0669-002 01/01/2022

	Rates	Fringes
SPRINKLER FITTER.....	\$ 41.27	26.77
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SHEE0206-002 07/01/2020		

	Rates	Fringes
Sheet Metal (TECHNICIAN).....	\$ 30.51	9.49
SHEET METAL WORKER.....	\$ 40.62	29.55

SHEET METAL TECHNICIAN - SCOPE:

LIGHT COMMERCIAL WORK: Any sheet metal, heating and air conditioning work performed on a project where the total construction cost, excluding land, is under \$1,000,000.  
 TENANT IMPROVEMENT WORK: Any work necessary to finish interior spaces to conform to the occupants of commercial buildings, after completion of the building shell

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 TEAM0011-002 07/01/2020

	Rates	Fringes
TRUCK DRIVER		
GROUP 1.....	\$ 32.59	30.59
GROUP 2.....	\$ 32.74	30.59
GROUP 3.....	\$ 32.87	30.59
GROUP 4.....	\$ 33.06	30.59
GROUP 5.....	\$ 33.09	30.59
GROUP 6.....	\$ 33.12	30.59
GROUP 7.....	\$ 33.37	30.59
GROUP 8.....	\$ 33.62	30.59
GROUP 9.....	\$ 33.82	30.59
GROUP 10.....	\$ 34.12	30.59
GROUP 11.....	\$ 34.62	30.59
GROUP 12.....	\$ 35.05	30.59

WORK ON ALL MILITARY BASES:

PREMIUM PAY: \$3.00 per hour additional.  
 [29 palms Marine Base, Camp Roberts, China Lake, Edwards AFB, El Centro Naval Facility, Fort Irwin, Marine Corps Logistics Base at Nebo & Yermo, Mountain Warfare Training Center, Bridgeport, Point Arguello, Point Conception, Vandenberg AFB]

TRUCK DRIVERS CLASSIFICATIONS

GROUP 1: Truck driver

GROUP 2: Driver of vehicle or combination of vehicles - 2 axles; Traffic control pilot car excluding moving heavy equipment permit load; Truck mounted broom

GROUP 3: Driver of vehicle or combination of vehicles - 3 axles; Boot person; Cement mason distribution truck; Fuel truck driver; Water truck - 2 axle; Dump truck, less than 16 yds. water level; Erosion control driver

GROUP 4: Driver of transit mix truck, under 3 yds.; Dumpcrete truck, less than 6-1/2 yds. water level

GROUP 5: Water truck, 3 or more axles; Truck greaser and tire

person (\$0.50 additional for tire person); Pipeline and utility working truck driver, including winch truck and plastic fusion, limited to pipeline and utility work; Slurry truck driver

GROUP 6: Transit mix truck, 3 yds. or more; Dumpcrete truck, 6-1/2 yds. water level and over; Vehicle or combination of vehicles - 4 or more axles; Oil spreader truck; Dump truck, 16 yds. to 25 yds. water level

GROUP 7: A Frame, Swedish crane or similar; Forklift driver; Ross carrier driver

GROUP 8: Dump truck, 25 yds. to 49 yds. water level; Truck repair person; Water pull - single engine; Welder

GROUP 9: Truck repair person/welder; Low bed driver, 9 axles or over

GROUP 10: Dump truck - 50 yds. or more water level; Water pull - single engine with attachment

GROUP 11: Water pull - twin engine; Water pull - twin engine with attachments; Winch truck driver - \$1.25 additional when operating winch or similar special attachments

GROUP 12: Boom Truck 17K and above

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the

cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

#### Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

#### Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

#### Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISIO"

**4. BID FORM**

Project Identification: **Seeley Fire and Cooling Center**

Contract Identification and Number: **CDBG Grant No. 18-CDBG-12924**

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**ARTICLE 1 - BID RECIPIENT**

- 1.01 This Bid Is Submitted To: **Office of the Clerk of the Board of Supervisors  
940 W. Main Street, Suite 209  
El Centro, CA 92243**
- 1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with the Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in the Bid and in accordance with the other terms and conditions of the Bidding Documents.

**ARTICLE 2 - BIDDER'S ACKNOWLEDGMENTS**

- 2.01 The Bidder accepts all of the terms and conditions of the Advertisement and Instructions to Bidders, including without limitations those dealing with the dispositions of Bid Security. The Bid will remain subject to acceptance for **sixty (60) days** after the Bid Opening, or for such longer period of time that the Bidder may agree to in writing upon a request from the Owner.

**ARTICLE 3 - BIDDER'S REPRESENTATIONS**

- 3.01 In submitting this Bid, the Bidder represents that:
  - A. The Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged.
 

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____
_____	_____
  - B. The Bidder has visited the Site and become familiar with and is satisfied as to the General, Local, and Site conditions that may affect cost, progress, and performance of the Work.
  - C. The Bidder is familiar with and is satisfied as to all Federal, State, and Local Laws and Regulations that may affect cost, progress, and performance of the Work.

- D. The Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities), if any, which have been identified in Supplementary Conditions 4.02, and (2) reports and drawings of a Hazard Environmental Condition, if any, which has been identified in Supplementary Conditions 4.06.
- E. The Bidder has obtained and carefully studied (or accepts the consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by the Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by the Bidder, and safety precautions and programs incident thereto.
- F. The Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- G. The Bidder is aware of the general nature of the Work to be performed by the Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. The Bidder has correlated the information known to the Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.
- I. The Bidder has given the Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that the Bidder has discovered in the Bidding Documents, and the written resolution thereof by the Engineer is acceptable to the Bidder.
- J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
- K. The Bidder will submit written evidence of its authority to do business in the State where the Project is located not later than the date of its execution of the Agreement.

#### **ARTICLE 4 - FURTHER REPRESENTATIONS**

4.01 The Bidder further represents that:

- A. This Bid is genuine and not made in the interest of or on the behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation;
- B. The Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. The Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. The Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over the Owner.

**ARTICLE 5 – BASIS OF BID – SCHEDULE OF VALUES**

5.01 The Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

**BID – TOTAL FOR COMPARISON**

Construct the Seeley Fire Station and Cooling Center complete in its entirety in strict conformance with the Civil, Architectural, Mechanical, Electrical, Plumbing and Structural Drawings as listed in Supplementary Conditions 1.01.A.18; Project Manual Items as listed in Supplementary Conditions 1.01.A.35 and addendum(a) for the lump sum of

\_\_\_\_\_ \$ \_\_\_\_\_ (FIGURES)

\_\_\_\_\_

\_\_\_\_\_ (WORDS)



**ARTICLE 6 - TIME OF COMPLETION**

- 6.01 The Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07.B of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 6.02 The Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the work within the Contract Times.

**ARTICLE 7 - ATTACHMENTS TO BID**

7.01 The following documents are attached to and made a condition of the Bid:

- A. Non-Collusion Affidavit;
- B. Required Bid Security of ten percent (10%) in the form of a Bid Bond (Section 00430) or Certified Check (circle type of security provided);
- C. If Bid amount exceeds \$10,000, signed Compliance Statement/Certifications of Non-segregated Facilities (Section 00440). Refer to specific equal opportunity requirements set forth in Paragraph 18.10 of the General Conditions;
- D. If Bid amount exceeds \$25,000, Federal and State contract language inclusion dated January 1, 2014 including signed Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions (Within Section 00451) and initial and signed Inclusion Document.
- E. If Bid amount exceeds \$100,000, signed Certification for Contracts, Grant, and Loans (Section 00460). Refer to paragraph 18.11 of the General Conditions;
- F. Worker's Compensation Insurance Certification;
- G. A Tabulation of Subcontractors with Names and Addresses and percent of Total Contract;
- H. Bidder Qualifications Statement with supporting data; and
- I. Tabulation of Major Material Suppliers.

**ARTICLE 8 - DEFINED TERMS**

- 8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

**ARTICLE 9 - BID SUBMITTAL**

9.01 This Bid submitted by:

If Bidder is:

**An Individual**

Name (typed or printed): \_\_\_\_\_

By: \_\_\_\_\_

(Individual's signature)

SEAL,  
if required  
by State

Doing business as: \_\_\_\_\_

**A Partnership**

Partnership Name: \_\_\_\_\_

By: \_\_\_\_\_

(Signature of general partner -- attach evidence of authority to sign)

SEAL,  
if required  
by State

Name (typed or printed): \_\_\_\_\_

**A Corporation**

Corporation Name: \_\_\_\_\_

State of Incorporation: \_\_\_\_\_

Type (General Business, Profession, Service, Limited Liability): \_\_\_\_\_

By: \_\_\_\_\_

(Signature -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_

Attest \_\_\_\_\_

(Signature of Corporate Secretary)

CORPORATE  
SEAL,  
if required by State

Date of Qualification to do business in \_\_\_\_\_ California is \_\_\_/\_\_\_/\_\_\_\_\_

**A Joint Venture**

Name of Joint Venture: \_\_\_\_\_

SEAL,  
if required  
by State

First Joint Venture Name: \_\_\_\_\_

By: \_\_\_\_\_

(Signature of joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_

Second Joint Venture Name: \_\_\_\_\_

SEAL,  
if required  
by State

By: \_\_\_\_\_

(Signature of joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is party to the venture should be in the manner indicated above.)

Bidder's Business Address:

\_\_\_\_\_

\_\_\_\_\_

Business Phone No. (\_\_\_\_) \_\_\_\_\_

Business Fax No. (\_\_\_\_) \_\_\_\_\_

Business E-Mail Address \_\_\_\_\_

State Contractor License No. \_\_\_\_\_.

Employer's Tax ID No. \_\_\_\_\_

Phone and Fax Numbers, and Address for receipt of official communications, if different from Business Contact Information:

\_\_\_\_\_

\_\_\_\_\_

9.02 Bid submitted on \_\_\_\_\_, 20\_\_.

**5. NON COLLUSION AFFIDAVIT**  
(Public Contract Code Section 7106)

State of California

County of \_\_\_\_\_

\_\_\_\_\_, being first duly sworn, deposes and says that he or she is \_\_\_\_\_ of \_\_\_\_\_, the party making the foregoing bid, that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that 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 that anyone shall refrain from bidding; that 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, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and further that 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, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

By: \_\_\_\_\_

Subscribed and sworn to before me on \_\_\_\_\_  
(Date)

\_\_\_\_\_  
(Notary Public)

(SEAL)

**6. BID BOND**

Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

---

BIDDER (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):  
**County of Imperial**  
**Imperial County Department of Public Works**  
**155 South 11<sup>th</sup> Street,**  
**El Centro, CA 92243**

BID  
Bid Due Date:  
Project: **Seeley Fire and Cooling Center**  
BOND  
Bond Number:

Date (Not later than Bid due date):

Penal sum \_\_\_\_\_ (Words) \_\_\_\_\_ (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER

SURETY

\_\_\_\_\_  
Bidder's Name and Corporate Seal (Seal)

\_\_\_\_\_  
Surety's Name and Corporate Seal (Seal)

By: \_\_\_\_\_  
Signature and Title

By: \_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

Attest: \_\_\_\_\_  
Signature and Title

Attest: \_\_\_\_\_  
Signature and Title

Note: Above addresses are to be used for giving required notice.

1. The Bidder and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to the Owner upon default of the Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of the Surety's liability.
2. Default of the Bidder shall occur upon the failure of the Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by the Owner) the executed Agreement required by the Bidding Documents and the Performance and Payment Bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
  - 3.1 The Owner accepts the Bidder's Bid and the Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by the Owner) the executed Agreement required by the Bidding Documents and the Performance and Payment Bonds required by the Bidding Documents, or
  - 3.2 All Bids are rejected by the Owner, or
  - 3.3 The Owner fails to issue a Notice of Award to the Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by the Bidder and, if applicable, consented to by the Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default by the Bidder and within **thirty (30) calendar days** after receipt by the Bidder and the Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. The Surety waives notice of any and all defenses based upon or arising out of any time extension to issue the Notice of Award agreed to in writing by the Owner and the Bidder, provided that the total time for issuing the Notice of Award including extensions shall not in the aggregate exceed **one hundred and twenty (120) days** from Bid due date without the Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to **thirty (30) calendar days** after the notice of default required in Paragraph 4 above is received by the Bidder and the Surety and in no case later than **one (1) year** after the Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the State of California.
8. Notices required hereunder shall be in writing and sent to the Bidder and the Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. The Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of the Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

## 7. COMPLIANCE STATEMENT

This statement relates to a proposed contract with County of Imperial  
(Name of borrower or grantee)

Who expects to finance the contract with assistance from the Community Development Block Grant (CDBG) or their successor agencies, California Department of Housing and Community Development (HCD) (whether by a loan, grant, loan insurance, guarantee, or other form of financial assistance). I am the Undersigned Bidder or Prospective Contractor. I represent that:

1. I  have,  have not, participated in a previous contract or subcontract subject to Executive Order 11246 (regarding equal employment opportunity) or a preceding similar Executive Order.
2. If I have participated in such a contract or subcontract, I  have,  have not, filed all Compliance Reports that I have been required to file in connection with the contract or subcontract.

If the proposed contract is for \$50,000 or more and I have 50 or more employees, I also represent that:

3. I  have,  have not, previously had contracts subject to the written Affirmative Action Program Requirements of the Secretary of Labor.
4. If I have participated in such a contract or subcontract, I  have,  have not, developed and placed on file at each establishment Affirmative Action Programs as required by the rules and regulations of the Secretary of Labor.

I understand that if I have failed to file any compliance reports that have been required by me, I am not eligible and will not be eligible to have my bid considered or to enter into the proposed contract unless and until I make an arrangement regarding such reports that is satisfactory to the HCD, or to the office of the governing agency where the reports are required to be filed.

I also certify that I do not maintain or provide for my employees any segregated facilities at any of my establishments, and that I do not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. I certify further that I will not maintain or provide for my employees any segregated facilities at any of my establishments, and that I will not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. I agree that a breach of this certification is a violation of the Equal Opportunity Clause in my contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. I further agree that (except where I have obtained identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause; that I will retain such certifications in my files; and that I will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods).

**7A. NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENTS  
FOR  
CERTIFICATIONS OF NON-SEGREGATED FACILITIES**

A certification of Nonsegregated Facilities, as required by the May 9, 1967, Order (32F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually)

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

Date: \_\_\_\_\_

\_\_\_\_\_  
(Signature of Bidder or Prospective Contractor)

\_\_\_\_\_  
Address (including Zip Code)



**8. FEDERAL AND STATE CONTRACT LANGUAGE INCLUSION - JANUARY 01, 2014 - EXHIBIT 'A'**

The Contractor shall submit the Exhibit 'A' – Federal and State Contract Language Inclusion dated January 1, 2014 as a part of the Bid. Exhibit 'A' is attached as follows:

# EXHIBIT 'A'

## FEDERAL AND STATE CONTRACT LANGUAGE INCLUSION

### JANUARY 01, 2014

#### Public Works Projects Required Bid Language

Required contract language for all state Public Works construction contracts between an awarding agency and the prime contractor; subcontractor contracts with the prime contractor; and any lower tier subcontracts.

#### California Labor Codes:

This Public Works project is funded by Agencies in California and requires compliance with the California Labor Standards, California Code of Regulations pertaining to Public Works projects, California Labor Codes and the California prevailing wage requirements with special attention to CLC §1720, CLC §1770, CLC § 1771, CLC § 1775, CLC § 1776, CLC §1777.5, CLC §1777.7, CLC §1810 through § 1815 and CLC §3700.

The contract executed between the contractor and the subcontractor or the performance of work on the public works project shall include a copy of the provisions of Sections 1771, 1775, 1776, 1777.5, 1813, and 1815.

**CLC § 1720;** State prevailing wage rates shall apply when the State wage rate is higher than the Federal wage rate. All contractors and subcontractors are subject to the application of Section 1720 et seq. of the California Labor Code which details the regulations and procedures governing the payment of State prevailing wages. Etc.

**CLC § 1727;** (a) Before making payments to the contractor of money due under a contract for public work, the awarding body shall withhold and retain there from all amounts required to satisfy any civil wage and penalty assessment issued by the Labor Commissioner under this chapter. The amounts required to satisfy a civil wage and penalty assessment shall not be disbursed by the awarding body until receipt of a final order that is no longer subject to judicial review. Etc.

**CLC § 1729;** It shall be lawful for any contractor to withhold from any subcontractor under him sufficient sums to cover any penalties withheld from him by the awarding body on account of the subcontractor's failure to comply with the terms of this chapter, and if payment has already been made to the subcontractor the contractor may recover from him the amount of the penalty or forfeiture in a suit at law.

**CLC § 1729;** It shall be lawful for any contractor to withhold from any subcontractor under him sufficient sums to cover any penalties withheld from him by the awarding body on account of the subcontractor's failure to comply with the terms of this chapter, and if payment has already been made to the subcontractor the contractor may recover from him the amount of the penalty or forfeiture in a suit at law. Etc.

**CLC § 1771.2;** A joint labor-management committee established pursuant to the federal Labor Management Cooperation Act of 1978 (Section 175a of Title 29 of the United States Code) may bring an action in any court of competent jurisdiction against an employer that fails to pay the prevailing wage to its employees, as required by this article.

#### CLC § 1775; PENALTIES FOR INCORRECT WAGES

1775. (a) (1) The contractor and any subcontractor under the contractor shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit not more than fifty dollars (\$50) for **each calendar day**, or portion thereof, for each worker paid less than the prevailing wage rates as determined by the director for the work or craft in which the worker is employed for any public work done under the contract by the contractor or, except as provided in subdivision (b), by any subcontractor under the contractor.

**CLC § 1776;** Each contractor and subcontractor shall keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following:

**CLC § 1777.5 APPRENTICE REQUIREMENTS;**

When the contractor to whom the contract is awarded by the state or any political subdivision, in performing any of the work under the contract, employs workers in any apprenticeable craft or trade, the contractor shall employ apprentices in at least the ratio set forth in this section and may apply to any apprenticeship program in the craft or trade that can provide apprentices to the site of the public work for a certificate approving the contractor under the apprenticeship standards for the employment and training of apprentices in the area or industry affected.

**CLC § 1777.7 APPRENTICE PENALTIES;** A contractor or subcontractor that is determined by the Chief of the Division of Apprenticeship Standards to have knowingly violated Section 1777.5 shall forfeit as a civil penalty an amount not exceeding one hundred dollars (\$100) for each full calendar day of noncompliance. The amount of this penalty may be reduced by the Chief if the amount of the penalty would be disproportionate to the severity of the violation. A contractor or subcontractor that knowingly commits a second or subsequent violation of Section 1777.5 within a three-year period, where the noncompliance results in apprenticeship training not being provided as required by this chapter, shall forfeit as a civil penalty the sum of not more than three hundred dollars (\$300) for each full calendar day of noncompliance.

**CLC § 1810-1814;** All contractors and subcontractors are subject to the provisions of Sections 1810-1814 of the California Labor Code which provide that the maximum hours a worker is to be employed is limited to eight hours a day and 40 hours a week and the contractor or subcontractor shall forfeit, as a penalty, \$25 for each worker employed in the execution of the contract for each calendar day during which a worker is required or permitted to labor more than eight hours in any calendar day or more than 40 hours in any calendar week and is not paid overtime. Etc.

**CLC § 1815;** of the California Labor Code requires that notwithstanding the provisions of Sections 1810-1814, employees of contractors who work in excess of eight hours per day and 40 hours per week shall be compensated for all hours worked in excess of eight hours per day at not less than 1-1/2 times the basic rate of pay. Etc.

**CLC § Section 1860;** The awarding body shall cause to be inserted in every public works contract a clause providing that, in accordance with the provisions of Section 3700 of the Labor Code, every contractor will be required to secure the payment of compensation to his employees.

**CLC § 1861;** Each contractor to whom a public works contract is awarded shall sign and file with the awarding body the following certification prior to performing the work of the contract: "I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract."

**CONFLICT OF INTEREST:**

Contractor needs to be aware of the following provisions regarding current or former state employees. If Contractor has any questions on the status of any person rendering services or involved with the Agreement, the Department must be contacted immediately for clarification. The following explanations are general in nature. Please review the actual text of the statutes for detailed application.

**Public Contracts Code section 10410 – Current State Employees:**

- 1) No officer or employee shall engage in any employment, activity or enterprise from which the officer or employee receives compensation or has a financial interest and which is sponsored or funded by any state agency, unless the employment, activity or enterprise is required as a condition of regular state employment.
- 2) No officer or employee shall contract on his or her own behalf as an independent contractor with any state agency to provide goods or services.

**Public Contracts Code section 10411—Former State Employees:**

- 1) For the two-year period from the date he or she left state employment, no former state officer or employee may enter into a contract in which he or she engaged in any of the negotiations, transactions, planning, arrangements or any part of the decision-making process relevant to the contract while employed in any capacity by any state agency.
- 2) For the twelve-month period from the date he or she left state employment, no former state officer or employee may enter into a contract with any state agency if he or she was employed by that state agency in a policy-making position in the same general subject area as the proposed contract within the twelve (12) month period prior to his or her leaving state service.

**Public Contracts Code section 10420:**

If Contractor violates any provisions of above paragraphs, such action by Contractor shall render this Agreement void.

**Public Contracts Code section 10430 (e):**

Members of boards and commissions are exempt from this section if they do not receive payment other than payment of each meeting of the board or commission, payment for preparatory time and payment for per diem.

**NONDISCRIMINATION:**

The Contractor will not discriminate against any employee or applicant for employment because of race, color, creed, religion, ancestry, national origin, sex, disability or other handicap, age, marital/familial status, or status with regard to public assistance. The Contractor will take affirmative action to insure that all employment practices are free from such discrimination. Such employment practices include, but are not limited to, the following: hiring, upgrading, demotion, transfer, recruitment or recruitment advertising layoff, termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting agency setting forth the provisions of the nondiscrimination clause.

**TERMINATION FOR CAUSE:**

The City/County may terminate this Agreement and be relieved of any payments should the Contractor fail to perform the requirements of this Agreement at the time and in the manner herein provided. In the event of such termination, the City/County may proceed with the work in any manner deemed proper by the City/County. All costs to the City/County shall be deducted from any sum due the Contractor under this Agreement and the balance, if any, shall be paid to the Contractor.

**CHILD SUPPORT COMPLIANCE ACT:**

For any agreement in excess of \$100,000, the Contractor acknowledges in accordance with, that:

- 1) The contractor recognizes the importance of child and family support obligations and shall fully comply with all applicable state and federal laws relating to child and family support enforcement, including, but not limited to, disclosure of information and compliance with earnings assignment orders, as provided in Chapter 8 (commencing with section 5200) of Part 5 of Division 9 of the Family Code; and
- 2) The contractor, to the best of its knowledge is fully complying with the earnings assignment orders of all employees and is providing the names of all new employees to the New Hire Registry maintained by the California Employment Development Department.

**UNION ORGANIZING:**

By signing this agreement, Contractor hereby acknowledges the applicability of Government Code section 16645 through section 16649 to this agreement.

- a. Contractor will not assist, promote or deter union organizing by employees performing work on a state construction contract, including a public works contract.
- b. No state funds received under this agreement will be used to assist, promote or deter union organizing.
- c. Contractor will not, for any business conducted under this agreement, use any state property to hold meetings with employees or supervisors, if the purpose of such meetings is to assist, promote or deter union organizing, unless the state property is equally available to the general public for holding meetings.
- d. If Contractor incurs costs, or makes expenditures to assist, promote or deter union organizing, the Contractor will maintain records sufficient to show that no reimbursement from state funds has been sought for these costs, and that Contractor shall provide those records to the Attorney General upon request.

**DRUG FREE WORKPLACE:**

By signing this Agreement, Contractor hereby certifies under penalty of perjury under the laws of the State of California that Contractor will comply with the requirements of the Drug-Free Workplace Act of 1990 (Gov. Code, §8350 et seq.) and will provide a drug-free workplace by taking the following actions:

- a. Publish a statement notifying employees that unlawful manufacture, distribution, dispensation, possession or use of a controlled substance is prohibited and specifying actions to be taken against employees for violations.
- b. Establish a Drug-Free Awareness Program to inform employees about: (1) the dangers of drug abuse in the workplace; (2) the Contractor's policy of maintaining a drug-free workplace; (3) any available counseling, rehabilitation and employee assistance programs; and (4) penalties that may be imposed upon employees for drug abuse violations.

c. Every employee who works at the Property will: (1) receive a copy of the Contractor's drug-free workplace policy statement; and (2) agree to abide by the terms of the Contractor's statement as a condition of employment at the Property.

Failure to comply with these requirements may result in suspension of payments under the Agreement or termination of the Agreement or both and Contractor may be ineligible for award of any future state agreements if the department determines that any of the following has occurred: (1) the Contractor has made false certification, or violated the certification by failing to carry out the requirements as noted above. (Gov. Code, §8350 et seq.)

**THE IMMIGRATION REFORM AND CONTROL ACT: (E-Verify.com)**

The Immigration Reform and Control Act of 1986 (IRCA) legally mandates that U.S. employers verify the employment eligibility status of newly-hired employees. IRCA made it unlawful for employers to knowingly hire or continue to employ unauthorized workers. In response to the law, the Immigration and Naturalization Service (INS), now an integrated component of the Department of Homeland Security (DHS), created Form I-9 and mandated its accurate and timely completion by all U.S. employers and their employees.

For employers who fail to properly complete, retain, or make I-9 Forms available for inspection, fines range from \$100 to \$1,100 per individual I-9.

For employers who knowingly hire or knowingly continue to employ unauthorized workers, civil penalties range from \$250 to \$11,000 per violation.

For employers engaging in a pattern or practice of knowingly hiring or continuing to employ unauthorized workers, fines can be as much as \$3,000 per employee and/or 6 months of imprisonment. <http://www.formi9.com/index.aspx>

**SECTION 504 OF THE REHABILITATION ACT:**

**Nondiscrimination Under Federal Grants and Programs**

No otherwise qualified individual with a disability in the United States, as defined in section 7(20), shall, solely by reason of her or his disability, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance or under any program or activity conducted by any Executive agency or by the United States Postal Service. The head of each such agency shall promulgate such regulations as may be necessary to carry out the amendments to this section made by the Rehabilitation, Comprehensive Services, and Developmental Disabilities Act of 1978. Copies of any proposed regulation shall be submitted to appropriate authorizing committees of Congress, and such regulations may take effect no earlier than the thirtieth day after the date on which such regulation is so submitted to such committees.

**SECTION 3 CLAUSE:**

- a. The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C 1701u (Section 3). The purpose of Section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by Section 3, shall to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.
- b. The parties to this contract agree to comply with HUD's regulations in 24 CFR Part 135, which implement Section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with part 135 regulations.
- c. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this Section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the Section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions, and the anticipated date the work shall begin.
- d. The contractor agrees to include this Section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this Section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR Part 135.
- e. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.
- f. Noncompliance with HUD's regulations in 24 CFR Part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD-assisted contracts.

**THE DAVIS-BACON AND RELATED ACTS: (DBRA)**

Published in Chapter 3, section 276(a) 7 et seq. of U.S.C. Title 40. The Davis Bacon and Related Acts (DBRA) requires all contractors and subcontractors performing work on federal construction contracts or federally assisted contracts in excess of \$2,000 to pay their laborers and mechanics not less than the prevailing wage rates and fringe benefits for corresponding classes of laborers and mechanics employed on similar projects in the area. The prevailing wage rates and fringe benefits are determined by the Secretary of Labor for inclusion in covered contracts.

**THE COPELAND “ANTI-KICKBACK” ACT: (ANTI-KICKBACK)**

Published in Chapter 3, section 276(c) of U.S.C. Title 40. The Copeland “Anti-Kickback” Act generally prohibits federal contractors or subcontractors engaged in building construction or repair from inducing an employee to give up any part of the compensation to which he or she is entitled under his or her employment contract and requires such contractors and subcontractors to submit weekly statements of compliance.

**THE CONTRACT WORK HOURS AND SAFETY STANDARDS ACT, AS AMENDED: (CWHSSA)**

Published in Chapter 5, Subchapter II, section 327 et seq. of U.S.C. Title 40. The Contract Work Hours and Safety Standards Act (CWHSSA) applies to federal service contracts and federal and federally assisted construction contracts over \$100,000. It requires contractors and subcontractors on covered contracts to pay laborers and mechanics employed in the performance of the contracts one and one-half times their basic rate of pay for all hours worked over 40 in a workweek. This Act also prohibits unsanitary, hazardous, or dangerous working conditions on federal and federally financed and assisted construction projects.

**THE FAIR LABOR STANDARDS ACT: (FLSA)**

Is published in Chapter 9, sections 201 et seq. of U.S.C. Title 29 which prescribes standards for the basic minimum wage and overtime pay, affects most private and public employment. It requires employers to pay covered employees who are not otherwise exempt at least the federal minimum wage and overtime pay of one-and-one-half-times the regular rate of pay. For nonagricultural operations, it restricts the hours that children under age 16 can work and forbids the employment of children under age 18 in certain jobs deemed too dangerous. For agricultural operations, it prohibits the employment of children under age 16 during school hours and in certain jobs deemed too dangerous. The Act is administered by the Employment Standards Administration's Wage and Hour Division within the U.S. Department of Labor.

**ACCESS AND RETENTION OF RECORDS: (24 CFR 92.508)**

The awarding agency, the State of California, the U S DOL, the Comptroller General of the United States, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the contractor which are directly pertinent to this specific contract, for the purpose of making audit, examination, excerpts, and transcriptions. Under federal regulations all required records must be maintained by the contractor for five years after grantee makes final payments and all other pending matters are closed (this is two years longer than the old federal requirement of three years). The Contractor agrees to the above specified requirements.

**WORKMAN’S COMP. & LIABILITY INSURANCES.**

Contractor shall at his own expense carry all workmen's compensation insurance to protect Contractor's employees and public liability insurance necessary for the full protection of Contractor and Awarding Agency from injury to persons or property arising from the acts of Contractor or his Subcontractors during the progress of the work. Certificates of such insurance shall be filed with Awarding Agency and with the Construction Lender if Awarding Agency so requires, and shall be subject to the approval of both of them as to adequacy of protection.

**INSURANCE & BONDING:**



The Contractor shall carry sufficient insurance coverage for unemployment, disability, and liability to protect contract assets from loss due to theft, fraud and/or undue physical damage, and as a minimum shall purchase a blanket fidelity bond covering all employees in an amount equal to cash advances from the Grantee. The Consultant shall comply with the bonding and insurance requirements of Attachment B of OMB Circular A-110, Bonding and Insurance.

**CLEAN AIR ACT:**

The contractor is required to comply with all aspects for the federal Clean Air Act which is the law that defines EPA's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. The last major change in the law, the Clean Air Act Amendments of 1990, was enacted by Congress in 1990. Legislation passed since then has made several minor changes. The Clean Air Act, like other laws enacted by Congress, was incorporated into the United States Code as Title 42, Chapter 85. The House of Representatives maintains a current version of the U.S. Code, which includes Clean Air Act changes enacted since 1990.

**LOBBYING:**

The Contractor hereby certifies that:

- a. No Federal appropriated funds have been paid or will be paid, by or on behalf of it, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress 'in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement;
- b. If any funds other than Federal appropriated funds have been paid or will be paid to any persons for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, it will complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions;
- c. It will require that the language of paragraph (d) of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all Consultants shall certify and disclose accordingly; and
- d. Lobbying Certification - Paragraph\_This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$ 100,000 for each such failure.

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CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY, AND  
VOLUNTARY EXCLUSION

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LOWER TIER COVERED TRANSACTIONS  
NONDEBARMENT CERTIFICATION

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This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 29 CFR Part 98, Section 98.510, Participants' Responsibilities. The regulations were published as Part VII of the May 26, 1988 Federal Register (pages 19160 – 19211).

(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS FOR CERTIFICATION)

(1) The prospective recipient of Federal assistance funds certifies, by submission of this proposal, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective recipient of Federal assistance funds is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

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Organization

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Name & Title of Authorized Representative

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Signature

Date

**INSTRUCTIONS FOR CERTIFICATION REGARDING DEBARMENT:**

1. By signing and submitting this proposal, the prospective recipient of Federal assistance funds is providing the certification as set out below.
2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective recipient of Federal assistance funds knowingly rendered an erroneous certification, in addition to other remedies available to the Federal government, the Department of Labor (DOL) may pursue available remedies, including suspension and/or debarment.
3. The prospective recipient of Federal assistance funds shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective recipient of Federal assistance funds learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
4. The terms “covered transaction” “debarred”, “suspended,” “ineligible,” “lower tier covered transaction,” “participant,” “person,” “primary covered transaction,” “principal,” “proposal,” and “voluntarily excluded,” as used in this clause, have the meanings set out in the definitions and coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.
5. The prospective recipient of Federal assistance funds agrees by submitting the proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the DOL.
6. The prospective recipient of Federal assistance funds further agrees by submitting this proposal that it will include the clause titled “Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – Lower Tier Covered Transactions,” without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but it is not required to, check the List of Parties Excluded from Procurement or Non-procurement Programs.
8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transactions knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal government, the DOL may pursue available remedies, including suspension and/or debarment.

**STANDARD CONTRACT LANGUAGE REQUIRED FOR ALL  
CONTRACTS AND SUBCONTRACTS**

1. The Civil Rights, HCD, and Age Discrimination Acts Assurances:

During the performance of this Contract, the Contractor assures that no otherwise qualified person shall be excluded from participation or employment, denied program benefits, or be subjected to discrimination based on race, color, national origin, sex, age, or handicap, under any program or activity funded by this Contract, as required by Title VI of the Civil Rights Act of 1964, Title I of the Housing and Community Development Act of 1974, as amended, and the Age Discrimination Act of 1975, and all implementing regulations.

2. State Nondiscrimination Clause:

- a. During the performance of this contract, Contractor and its subcontractors shall not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of the following: race, religion, color, national origin, ancestry, disability, medical condition, marital status, age (over 40) or sex. Contractors and subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free of such discrimination and harassment. Contractors and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Government Code, Section 12900 et seq.) and the applicable regulations promulgated there under (California Code of Regulations, Title 2, Section 7258.0 et seq.) The applicable regulations of the Fair Employment and Housing Commission implementing Government Code, Section 12990 (a-f), set forth in Chapter 5 of Division 4 of Title 2 of the California Code of Regulations are incorporated into this contract by reference and made a part hereof as if set forth in full, Contractor and its subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.
- b. This Contractor shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the contract.

**STANDARD EQUAL OPPORTUNITY CLAUSE**  
**(CONSTRUCTION OVER \$10,000)**

The Contractor hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, the following equal opportunity clause:

**During the performance of this contract, the Contractor agrees as follows:**

1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin or disabilities. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin or disabilities.
3. The Contractor will send to each labor union or representative of workers with which the Contractor has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
5. The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
6. In the event of the Contractor's noncompliance with the discrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rules, regulations, or orders of the Secretary of Labor, or as otherwise provided by law.
7. The Contractor will include the portion of the sentence immediately preceding paragraph "1" and the provisions of paragraphs "1" through "7" in every contract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 504 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each

contractor or vendor. The Contractor will take such action with respect to any contract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance; provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a contractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

8. The Contractor further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally- assisted construction work; provided that if the Contractor so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality, or subdivision of such government which does not participate in work on or under the contract.
9. The Contractor agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of Contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the Department and HUD and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.
10. The Contractor further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, government contracts and federally-assisted construction contracts, pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the Contractor agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this funding commitment (contract, loan, grant, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such Contractor; and refer the case to the Department of Justice for appropriate legal proceedings.

**MBE/WBE STANDARD**  
**BID DOCUMENT LANGUAGE FOR CONSTRUCTION CONTRACTS OVER \$10,000**

(The following notice shall be included in and shall be a part of all solicitations for offers and bids on all Federal and Federally assisted construction contracts or subcontracts in excess of \$10,000 to be performed in geographical areas designated by the Secretary of Labor.)

Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered areas are as follows:

Time- tables	Goals for female participation in each trade
From December 30, 1980, until further notice	6.9%

Time- tables	Goals for minority participation for each trade
From November 3, 1980, until further notice	16.2% - Imperial County – Non SMSA Counties 16.9% - San Diego County – SMSA Counties

These goals are applicable to all contractor's construction work (whether or not it is Federal or Federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its Federally involved and non-Federally involved construction.

The contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform through the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from contractor to contractor or from project to project for the sole purpose of meeting the contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs, U.S. Department of Labor, within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.
4. As used in this notice, and in the contract resulting from this solicitation, the "covered area" is (insert description of the geographical areas where the contract is to be performed giving the state, county, and city, if any).

**MBE/WBE**  
**STANDARD CONTRACT LANGUAGE - CONSTRUCTION OVER \$10,000**

FEMALE AND MINORITY GOALS AND TIMETABLES

The following goals and timetables for female utilization shall be included in all Federal and Federally-assisted construction contracts and subcontracts in excess of \$10,000. The goals are applicable to the contractor's aggregate on-site construction workforce whether or not part of that workforce is performing work on a Federal or Federally-assisted construction contract or subcontract.

AREA COVERED  
(Goals for females apply nationwide)

<u>Timetable</u>	<u>Goal</u>
From December 30, 1980, until further notice	6.9%

Until further notice, the following goals for minority utilization in each construction craft and trade shall be included in all Federal or Federally-assisted construction contracts and subcontracts in excess of \$10,000 to be performed in the respective geographical areas. The goals are applicable to each nonexempt contractor's total on-site construction workforce, regardless of whether or not part of that workforce is performing work on a Federal, Federally-assisted, or non-Federally related project, contract, or subcontract.

Construction contractors participating in an approved Hometown Plan (see 41 CFR 60-4.5) are required to comply with the goals of the Hometown Plan with regard to construction work they perform in the area covered by the Hometown Plan. With regard to all their other covered construction work, such contractors are required to comply with the applicable SMSA or EA goal contained in this appendix.

SMSA/Non-SMSA Counties

<u>Area Covered</u>	<u>Goal Percent</u>
Imperial County – Non SMSA Counties	16.2%
San Diego County – SMSA Counties	16.9%



**MBE/WBE SUGGESTED  
 BID DOCUMENT LANGUAGE FOR  
 MINORITY/WOMEN'S BUSINESS ENTERPRISE CONSTRUCTION PROJECTS**

- (a) It is the policy of the County of Imperial to take positive steps to maximize the utilization of minority and women's business enterprises in all contract activity administered by the \_\_\_\_\_ County of Imperial.
- (b) The contractor will utilize his best efforts to carry out this policy in the award of his subcontracts to the fullest extent consistent with the efficient performance of this contract. As used in this contract, the term "minority or women's business enterprise" means a business, at least 50% of which is owned by minority group members or women or, in the case of publicly-owned businesses, at least 51% of the stock is owned by minority group members or women. For the purpose of this definition, minority group members are Black, Hispanics, Asians, Native Americans, Alaskans or Pacific Islanders.
- (c) The contractor will submit the following statement as part of his/her sealed bid:

I have taken affirmative action to seek out and consider minority and women's business enterprises for the portions of work to be subcontracted. Such actions are fully documented in my records and available upon request. Results are as follows:

<u>Name and Address of Minority/ Women's Firms Contractor Anticipates Utilizing*</u>	<u>Category of Work</u>	<u>Dollar Value of Participation</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Total Bid \_\_\_\_\_ Total Subcontract Amount

Minority/Women's Enterprise Total of Subcontract Amount

\*Indicate whether business is owned by a minority or a woman.

NOTE: Use additional sheets of paper to demonstrate Good Faith Effort, if necessary.

**STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY**  
**CONSTRUCTION CONTRACT SPECIFICATIONS (CONSTRUCTION OVER \$10,000)**

**1. As used in these specifications:**

- a. "Covered area" means the geographical area described in the solicitation from which this contract resulted.
- b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority.
- c. "Employer identification number" means the federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
- d. "Minority" includes:
  - (1) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin).
  - (2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race).
  - (3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, southeast Asia, the Indian subcontinent or the Pacific Islands).
  - (4) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

**2. Whenever the Contractor, or any subcontractor at any tier, contracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the notice which contains the applicable goals for minority and women participation and which is set forth in the solicitations from which this contract resulted.**

**3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U. S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the plan area (including goals and timetables) shall be in accordance with that plan for those trades which have unions participating in the plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the plan's goals and timetables.**

**4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7.a. through 7.p. of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and women utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in geographical areas where they do not have a federal or federally assisted construction contract shall apply the minority and women goals established for the geographical area where the work is being performed. Goals are published periodically in**

the Federal Register in notice form and such notices may be obtained from any Office of Federal Contract Compliance Programs or from federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

- 5. Neither the provisions of any collective bargaining agreement, nor the** failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
- 6. In order for the nonworking training hours of apprentices and trainees to** be counted in meeting the goals, such apprentices and trainees must be employed by the contractor during the training period, and the contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
- 7. The Contractor shall take specific affirmative action's to ensure equal** employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:
  - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority individuals or women working at such sites or in such facilities.
  - b. Establish and maintain a current list of minority and women recruitment sources, provide written notification to minority and women recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
  - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off the street applicant and minority or women referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the contractor may have taken.
  - d. Provide immediate written notification to the Director when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority person or woman sent by the Contractor or when the contractor has other information that the union referral process has impeded the contractor's efforts to meet its obligations.
  - e. Develop on the job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the contractor's employment needs, especially those programs funded or approved by the Department of Labor. The contractor shall provide notice of these programs to the sources compiled under 7b. above.

- f. Disseminate the contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g. Review at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions, including specific review of these items with on-site supervisory personnel such as superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- h. Disseminate the contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and women-focused news media, and providing written notification to and discussing the contractor's EEO policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.
- i. Direct its recruitment efforts, both oral and written, to minority, women and community organizations, to schools with minority- and women-students and to minority and women-recruitment and training organizations serving the contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
- j. Encourage present minority and women employees to recruit other minority persons and women and, where reasonable, provide after-school summer and vacation employment to minority and female youth both on the site and in other areas of a contractor's workforce.
- k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60.3.
- l. Conduct at least annually, an inventory and evaluation at least of all minority and women personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., or other advancement opportunities.
- m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel- and employment-related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
- n. Ensure that all facilities and company activities are non-segregated except that separate or single user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
- o. Document and maintain a record of all solicitations of offers for subcontracts from minority- and women-owned construction companies, contractors and suppliers, including circulation of solicitations to minority- and women-focused Contractor associations and other business associations.

- p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the contractor's EEO policies and affirmative action obligations.
- 8. Contractors are encouraged to participate in voluntary associations which** assist in fulfilling one or more of their affirmative action obligations (7.a. through 7.p.). The efforts of a contractor association, joint contractor/union, contractor/community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7.a. through 7.p. of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the contractor's minority and women workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.
- 9. A single goal for minorities and a separate single goal for women have** been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both men and women, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).
- 10. The Contractor shall not use the goals and timetables or affirmative action** standards to discriminate against any person because of race, color, religion, sex or national origin.
- 11. The Contractor shall not enter into any subcontract with any person or firm** debarred from government contracts pursuant to Executive Order 11246.
- 12. The Contractor shall carry out such sanctions and penalties for violation of** these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
- 13. The Contractor, in fulfilling its obligations under these specifications, shall** implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
- 14. The Contractor shall designate a responsible official to monitor all** employment related activity to ensure that the company's EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the government and to keep records. Records shall at least include for each employee the name, address, telephone number, construction trade, union affiliation, if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Contractors shall not be required to maintain separate records.

- 15. Nothing herein provided shall be construed as a limitation upon the** application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area resident (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).
- 16. By the submission of this bid, the bidder, offeror, applicant, or** subcontractor certifies that he/she does not maintain or provide for his/her employees any segregated facility at any of his/her establishments, and that he/she does not permit employees to perform their services at any location under his/her control where segregated facilities are maintained. He/she certifies further that he/she will not maintain or provide for employees any segregated facilities at any of his/her establishments, and he/she will not permit employees to perform their services at any location under his/her control where segregated facilities are maintained. The bidder, offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause of this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas,\* transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, habits, local custom, or otherwise. He/she further agrees that (except where he/she has obtained identical certifications from proposed subcontractors for specific time periods) he/she will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause; that he/she will retain such certifications in his/her files; and that he/she will forward the following notice to such proposed subcontractors (except where proposed subcontractors have submitted identical certifications for specific time periods).\***Parking lots, drinking fountains, recreation or entertainment areas.**

## CALIFORNIA STATE LABOR STANDARDS AND PREVAILING WAGES

All contractors and subcontractors shall give the following certification to the grantee and forward this certification to the grantee within 10 days after the execution of any contract or subcontract.

- A. "I am aware of the provisions of Section **1720 et seq.** of the California Labor Code which requires that the State prevailing wage rate shall be paid to employees where this rate exceeds the Federal wage rate."
- B. "I am aware of the provisions of Section **3700** of the California 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."
- C. "It is further agreed that, except as may be provided in Section **1810-1814** of the California Labor Code, the maximum hours a worker is to be employed is limited to eight hours a day and 40 hours a week and the subcontractor shall forfeit, as a penalty, \$25 for each worker employed in the execution of the subcontract for each calendar day during which a worker is required or permitted to labor more than eight hours in any calendar day or more than 40 hours in any calendar week."
- D. "I am aware of the provisions of California Labor Code Section **1815** notwithstanding the provisions of 1810-1814 inclusive, of this code, and notwithstanding any stipulation inserted in any contract pursuant to the requirements of said sections, work performed by employees of contractors in excess of 8 hours per day, and 40 hours during any one week, shall be permitted upon public work upon compensation for all hours worked in excess of 8 hours per day at not less than 1-1/2 times the basic rate."
- E. "I am aware of the provisions of California Labor Code, Section **1777.5** which requires the employment of apprentices on all public works projects and the payment of training contributions to the proper agency."
- F. Section **1861** of the California Labor Code; Each contractor to whom a public works contract is awarded shall sign and file with the awarding body the following certification prior to performing the work of the contract: "I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract."

## STATE LABOR STANDARDS PROVISIONS

State prevailing wage rates shall apply when the State wage rate is higher than the Federal wage rate. All contractors and subcontractors are subject to the application of Section 1720 et seq. of the California Labor Code which details the regulations and procedures governing the payment of State prevailing wages.

All contractors and subcontractors are subject to the provisions of Section 3700 of the California Labor Code which requires that every employer be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of the code.

All contractors and subcontractors are subject to the provisions of Sections 1810-1814 of the California Labor Code which provide that the maximum hours a worker is to be employed is limited to eight hours a day and 40 hours a week and the contractor or subcontractor shall forfeit, as a penalty, \$25 for each worker employed in the execution of the contract for each calendar day during which a worker is required or permitted to labor more than eight hours in any calendar day or more than 40 hours in any calendar week and is not paid overtime.

Section 1815 of the California Labor Code requires that notwithstanding the provisions of Sections 1810-1814, employees of contractors who work in excess of eight hours per day and 40 hours per week shall be compensated for all hours worked in excess of eight hours per day at not less than 1-1/2 times the basic rate of pay.



## Federal Labor Standards Provisions:

### Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

**A. 1. (1) Minimum Wages.** All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section I(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR-5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's pay-roll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR Part 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1 321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

**2. Withholding.** HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract HUD or its designee may, after written notice to the

contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or sub-contractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

**3. (I) Payrolls and basic records.** Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section I (b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section I (b)(2)(B) of the Davis-Bacon Act the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(ii) (a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR Part 5.5(a)(3)(i). This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-WO14-1), U.S. Government Printing Office, Washington, DC. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be maintained under 29 CFR Part 5.5 (a)(3)(i) and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph A.3.(ii)(b) of this section.

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph A.3.(i) of this section available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR Part 5.1 2.

**4. (I) Apprentices and Trainees. Apprentices.** Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws

approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) **Trainees.** Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) **Equal employment opportunity.** The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

**5. Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract.

**6. Subcontracts.** The contractor or subcontractor will insert in any sub- contracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as HUD or its designee may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR Part 5.5.

**7. Contract Termination; debarment.** A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

**8. Compliance with Davis-Bacon and Related Act Requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract

**9. Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

**10. (1) Certification of Eligibility.** By entering into this contract the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1010, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part "Whoever, for the purpose of . . . influencing in any way the action of such Administration . . . makes, utters or publishes any statement knowing the same to be false . . . shall be fined not more than \$5,000 or imprisoned not more than two years, or both."

**11. Complaints, Proceedings, or Testimony by Employees.** No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

**B. Contract Work Hours and Safety Standards Act.** As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(1) **Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of eight hours in any calendar day or in excess of forty hours in such workweek, whichever is greater.

(2) **Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory, for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$1 0 for each calendar day on which such individual was required or permitted to work in excess of eight hours or in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in subparagraph (1) of this paragraph.

(3) **Withholding for unpaid wages and liquidated damages.** HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable

on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

**(4) Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

**C. Health and Safety**

**(1)** No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

**(2)** The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 (formerly part 1518) and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act (Public Law 91 -54, 83 Stat 96).

**(3)** The Contractor shall include the provisions of this Article in every subcontract so that such provisions will be binding on each subcontractor. The Contractor shall take such action with respect to any subcontract as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

\_\_\_\_\_  
(Organization/Firm)

\_\_\_\_\_  
(Name & Title of Authorized Representative)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)

**9. CERTIFICATION FOR CONTRACTS, GRANTS AND LOANS**

The undersigned certifies, to the best of his or her knowledge and belief, that:

- 1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant or Federal loan, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant or loan.
- 2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant or loan, the undersigned shall complete and submit Standard Form – LLL, “Disclosure of Lobbying Activities,” in accordance with its instructions.
- 3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including contracts, subcontracts, and subgrants under grants and loans) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1354, Title 34, US Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

\_\_\_\_\_  
(Organization/Firm)

\_\_\_\_\_  
(Name & Title of Authorized Representative)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)

**10. CONTRACTOR'S CERTIFICATION REGARDING WORKER'S  
COMPENSATION INSURANCE**

State of California

County of \_\_\_\_\_

I am aware of the requirements that every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that applicable codes, and I will comply with such provisions before commencing the performance of the work of this Contract.

\_\_\_\_\_  
(Organization/Firm)

\_\_\_\_\_  
(Name & Title of Authorized Representative)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)

11. TABULATION OF SUBCONTRACTORS

No.	Subcontractor	Work To Be Performed	Percent Of Total Contract
1.	Name: Address: Department of Industrial Relations (DIR) Registration Number: SAM.gov Number:		
2.	Name: Address: Department of Industrial Relations (DIR) Registration Number: SAM.gov Number:		
3.	Name: Address: Department of Industrial Relations (DIR) Registration Number: SAM.gov Number:		
4.	Name: Address: Department of Industrial Relations (DIR) Registration Number: SAM.gov Number:		
5.	Name: Address: Department of Industrial Relations (DIR) Registration Number: SAM.gov Number:		
6.	Name: Address: Department of Industrial Relations (DIR) Registration Number: SAM.gov Number:		

No.	Subcontractor	Work To Be Performed	Percent Of Total Contract
7.	<b>Name:</b> <b>Address:</b>  <b>Department of Industrial Relations (DIR) Registration Number:</b> <b>SAM.gov Number:</b>		
8.	<b>Name:</b> <b>Address:</b>  <b>Department of Industrial Relations (DIR) Registration Number:</b> <b>SAM.gov Number:</b>		
9.	<b>Name:</b> <b>Address:</b>  <b>Department of Industrial Relations (DIR) Registration Number:</b> <b>SAM.gov Number:</b>		
10.	<b>Name:</b> <b>Address:</b>  <b>Department of Industrial Relations (DIR) Registration Number:</b> <b>SAM.gov Number:</b>		
11.	<b>Name:</b> <b>Address:</b>  <b>Department of Industrial Relations (DIR) Registration Number:</b> <b>SAM.gov Number:</b>		
12.	<b>Name:</b> <b>Address:</b>  <b>Department of Industrial Relations (DIR) Registration Number:</b> <b>SAM.gov Number:</b>		



No.	Subcontractor	Work To Be Performed	Percent Of Total Contract
13.	Name:		
	Address:		
	Department of Industrial Relations (DIR) Registration Number:		
14.	Name:		
	Address:		
	Department of Industrial Relations (DIR) Registration Number:		
15.	Name:		
	Address:		
	Department of Industrial Relations (DIR) Registration Number:		
16.	Name:		
	Address:		
	Department of Industrial Relations (DIR) Registration Number:		
17.	Name:		
	Address:		
	Department of Industrial Relations (DIR) Registration Number:		
18.	Name:		
	Address:		
	Department of Industrial Relations (DIR) Registration Number:		
SAM.gov Number:			

No.	Subcontractor	Work To Be Performed	Percent Of Total Contract
19.	Name:		
	Address:		
	Department of Industrial Relations (DIR) Registration Number:		
20.	Name:		
	Address:		
	Department of Industrial Relations (DIR) Registration Number:		
21.	Name:		
	Address:		
	Department of Industrial Relations (DIR) Registration Number:		
22.	Name:		
	Address:		
	Department of Industrial Relations (DIR) Registration Number:		
23.	Name:		
	Address:		
	Department of Industrial Relations (DIR) Registration Number:		
24.	Name:		
	Address:		
	Department of Industrial Relations (DIR) Registration Number:		
SAM.gov Number:			

(ATTACH ADDITIONAL NUMBERED PAGES IF NEEDED)

**12. BIDDER QUALIFICATIONS STATEMENT**

The bidder shall submit, as part of its proposal, the following statements as to its experience qualifications. The bidder certifies that all statements and information set forth are true and accurate.

- a. The bidder has been engaged in the contracting business under its present business name for \_\_\_\_\_ years.
- b. Experience in work of nature similar in type and magnitude to that set forth in the specification extends over a period of \_\_\_\_\_ years.
- c. The bidder, as Contractor, has satisfactorily completed all contracts awarded to it, except as follows: (Name any and all exceptions and reasons therefore. Bidder should attach additional pages if necessary).
  - 1. \_\_\_\_\_
  - 2. \_\_\_\_\_
- d. The following contracts cover work similar in type and magnitude to that set forth in the specification have been satisfactorily completed within the last **five (5) years** for the following owners (person, firms or authorities):

No.	Owner	Telephone No.	Contract Amount	Type of Work	Year Complete
1.					
2.					
3.					
4.					
5.					
6.					
7.					

e. The bidder shall provide an audited financial statement (no more than two years old) with accompanying notes. (An audited financial statement with accompanying notes of a parent company guarantor may be substituted. A financial statement that is not audited is not acceptable. A letter verifying availability of a line of credit is not a substitute for the required financial statement.)

Yes                       No

f. The bidder shall fill in the following blanks based on the bidder's attached financial statement.

Current Assets:	\$ _____
Current Liabilities:	\$ _____
Total Net Worth:	\$ _____
Current Ratio (Assets/Liabilities):	_____
Working Capital (Current Assets – Current Liabilities):	\$ _____

**13. TABULATION OF MAJOR MATERIAL SUPPLIERS**

The contractor shall indicate opposite each item of equipment or material listed below the name of the manufacturer and supplier of the equipment or material proposed to be furnished under the bid.

No.	Item	Manufacturer	Supplier
1.	A.C. Pavement		
2.	Class 2 Base		
3.	Concrete		
4.	Granular Sand		
5.	¾ Inch Crushed Rock		
6.	AWWA C-900 PVC Pipe		
7.	SDR 26 PVC Pipe		
8.	Water Meter		
9.	2" Backflow Preventor		
10.	6" Fire Backflow Preventor		
11.	Ductile Iron Fittings, Reducers, Etc.		
12.	Post Indicator Valve		

No.	Item	Manufacturer	Supplier
13.	6" Fire Hydrant		
14.	Resilient Wedge Gate Valve		
15.	Chain-link Fence		
16.	Fire Truck Sign w/ Flashing Beacon, Transmitter and Antenna		
17.	Metal Building		
18.	Emergency Generator		
19.	Automatic Transfer Switch		
20.	Parking Lot Light Poles and Fixtures		
21.			
22.			
23.			
24.			
25.			
26.			

No.	Item	Manufacturer	Supplier
27.			
28.			
29.			
30.			
31.			
32.			
33.			
34.			
35.			
36.			
37.			
38.			
39.			

No.	Item	Manufacturer	Supplier
40.			
41.			
42.			
43.			
44.			
45.			
46.			
47.			
48.			
49.			
50.			
51.			
52.			

(ATTACH ADDITIONAL NUMBERED PAGES IF NEEDED)



**14. NOTICE OF AWARD**

Dated: \_\_\_\_\_

Project: <b>Seeley Fire and Cooling Center</b>	Owner: <b>County of Imperial</b>	Owner's Contract No.:
---	-------------------------------------	-----------------------

Contract:	Engineer's Project No.: <b>542.088</b>
-----------	---

Bidder: \_\_\_\_\_

Bidder's Address (send Certified Mail, Return Receipt Requested):  
\_\_\_\_\_  
\_\_\_\_\_

You are notified that your Bid dated \_\_\_\_\_ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for the construction of the **Seeley Fire and Cooling Center**.

The Contract Price of your Contract is \_\_\_\_\_ Dollars (\$\_\_\_\_\_).

You must comply with the following conditions within **fifteen (15) days** of the date you receive this Notice of Award.

1. Deliver to the Owner four (4) fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Performance and Payment Bonds and Insurance Certificate as specified in the Instructions to Bidders (Article 20), and General Conditions (Paragraph 5.01)

Failure to comply with these conditions within the time specified will entitle the Owner to consider you in default, annul this Notice of Award and declare your Bid Security forfeited.

Within **ten (10) days** after you comply with the above conditions, the Owner will return to you one (1) fully executed counterpart of the Contract Documents.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

**County of Imperial**  
\_\_\_\_\_  
(Owner)

\_\_\_\_\_  
(Authorized Signature)

\_\_\_\_\_  
(Title)

**14A. ACCEPTANCE NOTICE**

Receipt of above NOTICE OF AWARD is hereby acknowledged

By: \_\_\_\_\_,

this the \_\_\_\_\_ day of \_\_\_\_\_, 2019.

By: \_\_\_\_\_  
(Authorized Signature)

\_\_\_\_\_  
(Title)

State of \_\_\_\_\_ }

County of \_\_\_\_\_ }

On \_\_\_\_\_, before me, \_\_\_\_\_,

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

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

**WITNESS** my hand and official seal.

\_\_\_\_\_  
Signature of Notary Public

**15. AGREEMENT  
BETWEEN OWNER AND CONTRACTOR  
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)  
FUNDING AGENCY EDITION**

THIS AGREEMENT is by and between \_\_\_\_\_ **COUNTY OF IMPERIAL** \_\_\_\_\_ (“Owner”) and \_\_\_\_\_ (“Contractor”).

Owner and Contractor, in consideration of the mutual covenants hereinafter set forth, agree as follows:

<b>TABLE OF ARTICLES</b>	<b>Page</b>
Agreement	00521-1
Article 1-Work	00521-1
Article 2-The Project	00521-1
Article 3-Engineer	00521-1
Article 4-Contract Times	00521-2
Article 5-Contract Price	00521-2
Article 6-Payment Procedures	00521-2
Article 7-Interest	00521-4
Article 8-Contractor’s Representatives	00521-4
Article 9-Contract Documents	00521-4
Article 10-Miscellaneous	00521-6

**ARTICLE 1 – WORK**

1.01 The Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

**Seeley Fire and Cooling Center**

**ARTICLE 2 – THE PROJECT**

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

**Seeley Fire and Cooling Center**

**ARTICLE 3 – ENGINEER**

3.01 The Project has been designed by **The Holt Group, Inc.** (Architect and Engineer), who is to act in support of the Construction Manager and Owner, and complete tasks as contained within the specifications. The Construction Manager is to act as the Owner’s representative, assume all duties and responsibilities, and have the rights and authority assigned to the Construction Manager in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

**ARTICLE 4 – CONTRACT TIME**

4.01 *Time is of the Essence*

- A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Days to Achieve Final Completion*

- A. The Work will be completed and ready for Final Payment within **two hundred eighty (280) calendar** days after the date when the Contract Time commences to run as provided in Paragraph 2.03 of the General Conditions.

4.03 *Liquidated Damages*

- A. The Contractor and the Owner recognize that time is of the essence for this Agreement and that the Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by the Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, the Owner and the Contractor agree that as liquidated damages for delay (but not as a penalty), the Contractor shall pay Owner **\$2,500.00** for each day that expires after the time specified in Paragraph 4.02 for completion and readiness for final payment until the Work is completed and ready for final payment.

**ARTICLE 5 – CONTRACT PRICE**

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraphs 5.01.A, 5.01.B and 5.01.C. below:

- A. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in this paragraph 5.01.B:
- B. As provided in Paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer as provided in Paragraph 9.07 of the General Conditions. Unit prices have been computed as provided in Paragraph 11.03 of the General Conditions.
- C. For Lump Sum Work the amount indicated on the Bid Form Item for which a lump sum is indicated.

**ARTICLE 6 – PAYMENT PROCEDURES**

6.01 *Submittal and Processing of Payments*

- A. The Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by the Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. The Owner shall make progress payments on account of the Contract Price on the basis of the Contractor's Applications for Payment on or about the 20th day of each month during performance of the Work as

provided in Paragraphs 6.02.A.1 and 6.02.A.2 below. All such payments will be measured by the Schedule of Values established as provided in Paragraph 2.07.A of the General Conditions.

1. Prior to Substantial Completion, Progress Payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as the Engineer may determine or the Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions:
  - a. **Ninety-five percent (95%)** of Work completed (with the balance being retainage); and
  - b. **Ninety-five percent (95%)** of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
2. Upon Substantial Completion, the Owner shall pay an amount sufficient to increase total payments to the Contractor to **ninety-five percent (95%)** of the Work completed, less such amounts as the Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions.

6.03 *Final Payment*

- A. Upon receipt of the final Application for Payment accompanied by the Engineer's recommendation of payment in accordance with Paragraph 14.07 of the General Conditions, the Owner shall pay the Contractor as provided in Paragraph 14.07 of the General Conditions the remainder of the Contract Price as recommended by the Engineer as provided in said Paragraph 14.07, less any sum the Owner is entitled to set off against the Engineer's recommendation, including but not limited to liquidated damages.

6.04 *Substitution of Security*

~~Upon Contractor's request, COUNTY will make payment of funds withheld from progress payments to ensure performance under the contract pursuant to the requirements of California Public Contracts Code, Section 22300, if the Contractor deposits in escrow with COUNTY, or with a bank acceptable to COUNTY, securities eligible for investment under Government Code Section 16430 or bank savings and loan certifications of deposit, subject to the following conditions:~~

- ~~A. Contractor shall bear the expense of COUNTY and the escrow agent, and COUNTY and the bank, in connection with the escrow deposit made.~~
- ~~B. Securities or certificates of deposit to be placed in escrow shall be of a value at least equivalent to the amount of retention to be paid to the Contractor pursuant to this Article.~~
- ~~C. Contractor shall enter into an escrow agreement satisfactory to COUNTY, which agreement shall include provisions governing, inter alia:
  - ~~1. the amount of securities to be deposited,~~
  - ~~2. the providing of powers of attorney or other documents necessary for the transfer of the securities to be deposited,~~
  - ~~3. conversion of cash to provide funds to meet defaults by Contractor including, but not limited to, termination of Contractor's control over the work, stop notice filed pursuant to law or other amounts to be kept or retained under the provisions of the contract,~~
  - ~~4. decrease in value of securities on deposit,~~
  - ~~5. the termination of the escrow upon completion of the contract.~~~~
- ~~D. Contractor shall obtain the written consent of the surety to such agreement.~~

**ARTICLE 7 – INTEREST**

7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at **seven percent (7%)** per annum.

**ARTICLE 8 – CONTRACTOR’S REPRESENTATIONS**

- 8.01 In order to induce the Owner to enter into this Agreement the Contractor makes the following representations:
- A. The Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
  - B. The Contractor has visited the Site and become familiar with and is satisfied as to the General, Local, and Site Conditions that may affect cost, progress, and performance of the Work.
  - C. The Contractor is familiar with and is satisfied as to all Federal, State, and Local Laws and Regulations that may affect the cost, progress, and performance of the Work.
  - D. The Contractor has obtained and carefully studied (or assumes responsibility for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (Surface, Subsurface, and Underground Facilities) at or contiguous to the Site which may affect the cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by the Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto.
  - E. The Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.
  - F. The Contractor is aware of the general nature of work to be performed by the Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
  - G. The Contractor has correlated the information known to the Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.
  - H. The Contractor has given the Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that the Contractor has discovered in the Contract Documents, and the written resolution thereof by the Engineer is acceptable to the Contractor.
  - I. The Contract Documents are generally sufficient to indicate and convey a clear understanding of all terms and conditions for the performance and furnishing of the Work.

**ARTICLE 9 – CONTRACT DOCUMENTS**

9.01 *Contents*

- A. The Contract Documents consist of the following:
  - 1. This Agreement
  - 2. Performance Bond
  - 3. Payment Bond
  - 4. General Conditions
  - 5. Supplementary Conditions
  - 6. Technical Conditions
  - 7. Special Conditions
  - 8. Specifications as listed in the Table of Contents of the Project Manual
  - 9. Drawings consisting of **81** plan\_sheets.
  - 10. Addenda
  - 11. Exhibits to this Agreement
    - a. The Contractor’s Bid
    - b. Documentation submitted by the Contractor prior to the Notice of Award
    - c. Federal and State Contract Language Inclusion – January 01, 2014 – Exhibit ‘A’
  - 13. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
    - a. Notice to Proceed
    - b. Work Change Directives
    - c. Change Order(s).
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement.
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.
- E. Contractor represents and warrants that it and its subcontractors are not ineligible to work for COUNTY due to violations of Labor Code Sections 1777.1 and 1777.7.

**ARTICLE 10 – MISCELLANEOUS**

10.01 *Terms*

- A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 *Assignment of Contract*

- A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

- A. The Owner and the Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon the Owner and the Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Prevailing Wage*

- A. Notice is hereby given that, pursuant to 1773 of the Labor Code of the State of California, the Owner has obtained from the Director of the Department of Industrial Relations the general prevailing rate of per diem wages and the general prevailing rate for holidays and overtime work for each craft, classification, or type of worker required to execute the Contract. A copy of said prevailing rate of per diem wages is on file in the principal office of the Owner, to which reference is hereby made for further particulars. Said prevailing rate of per diem wages will be made available to any interested party upon request, and a copy thereof shall be posted at each job site.



IN WITNESS WHEREOF, the Owner and the Contractor have signed this Agreement in four (4) copies. One (1) counterpart each has been delivered to the Owner, the Contractor, the Engineer, and the Agency. All portions of the Contract Documents have been signed, initialed, or identified by the Owner and the Contractor or identified by the Engineer on their behalf.

This Agreement is dated \_\_\_\_\_. This Agreement shall not be effective unless and until the Agency's designated representative concurs.

**OWNER: COUNTY OF IMPERIAL**

**CONTRACTOR:**

\_\_\_\_\_  
By: \_\_\_\_\_

\_\_\_\_\_  
By: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

[CORPORATE SEAL]

[CORPORATE SEAL]

Attest: \_\_\_\_\_

Attest: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Address for giving notices:

Address for giving notices:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Agent for service of process:

\_\_\_\_\_

(If Contractor is a corporation or a partnership, attach evidence of authority to sign.)

Agency Concurrence:

As lender or insurer of funds to defray the costs of this Contract, and without liability for any payments there under, the Agency hereby concurs in the form, content, and execution of this Agreement.

Agency: \_\_\_\_\_

By: \_\_\_\_\_

Date: \_\_\_\_\_

Title: \_\_\_\_\_

**15. SAMPLE AGREEMENT**

**AGREEMENT FOR CONSTRUCTION SERVICES**

**[Contractor]**

THIS AGREEMENT FOR SERVICES (“Agreement”), made and entered into effective the \_\_\_\_\_ day of \_\_\_\_\_, 2022, by and between the County of Imperial, a political subdivision of the State of California, by and through its Public Works Department (“COUNTY”), and **[Enter Contractor]**, a [Enter Business Entity] (“CONTRACTOR”) (individually, “Party;” collectively, “Parties”).

**RECITALS**

**WHEREAS**, COUNTY desires to retain a qualified individual, firm or business entity to provide professional services for construction services for Imperial County Project [Project Number], [Project Name] (“Project”); and

**WHEREAS**, CONTRACTOR represents that it is qualified and experienced to perform the services; and

**WHEREAS**, COUNTY desires to engage CONTRACTOR to provide services by reason of its qualifications and experience for performing such services, and CONTRACTOR has offered to provide the required services for the Project on the terms and in the manner set forth herein.

**NOW, THEREFORE**, in consideration of their mutual covenants, COUNTY and CONTRACTOR have and hereby agree to the following:

**1. DEFINITIONS.**

**1.1.** “Invitation for Bids” shall mean that document that describes the Project and project requirements to prospective bidders entitled “Seeley Fire Station and Cooling Center ...” dated \_\_\_\_\_, 2022. The Invitation for Bids, including Special Conditions, Addendum(s), Special Notice(s), and Plans and Specifications (as defined in paragraph 1.3), are attached hereto as **Exhibit “A”** and incorporated herein by this reference.

**1.2.** “Proposal” shall mean CONTRACTOR’s document entitled [Enter Proposal] dated [Enter Date] and submitted to Clerk of the Board on [Enter Date]. The Proposal is attached hereto as **Exhibit “B”** and incorporated herein by reference.

///

1           **1.3.** “Plans and Specifications” shall mean the plans and specifications approved by the  
2 Director of Public Works, or his/her designee, for the Project. While COUNTY is responsible for the  
3 completeness and accuracy of the Plans and Specifications for the Project, CONTRACTOR is required  
4 to review the Plans and Specifications and promptly report any errors or omissions to COUNTY.

5 **2. CONTRACT COORDINATION.**

6           **2.1.** The Director of Public Works or his/her designee shall be the representative of COUNTY  
7 for all purposes under this Agreement. The Director of Public Works or his/her designee is hereby  
8 designated as the Contract Manager for COUNTY. He/she shall supervise the progress and execution  
9 of this Agreement.

10           **2.2.** CONTRACTOR shall assign a single Contract Manager to have overall responsibility for  
11 the progress and execution of this Agreement. Should circumstances or conditions subsequent to the  
12 execution of this Agreement require a substitute Contract Manager for any reason, the Contract  
13 Manager designee shall be subject to the prior written acceptance and approval of COUNTY’s Contract  
14 Manager.

15 **3. SCOPE OF WORK.**

16           **3.1.** CONTRACTOR shall provide all materials and labor to perform this Agreement consistent  
17 with the Invitation for Bid and the Proposal, as set forth in **Exhibits “A” and “B.”** In the event of a  
18 conflict amongst this Agreement, the Invitation for Bid, and the Proposal, the Invitation for Bid shall  
19 take precedence over the Proposal and this Agreement shall take precedence over both.

20           **3.2.** All described work shall be constructed, installed, placed, and performed in conformance  
21 with the Plans and Specifications and all Special Provisions contained therein and as directed by  
22 COUNTY’s engineer.

23 **4. WORK TO BE PERFORMED BY CONTRACTOR.**

24           **4.1.** CONTRACTOR shall comply with all terms, conditions, and requirements of the  
25 Invitation for Bid, Plans and Specifications, Proposal, and this Agreement.

26           **4.2.** CONTRACTOR shall perform such other tasks as necessary and proper for the full  
27 performance of the obligations assumed by CONTRACTOR hereunder.

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1           **4.3. CONTRACTOR shall:**

2                   (a) Procure all permits and licenses, pay all charges and fees, and give all notices that  
3 may be necessary and incidental to the due and lawful prosecution of the services to be performed by  
4 CONTRACTOR under this agreement;

5                   (b) Keep itself fully informed of all existing and proposed federal, state and local laws,  
6 ordinances, regulations, orders and decrees which may affect those engaged or employed under this  
7 Agreement;

8                   (c) At all times observe and comply with, and cause all of its employees to observe  
9 and comply with all of said laws, ordinances, regulations, orders and decrees mentioned above; and

10                   (d) Immediately report to COUNTY’s Contract Manager in writing any discrepancy  
11 or inconsistency it discovers in said laws, ordinances, regulations, orders and decrees mentioned above  
12 in relation to any plans, drawings, specifications or provisions of this Agreement.

13 **5. CHANGE ORDERS.**

14           **5.1. Change Orders.** CONTRACTOR shall make no changes to the work to be performed pursuant  
15 to this Agreement, including but not limited to additions, deletions, modifications or substitutions, nor  
16 shall CONTRACTOR perform any extra work (collectively, “Change Order Work”) without the prior  
17 written consent of COUNTY. If CONTRACTOR encounters conditions it considers different from those  
18 described in **Exhibit “A”** to this Agreement, CONTRACTOR may request a change order in  
19 conformance with COUNTY’s standard procedure (“Change Order”). If COUNTY approves the request,  
20 CONTRACTOR will execute a Change Order and CONTRACTOR’s execution of the Change Order  
21 shall confirm approval thereof. COUNTY may order additional work, and CONTRACTOR shall perform  
22 such changes in the work as directed by COUNTY in any Change Order prepared by CONTRACTOR.  
23 COUNTY’s rights to eliminate portions of the work or initiate a Change Order shall not be limited in any  
24 way. The Change Order shall be in writing and shall include:

25                   (a) Any and all supporting documents and drawings depicting the source and location  
26 of the desired change, and explain in detail the field conditions and reasons for the requested change;

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1 (b) Any change or adjustment to the compensation set forth in this Agreement as a  
2 result of changes in the work based on a lump sum or time and material basis, as may be directed by  
3 COUNTY; and

4 (c) Any request for adjustments to time for completion of the Project.

5 **5.2. Payment for Change Order Work.** CONTRACTOR shall not be entitled to receive any  
6 compensation for work, labor, materials, or changes of any kind, regardless of whether ordered by  
7 COUNTY or any of its representatives, unless a Change Order has been submitted in writing and  
8 approved prior to the commencement of any Change Order Work as described above. If the changes are  
9 required by any inspecting governmental agencies or utility companies, or are otherwise required to  
10 comply with any codes, laws, rules or regulations, including those set forth in this Agreement, then  
11 CONTRACTOR shall not be entitled to any increases in the compensation set forth in this Agreement or  
12 other compensation as a result of the changes.

13 **5.3. Disputed Change Order Work.** Any dispute concerning the performance of such Change  
14 Order Work or the amount of compensation to be paid to CONTRACTOR by COUNTY shall not  
15 affect CONTRACTOR's obligation to perform such Change Order Work. CONTRACTOR agrees  
16 that it shall timely complete all Change Order Work even if there shall be a dispute between  
17 CONTRACTOR and COUNTY over the amount or scope of the Change Order Work.  
18 CONTRACTOR shall have the right to be compensated for any undisputed Change Order Work  
19 amounts as determined to be undisputed in COUNTY's sole discretion.

20 **5.4. Authorized Representative.** No Change Order shall be valid or binding against COUNTY  
21 unless such Change Order has been executed by COUNTY's designated representative, who is the  
22 Imperial County Community & Economic Development Manager. COUNTY shall notify  
23 CONTRACTOR in writing if the designated representative is changed.

24 **5.5. Limits.** When applicable, the authority to execute a Change Order on this project shall not  
25 exceed the amount allowed by law pursuant to Public Contract Code sections 20137-20142 et seq., except  
26 as follows:

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1           (a)     Where Change Orders are in an amount between ten percent (10%) and twenty-  
2 five percent (25%) of the amount set forth in this Agreement and based on a need for additional quantities  
3 due to an increase in the unit quantities required to complete the project in excess of the COUNTY's  
4 Engineer's estimate of unit quantities as set forth in the Invitation to Bid, CONTRACTOR shall be paid  
5 pursuant to Public Contract Code sections 20143 and 20139 referred to in **Exhibit "A"** and incorporated  
6 herein by reference.

7     **6. REPRESENTATIONS BY CONTRACTOR.**

8           **6.1.** CONTRACTOR understands and agrees that COUNTY has limited knowledge in the  
9 multiple areas specified in the Proposal. CONTRACTOR has represented itself to be an expert in these  
10 fields and understands that COUNTY is relying upon such representation.

11           **6.2.** CONTRACTOR represents and warrants that it is a lawful entity possessing all required  
12 licenses and authorities to do business in the State of California and perform all aspects of this Agreement.

13           **6.3.** CONTRACTOR shall not commence any work under this Agreement or provide any other  
14 services, or materials, in connection therewith until CONTRACTOR has received written authorization  
15 from the Manager of Imperial County Community & Economic Development, or his/her designee  
16 ("Notice to Proceed") to do so.

17           **6.4.** CONTRACTOR represents and warrants that the people executing this Agreement on behalf  
18 of CONTRACTOR have the authority of CONTRACTOR to sign this Agreement and bind  
19 CONTRACTOR to the performance of all duties and obligations assumed by CONTRACTOR herein.

20           **6.5.** CONTRACTOR represents and warrants that any employee, contractor and/or agent who will  
21 be performing any of the duties and obligations of CONTRACTOR herein possess all required licenses  
22 and authorities, as well as the experience and training, to perform such tasks.

23           **6.6.** CONTRACTOR represents and warrants that the allegations contained in the Proposal are  
24 true and correct.

25           **6.7.** CONTRACTOR understands that COUNTY considers the representations made herein to be  
26 material and would not enter into this Agreement with CONTRACTOR if such representations were not  
27 made.

1           **6.8. Retention and Access of Books and Records.** CONTRACTOR represents and warrants that  
2 it shall maintain books, records, documents, reports and other materials developed under this Agreement  
3 as follows:

4           (a)           CONTRACTOR shall maintain all ledgers, books of accounts, invoices,  
5 vouchers, canceled checks, and other records relating to CONTRACTOR's charges for services or  
6 expenditures and disbursements charged to COUNTY for a minimum period of three (3) years, or for  
7 any longer period required by law, from the date of final payment to CONTRACTOR pursuant to this  
8 Agreement.

9           (b)           CONTRACTOR shall hold and possess as the property of COUNTY all papers,  
10 books, files, correspondence and other records of all kinds which at any time shall come into its  
11 possession or under its control relating only to services performed by CONTRACTOR under this  
12 Agreement for a minimum period of five (5) years, or for any longer period required by law, from the  
13 date said papers came into the possession of CONTRACTOR pursuant to this Agreement.

14           (c)           Any records or documents required to be maintained by CONTRACTOR  
15 pursuant to this Agreement shall be made available to COUNTY for inspection or audit at any time  
16 during CONTRACTOR's regular business hours provided that COUNTY provides CONTRACTOR  
17 with seven (7) days advanced written or e-mail notice. Copies of such documents shall, at no cost to  
18 COUNTY, be provided to COUNTY for inspection at CONTRACTOR's address indicated for receipt  
19 of notices under this Agreement.

20           (d)           CONTRACTOR shall surrender all papers maintained by CONTRACTOR  
21 pursuant to Paragraph 6.8. of this Agreement within thirty (30) days of termination of this Agreement.

22           (e)           CONTRACTOR represents and warrants that it has not been engaged by, nor will  
23 it be engaged by and owes no duty of performance to any other person or entity that would constitute a  
24 conflict. For breach or violation of this warranty, COUNTY shall amongst other remedies at law, have  
25 the right to terminate this Agreement without liability, or at its sole discretion, to deduct from the  
26 Agreement price or consideration, or otherwise recover the full amount of such fee, commission,  
27 percentage brokerage fee, gift or contingent fee paid or received from another entity or person.

1           **6.9.** CONTRACTOR represents and warrants that it and its subcontractors are not ineligible to  
2 work for COUNTY due to violations of Labor Code §§1777.1 and 1777.7.

3           **6.10.** CONTRACTOR shall perform pursuant to this Agreement in accordance with and in full  
4 compliance with all applicable Federal, State and local statutes, rules, regulations, policies, and  
5 procedures, regardless of whether they are expressly set forth in this Agreement.

6                   (a)     Applicable Federal, State, and local statutes, rules, regulations, policies, and  
7 procedures include, but are not limited to, those found in this Agreement, as well as those incorporated  
8 by reference through **Exhibit “A.”**

9                   (b)     It is understood that in the event COUNTY is investigated or audited by any State  
10 or Federal governmental agency, or any other recognized investigative/auditing entity, CONTRACTOR  
11 shall fully cooperate with such agencies’ reasonable and lawful request for information.

12           **6.11.** CONTRACTOR is familiar with the State and Federal requirements that may be applicable  
13 to CONTRACTOR pursuant to the State of California’s CDBG agreements between the COUNTY  
14 through the Imperial County Community & Economic Development Department and the State of  
15 California that are incorporated into this Agreement including but limited to the Davis-Bacon Act (40  
16 U.S.C 3141-3148; 24 CFR Part 85.36), the Anti-Kickback Act of 1986 (41 U.S.C 51-58), Contract Work  
17 Hours and Safety Standards Act-CWHSSA (40 U.S.C 3702)(the “Acts”).

18           **6.12.** CONTRACTOR understands and agrees not to discuss this Agreement or work performed  
19 pursuant to this Agreement with anyone not a party to this Agreement without the prior permission of  
20 COUNTY. CONTRACTOR further agrees to immediately advise COUNTY of any contacts or inquiries  
21 made by anyone not a party to this Agreement with respect to work performed pursuant to this Agreement.

22           **6.13.** Prior to accepting any work under this Agreement, CONTRACTOR shall perform a due  
23 diligence review of its files and advise COUNTY of any conflict or potential conflict CONTRACTOR  
24 may have with respect to the work requested.

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1           **6.14.** CONTRACTOR understands and agrees that in the course of performance of this Agreement  
2 CONTRACTOR may be provided with information or data considered by the owner or the COUNTY to  
3 be confidential. COUNTY shall clearly identify such information and/or data as confidential.  
4 CONTRACTOR shall take all necessary steps necessary to maintain such confidentiality including but  
5 not limited to restricting the dissemination of all material received to those required to have such data in  
6 order for CONTRACTOR to perform under this Agreement.

7           **6.15.** CONTRACTOR represents that the personnel dedicated to this project as identified in  
8 CONTRACTOR's Proposal, will be the people to perform the tasks identified therein. CONTRACTOR  
9 will not substitute other personnel or engage any contractors to work on any tasks identified herein  
10 without prior written notice to COUNTY.

11 **7. TERM OF AGREEMENT.**

12           This Agreement shall commence on the date first written above and shall remain in effect until  
13 [Enter date], unless otherwise terminated as provided for in this Agreement.

14 **8. COMPENSATION.**

15           **8.1.** The total compensation payable under this Agreement shall not exceed **[Enter Amount]**,  
16 unless otherwise previously agreed to in writing by COUNTY.

17           **8.2.** The fee for any additional services required by COUNTY will be computed either on a  
18 negotiated lump sum basis or upon actual hours and expenses incurred by CONTRACTOR and based on  
19 CONTRACTOR's current standard rates as set forth in the Proposal. Additional services or costs will not  
20 be paid without a prior written agreement between the Parties.

21           **8.3.** Except as provided under paragraph 8.1 and 8.2, COUNTY shall not be responsible to pay  
22 CONTRACTOR any compensation, out of pocket expenses, fees, reimbursement of expenses or other  
23 remuneration.

24 **9. PAYMENT.**

25           **9.1.** CONTRACTOR shall bill COUNTY on a time and material basis as set forth in  
26 **Exhibit "A."** COUNTY shall pay CONTRACTOR for completed and approved services upon  
27 presentation of its itemized billing.

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1           **9.2.** COUNTY shall have the right to retain five percent (5%) of the total of amount of each  
2 invoice, not to exceed five percent (5%) of the total compensation amount of the completed project.  
3 “Completion of the Project” is when the work to be performed has been completed in accordance with  
4 this Agreement, as determined by COUNTY, and all subcontractors, if any, have been paid in full by  
5 CONTRACTOR. Upon completion of the Project CONTRACTOR shall bill COUNTY the retention for  
6 payment by COUNTY.

7 **10.     METHOD OF PAYMENT.**

8           **10.1.** CONTRACTOR shall at any time prior to the fifteenth (15<sup>th</sup>) day of any month, submit to  
9 COUNTY a written claim for compensation for services performed. The claim shall be in a format  
10 approved by COUNTY. No payment shall be made by COUNTY prior to the claims being approved in  
11 writing by COUNTY’s Contract Manager or his/her designee. CONTRACTOR may expect to receive  
12 payment within a reasonable time thereafter and in any event in the normal course of business within  
13 thirty (30) days after the claim is submitted.

14           **10.2.** After determining that the claim is a proper payment request, the Manager of Imperial  
15 County Community & Economic Development, or his/her designee, shall submit to COUNTY’s  
16 Auditor/Controller undisputed and properly submitted claims approved for payment within ten (10) days  
17 following the date the claim was submitted to his/her Department.

18           **10.3.** CONTRACTOR may expect to receive payment within a reasonable time thereafter and in  
19 any event in the normal course of business within thirty (30) days after the undisputed and properly  
20 submitted claim is submitted.

21           **10.4.** Any claim determined to be an improper payment request shall be returned to  
22 CONTRACTOR as soon as practicable, but not later than seven (7) days, after receipt with a written  
23 explanation as to why the claim is an improper request for payment.

24           **10.5.** In order for prompt payment to be made by COUNTY pursuant to Public Contract Code  
25 §20104.50, CONTRACTOR must properly fill out all written claims for compensation for services  
26 performed.

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1           **10.6.** COUNTY shall pay interest at the legal rate set forth in Code of Civil Procedure §685.010  
2 in the event payment is not made within thirty (30) days of an undisputed properly submitted request.

3 **11. TIME FOR COMPLETION OF THE WORK.**

4           **11.1.** The Parties agree that time is of the essence in the performance of this Agreement. Program  
5 scheduling shall be as described in **Exhibit A and B**, unless revisions are approved by both COUNTY's  
6 Contract Manager and CONTRACTOR's Contract Manager. The Project will be completed and ready  
7 for final payment within **ninety (90) calendar days** after the commencement of this Agreement. Time  
8 extensions may be allowed for delays caused by COUNTY, other governmental agencies or factors not  
9 directly brought about by the negligence or lack of due care on the part of CONTRACTOR.

10           **11.2. Liquidated Damages.** COUNTY and CONTRACTOR agree that as liquidated damages for  
11 delay (but not as a penalty), the CONTRACTOR shall pay COUNTY **Two Thousand Dollars**  
12 **(\$2,000.00)** for each day that expires past the time specific in paragraph 7 and according to the timeline  
13 provided in the Exhibits. CONTRACTOR shall pay the liquidated damages amount until the Work is  
14 completed and ready for final payment.

15 **12. SUSPENSION OF AGREEMENT.**

16           COUNTY's Contract Manager shall have the authority to suspend this Agreement, in whole or in  
17 part, for such period as deemed necessary due to unfavorable conditions or to the failure on the part of  
18 CONTRACTOR to perform any provision of this Agreement. CONTRACTOR will be paid the  
19 compensation due and payable to the date of suspension.

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1 **0. TERMINATION.**

2 COUNTY retains the right to terminate this Agreement for any reason by notifying  
3 CONTRACTOR in writing twenty (20) days prior to termination and by paying the compensation due  
4 and payable to the date of termination; provided, however, if this Agreement is terminated for fault of  
5 CONTRACTOR, COUNTY shall be obligated to compensate CONTRACTOR only for that portion of  
6 CONTRACTOR's services which are of benefit to COUNTY. Said compensation is to be arrived at by  
7 mutual agreement between COUNTY and CONTRACTOR; should the parties fail to agree on said  
8 compensation, an independent arbitrator shall be appointed and the decision of the arbitrator shall be  
9 binding upon the parties.

10 **1. INSPECTION.**

11 CONTRACTOR shall furnish COUNTY with every reasonable opportunity for COUNTY to  
12 ascertain that the services of CONTRACTOR are being performed in accordance with the requirements  
13 and intentions of this Agreement. All work done and materials furnished, if any, shall be subject to  
14 COUNTY's Contract Manager's inspection and approval. The inspection of such work shall not relieve  
15 CONTRACTOR of any of its obligations to fulfill its Agreement as prescribed.

16 **2. OWNERSHIP OF MATERIALS.**

17 All original drawings, videotapes, studies, sketches, computations, reports, information, data and  
18 other materials given to or prepared or assembled by or in the possession of CONTRACTOR pursuant  
19 to this Agreement shall become the permanent property of COUNTY and shall be delivered to COUNTY  
20 upon demand, whether or not completed, and shall not be made available to any individual or organization  
21 without the prior written approval of COUNTY.

22 **3. INTEREST OF CONTRACTOR.**

23 **16.1.** CONTRACTOR covenants that it presently has no interest, and shall not acquire any  
24 interest, direct or indirect, financial or otherwise, which would conflict in any manner or degree with  
25 the performance of the services hereunder.

26 **16.2.** CONTRACTOR covenants that, in the performance of this Agreement, no sub-  
27 contractor or person having such an interest shall be employed.

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1           **16.3.** CONTRACTOR certifies that no one who has or will have any financial interest under this  
2 Agreement is an officer or employee of COUNTY.

3 **17. INDEMNIFICATION.**

4           **17.1.** CONTRACTOR agrees to the fullest extent permitted by law to indemnify, defend, protect  
5 and hold COUNTY and its representatives, officers, directors, designees, employees, successors and  
6 assigns harmless from any and all claims, expenses, liabilities, losses, causes of actions, demands,  
7 losses, penalties, attorneys' fees and costs, in law or equity, of every kind and nature whatsoever arising  
8 out of or in connection with CONTRACTOR's negligent acts and omissions or willful misconduct  
9 under this Agreement ("Claims"), whether or not arising from the passive negligence of COUNTY, but  
10 does not include Claims that are the result of the negligence or willful misconduct of COUNTY.

11           **17.2.** CONTRACTOR agrees to defend with counsel acceptable to COUNTY, indemnify and  
12 hold COUNTY harmless from all Claims, including but not limited to:

13                   (a) Personal injury, including but not limited to bodily injury, emotional injury,  
14 sickness or disease or death to persons including but not limited to COUNTY's representatives, officers,  
15 directors, designees, employees, agents, successors and assigns, subcontractors and other third parties  
16 and/or damage to property of anyone (including loss of use thereof) arising out of CONTRACTOR's  
17 negligent performance of, or willful misconduct surrounding, any of the terms contained in this  
18 Agreement, or anyone directly or indirectly employed by CONTRACTOR or anyone for whose acts  
19 CONTRACTOR may be liable;

20                   (b) Liability arising from injuries to CONTRACTOR and/or any of  
21 CONTRACTOR's employees or agents arising out of CONTRACTOR's negligent performance of, or  
22 willful misconduct surrounding, any of the terms contained in this Agreement, or anyone directly or  
23 indirectly employed by CONTRACTOR or anyone for whose acts CONTRACTOR may be liable;

24                   (c) Penalties imposed upon account of the violation of any law, order, citation, rule,  
25 regulation, standard, ordinance or statute caused by the negligent action or inaction, or willful misconduct  
26 of CONTRACTOR or anyone directly or indirectly employed by CONTRACTOR or anyone for whose  
27 acts CONTRACTOR may be liable;

1 (d) Infringement of any patent rights which may be brought against COUNTY  
2 arising out of CONTRACTOR's work;

3 (e) Any violation or infraction by CONTRACTOR of any law, order, citation, rule,  
4 regulation, standard, ordinance or statute in any way relating to the occupational health or safety of  
5 employees; and

6 (f) Any breach by CONTRACTOR of the terms, requirements or covenants of this  
7 Agreement.

8 **17.3.** These indemnification provisions shall extend to Claims occurring after this Agreement is  
9 terminated, as well as while it is in force.

10 **18. INDEPENDENT CONTRACTOR.**

11 In all situations and circumstances arising out of the terms and conditions of this Agreement,  
12 CONTRACTOR is an independent contractor, and as an independent contractor, the following shall  
13 apply:

14 **18.1.** CONTRACTOR is not an employee or agent of COUNTY and is only responsible for the  
15 requirements and results specified by this Agreement or any other agreement.

16 **18.2.** CONTRACTOR shall be responsible to COUNTY only for the requirements and results  
17 specified by this Agreement and except as specifically provided in this Agreement, shall not be subject  
18 to COUNTY's control with respect to the physical actions or activities of CONTRACTOR in fulfillment  
19 of the requirements of this Agreement.

20 **18.3.** CONTRACTOR is not, and shall not be, entitled to receive from, or through, COUNTY,  
21 and COUNTY shall not provide, or be obligated to provide, CONTRACTOR with Workers'  
22 Compensation coverage or any other type of employment or worker insurance or benefit coverage  
23 required or provided by any Federal, State or local law or regulation for, or normally afforded to, an  
24 employee of COUNTY.

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1           **18.4.** CONTRACTOR shall not be entitled to have COUNTY withhold or pay, and COUNTY  
2 shall not withhold or pay, on behalf of CONTRACTOR, any tax or money relating to the Social  
3 Security Old Age Pension Program, Social Security Disability Program, or any other type of pension,  
4 annuity, or disability program required or provided by any Federal, State or local law or regulation.

5           **18.5.** CONTRACTOR shall not be entitled to participate in, nor receive any benefit from, or make  
6 any claim against any COUNTY fringe program, including, but not limited to, COUNTY's pension plan,  
7 medical and health care plan, dental plan, life insurance plan, or any other type of benefit program, plan,  
8 or coverage designated for, provided to, or offered to COUNTY's employees.

9           **18.6.** COUNTY shall not withhold or pay, on behalf of CONTRACTOR, any Federal, State, or  
10 local tax, including, but not limited to, any personal income tax, owed by CONTRACTOR.

11           **18.7.** CONTRACTOR is, and at all times during the term of this Agreement, shall represent and  
12 conduct itself as an independent contractor, not as an employee of COUNTY.

13           **18.8.** CONTRACTOR shall not have the authority, express or implied, to act on behalf of, bind  
14 or obligate COUNTY in any way without the written consent of COUNTY.

15 **19. INSURANCE.**

16           **19.1.** CONTRACTOR agrees at its own cost and expense to procure and maintain during the  
17 entire term of this Agreement, and any extended term, commercial general liability insurance (bodily  
18 injury and property damage), employer's liability insurance, commercial automobile liability insurance  
19 (bodily injury and property damage) and professional liability insurance in a sum acceptable to COUNTY  
20 and adequate to cover potential liabilities arising in connection with the performance of this Agreement  
21 and in any event not less than the minimum limit set forth as follows:

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Insurance Minimum Limit

Errors & Omissions Coverage (professional liability – malpractice)	[Enter Amount]	Per person, per occurrence.
Workers’ Compensation, Coverage A		Statutory
Employer’s Liability, Coverage B		[Enter Amount]
Commercial General Liability (Including Contractual Liability)		[Enter Amount]
Bodily Injury		combined single limit to any one person (“CSL”) and [Enter Amount]
Property Damage		aggregate for any one accident, including personal injury, death and property damage.
Products – Completed Operations Aggregate		[Enter Amount]
Personal & Advertising Injury		[Enter Amount]
Excess or Umbrella Liability		[Enter Amount] per occurrence and [Enter Amount] general aggregate.
Commercial Automobile Liability (owned, hired & non-owned vehicles)		[Enter Amount] combined single limit (“CSL”) [Enter Amount] combined single limit (“CSL”)

**19.2. Special Insurance Requirements.** All insurance required shall:

- (a) Be procured from California admitted insurers (licensed to do business in California) with a current rating by Best’s Key Rating Guide, acceptable to COUNTY. A rating of at least A-VII shall be acceptable to COUNTY; lesser ratings must be approved in writing by COUNTY.
- (b) Be primary coverage as respects COUNTY and any insurance or self-insurance maintained by COUNTY shall be in excess of CONTRACTOR’s insurance coverage and shall not contribute to it.



1 (c) Name The Imperial County Community and Economic Development  
2 Department and the County of Imperial and their officers, employees, and volunteers as additional  
3 insured on all policies, except Workers' Compensation insurance and Errors & Omissions insurance, and  
4 provide that COUNTY may recover for any loss suffered by COUNTY due to CONTRACTOR's  
5 negligence.

6 (d) State that it is primary insurance and regards COUNTY as an additional insured  
7 and contains a cross-liability or severability of interest clause.

8 (e) Not be canceled, non-renewed or reduced in scope of coverage until after thirty  
9 (30) days written notice has been given to COUNTY. CONTRACTOR may not terminate such coverage  
10 until it provides COUNTY with proof that equal or better insurance has been secured and is in place.  
11 Cancellation or change without prior written consent of COUNTY shall, at the option of COUNTY, be  
12 grounds for termination of this Agreement.

13 (f) If this Agreement remains in effect more than one (1) year from the date of its  
14 original execution, COUNTY may, at its sole discretion, require an increase to liability insurance to the  
15 level then customary in similar COUNTY Agreements by giving sixty (60) days notice to  
16 CONTRACTOR.

17 **19.3. Additional Insurance Requirements.**

18 (a) COUNTY is to be notified immediately of all insurance claims. COUNTY is also  
19 to be notified if any aggregate insurance limit is exceeded.

20 (b) The comprehensive or commercial general liability shall contain a provision of  
21 endorsements stating that such insurance:

22 (i) Includes contractual liability;

23 (ii) Does not contain any exclusions as to loss or damage to property caused  
24 by explosion or resulting from collapse of buildings or structures or damage to property underground,  
25 commonly referred to by insurers as the "XCU Hazards;"

26 (iii) Does not contain a "pro rata" provision which looks to limit the insurer's  
27 liability to the total proportion that its policy limits bear to the total coverage available to the insured;  
28

1 (iv) Does not contain an “excess only” clause which require the exhaustion of  
2 other insurance prior to providing coverage;

3 (v) Does not contain an “escape clause” which extinguishes the insurer’s  
4 liability if the loss is covered by other insurance;

5 (vi) Includes COUNTY and COUNTY’s Engineer as an additional insured.

6 (vii) States that it is primary insurance and regards COUNTY as an additional  
7 insured and contains a cross-liability or severability of interest clause.

8 **19.4. Deposit of Insurance Policy.** Promptly on issuance, reissuance, or renewal of any insurance  
9 policy required by this Agreement, CONTRACTOR shall, if requested by COUNTY, provide COUNTY  
10 satisfactory evidence that insurance policy premiums have been paid together with a duplicate copy of  
11 the policy or a certificate evidencing the policy and executed by the insurance company issuing the policy  
12 or its authorized agent.

13 **19.5. Certificates of Insurance.**

14 CONTRACTOR agrees to provide COUNTY with the following insurance documents on or  
15 before the effective date of this Agreement:

16 (a) Complete copies of certificates of insurance for all required coverages including  
17 additional insured endorsements shall be attached hereto as **Exhibit “C”** and incorporated herein.

18 (b) The documents enumerated in this Paragraph shall be sent to the following:

19  
20 County of Imperial  
21 Risk Management Department  
22 940 Main Street, Suite 101  
23 El Centro, CA 92243

24 County of Imperial  
25 Imperial County Department of Public Works  
26 155 South Eleventh Street  
27 El Centro, CA 92243

28 **19.6. Additional Insurance.** Nothing in this, or any other provision of this Agreement, shall be  
construed to preclude CONTRACTOR from obtaining and maintaining any additional insurance policies  
in addition to those required pursuant to this Agreement.

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1 **20. PREVAILING WAGE.**

2 **20.1.** CONTRACTOR and its subcontractors shall pay all workers employed on the Project the  
3 higher of either the rates determined by the Director of the California Department of Industrial Relations  
4 (“DIR”) or, when applicable, the Davis-Bacon Federal wage rates as supplemented by the Department  
5 of Labor regulations. The Davis-Bacon Federal wage rates are attached to the RFP. Copies of the State  
6 prevailing rate of per diem wages are on file with the Department of Industrial Relations, Division of  
7 Apprenticeship Standards, 445 Golden Gate Avenue, San Francisco, California, and at COUNTY’s  
8 Department of Public Works, and are available to CONTRACTOR and any other interested party upon  
9 request. CONTRACTOR shall post the prevailing rate of per diem wages to be posted at the Project site

10 **20.2.** CONTRACTOR acknowledges that any work that qualifies as a “public work” within the  
11 meaning of California Labor Code section 1720 shall cause CONTRACTOR, and its subcontractors, to  
12 comply with the provisions of California Labor Code sections 1775 et seq.

13 **20.3.** When applicable, copies of the prevailing rate of per diem wages shall be on file at  
14 COUNTY’s Imperial County Community & Economic Development Department and available to  
15 CONTRACTOR and any other interested party upon request. CONTRACTOR shall post copies of the  
16 prevailing wage rate of per diem wages at the Project site.

17 **20.4.** CONTRACTOR hereby acknowledges and stipulates to the following:

18 (a) CONTRACTOR has reviewed and agrees to comply with the provisions of Labor  
19 Code section 1776 regarding retention and inspection of payroll records and noncompliance penalties;  
20 and

21 (b) CONTRACTOR has reviewed and agrees to comply with the provisions of Labor  
22 Code section 1777.5 regarding employment of registered apprentices; and

23 (c) CONTRACTOR has reviewed and agrees to comply with the provisions of Labor  
24 Code section 1810 regarding the legal day’s work; and

25 (d) CONTRACTOR has reviewed and agrees to comply with the provisions of Labor  
26 Code section 1813 regarding forfeiture for violations of the maximum hours per day and per week  
27 provisions contained in the same chapter.

1 (e) CONTRACTOR has reviewed and agrees to comply with any applicable  
2 provisions for those Projects subject to Department of Industrial Relations (DIR) Monitoring and  
3 Enforcement of prevailing wages, including Labor Code Section 1773.3 regarding notification to DIR of  
4 contract award. COUNTY hereby notifies CONTRACTOR that CONTRACTOR is responsible for  
5 submitting certified payroll records directly to the State Compliance Monitoring Unit (CMU) The  
6 Compliance Monitoring Unit or “CMU” is a new component within the State Division of Labor Standards  
7 Enforcement (DLSE) that was created to monitor and enforce prevailing wage requirements on public  
8 works projects that receive state bond funding and on other projects that are legally required to use the  
9 CMU. The CMU began operations on January 1, 2012, following the recent adoption of AB 436 and  
10 approval of revisions to program regulations. By actively monitoring compliance on an ongoing basis  
11 while work is being performed, the CMU will play a special role in ensuring that public works  
12 construction workers are promptly paid the proper prevailing wage rates and in helping maintain a level  
13 playing field for employers who comply with the law. Only projects for which the public works contract  
14 is awarded on or after January 1, 2012 are subject to the CMU requirements. For further information  
15 concerning compliance monitoring please visit the website located at:  
16 <http://www.dir.ca.gov/dlse/cmu/cmu.html>.

17 **20.5. Mandatory Registration with the Department of Industrial Relations – NEW**  
18 **REQUIREMENTS PURSUANT TO SB 854.**

19 (a) CONTRACTOR and its subcontractors shall register with the DIR and pay  
20 all applicable fees as set forth in Labor Code section 1725.5.

21 (b) CONTRACTOR and its subcontractors acknowledge that they shall not be  
22 listed on any bid proposal for a public works project (submitted on or after March 1, 2015) unless  
23 registered with the DIR pursuant to Labor Code section 1725.5. The requirements of this section  
24 shall apply unless one of the limited exceptions provided under Labor Code Section 1771.1(a)  
25 applies.

26 (c) CONTRACTOR and its subcontractors acknowledge that they shall not be  
27 awarded any contract for public work on a public works project (awarded on or after April 1,  
28 2015) unless registered with the DIR pursuant to Labor Code section 1725.5.

1 (d) The Project described herein is subject to compliance monitoring and  
2 enforcement with the DIR.

3 For further information concerning compliance with SB 854, please visit:  
4 <http://www.dir.ca.gov/Public-Works/SB854.html>.

5 **21. WORKERS' COMPENSATION CERTIFICATION.**

6 **21.1.** Prior to the commencement of work, CONTRACTOR shall sign and file with COUNTY  
7 the following certification: "I am aware of the provisions of California Labor Code §§3700 et seq. which  
8 require every employer to be insured against liability for workers' compensation or to undertake self-  
9 insurance in accordance with the provisions of that code, and I will comply with such provisions before  
10 commencing the performance of the work of this contract."

11 **21.2.** This certification is included in this Agreement and signature of the Agreement shall  
12 constitute signing and filing of the certificate.

13 **21.3.** CONTRACTOR understands and agrees that any and all employees, regardless of hire date,  
14 shall be covered by Workers' Compensation pursuant to statutory requirements prior to beginning  
15 work on the Project.

16 **21.4.** If CONTRACTOR has no employees, initial here: \_\_\_\_\_.

17 **22. WARRANTY.**

18 **22.1. One Year Warranty.** CONTRACTOR agrees to provide a minimum one-year warranty for  
19 all of its work and component parts and guarantees that all work shall be performed in a professional  
20 and workman-like manner and be free from defects. CONTRACTOR guarantees to timely correct all  
21 work performed by it under this Agreement which COUNTY determines to be defective in design,  
22 material and/or workmanship within a period of one (1) year from the date of the completion of the  
23 Work. The warranties set forth in this Agreement shall be in addition to, and not in lieu of, all other  
24 warranties in **Exhibit A**, statutory and case law warranties and obligations of CONTRACTOR.  
25 CONTRACTOR expressly agrees that all warranties made by CONTRACTOR, all obligations under  
26 this Agreement and all remedies for breach of such warranties shall survive this Agreement in the event  
27 it is terminated or expires for any reason prior to the running of the full warranty periods listed above.

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1           **22.2. Materials.**           All materials furnished by CONTRACTOR shall be new, manufactured  
2 during the current year, of first quality and carrying full manufacturer's warranty. CONTRACTOR shall  
3 be responsible for any expiration of manufacturer or other warranties of material or equipment being  
4 supplied for this Agreement. CONTRACTOR guarantees that all warranties of material and equipment  
5 shall become effective when the project is accepted by COUNTY's Board of Supervisors, not at time of  
6 installation by CONTRACTOR.

7           **22.3. Manufacturers' Warranty Information.**           CONTRACTOR agrees to promptly  
8 provide such information and maintenance recommendations to COUNTY at the inception of  
9 CONTRACTOR's work to the extent such information is reasonably available.

10 **23.    DEFAULT & REMEDIES.**

11           **23.1. Default.** In the event that (i) CONTRACTOR files a petition requesting relief under any  
12 bankruptcy act, or is adjudged as bankrupt, or makes a general assignment for the benefit of creditors  
13 or has a receiver appointed on account of its insolvency, or (ii) CONTRACTOR refuses or is unable,  
14 for whatever reason, to supply enough properly skilled workers or proper materials to complete the  
15 Project, or (iii) CONTRACTOR fails to follow the directions of COUNTY, or (iv) CONTRACTOR  
16 fails to make prompt payment to its subcontractors and suppliers for materials or labor supplied or  
17 permits any lien to be imposed upon all or any portion of the Project, or (v) CONTRACTOR disregards  
18 any laws or orders of any public or private authority having jurisdiction over the Work or the Project,  
19 or (vi) CONTRACTOR fails to perform in accordance with any of the terms of this Agreement or  
20 breaches any provision of this Agreement, COUNTY may give notice of such failure or breach to  
21 CONTRACTOR, identifying the failure or breach of this Agreement. Should any such failure or breach  
22 continue for twenty-four (24) hours after delivery of notice without a good faith effort on the part of  
23 CONTRACTOR to commence all necessary corrective action, or should such a breach continue despite  
24 CONTRACTOR's efforts for forty-eight (48) hours, then at that time such failure shall be deemed a  
25 default by CONTRACTOR under this Agreement and COUNTY shall have all rights and remedies  
26 available at law or in equity, including the right to terminate this Agreement. Without limiting its rights  
27 and remedies, COUNTY may then proceed as follows:

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1 (a) Without terminating this Agreement or the obligations of CONTRACTOR  
2 hereunder as to all of the Work required to be performed or furnished by CONTRACTOR pursuant to  
3 this Agreement, COUNTY may require CONTRACTOR, at CONTRACTOR's expense, to cure such  
4 default(s) as may exist in the performance of CONTRACTOR's obligations hereunder within forty-  
5 eight (48) hours after such default(s) has/have occurred including but not limited to repairing, replacing  
6 and correcting material or Work determined by COUNTY to be defective or not complying with the  
7 requirements of this Agreement. Should CONTRACTOR fail to timely repair, replace and/or correct  
8 non-complying or defective materials and workmanship or otherwise cure its default(s) hereunder, and  
9 in the case of emergencies in which case COUNTY may act immediately if CONTRACTOR is not  
10 available or is not responding, and without further notice, COUNTY may make required repairs,  
11 replacements and other corrections or otherwise remedy the default by CONTRACTOR pursuant to the  
12 paragraph below.

13 (b) Without terminating this Agreement or the obligations of CONTRACTOR  
14 hereunder as to all of the Work required to be performed or furnished by CONTRACTOR pursuant to this  
15 Agreement, COUNTY may engage another contractor to perform such portion of CONTRACTOR's  
16 Work required pursuant to this Agreement or furnish any materials or other items required hereunder as  
17 COUNTY in its sole discretion may deem necessary to avoid delay in the progress of the Work, and in  
18 connection therewith, COUNTY may perform such Work or any portion thereof itself or have the same  
19 performed by others and COUNTY may procure all necessary materials, equipment or other items required  
20 for the continued progress of such Work. The costs incurred by COUNTY as a result of engaging another  
21 contractor shall be deducted from the compensation payable pursuant to this Agreement and if COUNTY's  
22 costs exceed or may reasonably be anticipated to exceed the balance of the compensation due to  
23 CONTRACTOR for such work, such excess, or anticipated excess, shall be immediately due and owing  
24 from CONTRACTOR to COUNTY and may be withheld from any funds due to CONTRACTOR pursuant  
25 to this Agreement or any other agreement.

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1 (c) COUNTY may terminate CONTRACTOR's right to perform upon written  
2 notice and COUNTY shall then have the option of completing the Work or any portion thereof by exercise  
3 of its interest under the performance bond issued in favor by CONTRACTOR, or having such Work in  
4 whole or in part be completed by others for CONTRACTOR's account. A calculation shall take place at  
5 the conclusion of the Project wherein to the degree the sum of COUNTY's costs and any amounts paid  
6 to complete the Project exceed the compensation payable pursuant to this Agreement, then any such  
7 excess shall be immediately due and owing from CONTRACTOR to COUNTY.

8 **23.2. Damages.** CONTRACTOR shall be liable for all damages suffered by COUNTY by reason  
9 of CONTRACTOR's default in any provision of this Agreement and the exercise of COUNTY of its  
10 option to terminate this Agreement shall not release CONTRACTOR of such liability. CONTRACTOR  
11 shall have no right to receive any further payment after a default has occurred until such time as the Work  
12 to be performed by CONTRACTOR pursuant hereto has been completed and accepted by COUNTY and  
13 damages suffered by COUNTY, if any, ascertained. Damages shall include by way of illustration, but  
14 not of exclusion, COUNTY's costs of completing the Work which exceeds the compensation payable  
15 pursuant to this Agreement, other general, liquidated, special or consequential damages, attorney fees  
16 and costs.

17 **23.3. Actions After Default.** Should COUNTY exercise any of its options, remedies or rights  
18 granted pursuant to the terms of this Agreement in the event of a default by CONTRACTOR, COUNTY  
19 at its sole election may, but shall not be obligated to, use any materials, supplies, tools or equipment on  
20 the work site which belong to CONTRACTOR to complete the Work required to be completed by  
21 CONTRACTOR, whether such work is completed by COUNTY or by others, and CONTRACTOR  
22 agrees that it shall not remove such materials, supplies, tools and equipment from the work site unless  
23 directed in writing by COUNTY to do so.

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1           **23.4. Limit on Force Majeure Damages.** CONTRACTOR shall not be responsible for repairing  
2 or restoring damage to work caused by an act of God in excess of five (5) percent of the contract amount,  
3 provided that the work damaged is built in accordance with accepted and applicable building standards  
4 and the plans and specifications of COUNTY. In the event of such damage, COUNTY may, at its option,  
5 elect to terminate this Agreement. For purposes of this Agreement, an “act of God” shall be defined as  
6 an earthquake in excess of 3.5 on the Richter Scale and a tidal wave.

7           **23.5. Resolution of Claims of Three Hundred Seventy-Five Thousand Dollars (\$375,000) or**  
8 **Less.** For claims of three hundred seventy-five thousand dollars (\$375,000) or less, COUNTY and  
9 CONTRACTOR agree to follow and comply with the mediation, arbitration, claim, civil action procedure  
10 and trial de novo provisions set forth in California Public Contracts Code §§20104, 20104.2 and 20104.4.

11           **23.6. No Limitation of Rights.** The options and rights granted to COUNTY herein shall not be  
12 deemed as limitations upon the other rights and remedies of COUNTY in the event of a failure of  
13 performance or breach by CONTRACTOR, and COUNTY shall be entitled to exercise the rights and  
14 remedies hereinabove specified and all other rights and remedies which may be provided in this  
15 Agreement or by law or in equity, either cumulatively or consecutively, and in such order as COUNTY  
16 in its sole discretion shall determine.

17 **24. ASSIGNMENT.**

18           Neither this Agreement nor any duties or obligations hereunder shall be assignable by  
19 CONTRACTOR without the prior written consent of COUNTY. CONTRACTOR may employ other  
20 specialists to perform services as required with prior approval by COUNTY.

21 **25. NON-DISCRIMINATION.**

22           **25.1. CONTRACTOR and its subcontractors** shall reference and abide by the guidance and  
23 Disadvantaged Business Enterprise specifications contained in the California Department of  
24 Transportation’s Local Programs Procedures 06-01 (which has been approved and released at  
25 <http://www.dot.ca.gov/hq/LocalPrograms/>) when working pursuant to this Agreement.

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1           **25.2. The Civil Rights, Affirmative Action, HCD, and Age Discrimination Acts Assurances:**

2           **(a)**       During the performance of this Agreement, CONTRACTOR assures that no  
3 otherwise qualified person shall be excluded from participation or employment, denied program benefits,  
4 or be subjected to discrimination based on race, color, national origin, sex, age, or handicap, under any  
5 program or activity funded by this contract, as required by Title VI of the Civil Rights Act of 1964, Title  
6 I of the Housing and Community Development Act of 1974, as amended, and the Age Discrimination  
7 Act of 1975, and all implementing regulations.

8           **25.3. The Training, Employment, and Contracting Opportunities for Business and Lower Income**  
9 **Persons Assurance of Compliance:**

10           **(a)**       The work to be performed under this Agreement is on a project assisted under a  
11 program providing direct Federal financial assistance from the Department of Housing and Urban  
12 Development and is subject to the requirements of Section 3 of the Housing and Urban Development Act  
13 of 1968, as amended, 12 U.S.C. 1701u. Section 3 requires that to the greatest extent feasible,  
14 opportunities for training and employment be given lower income residents of the project area and  
15 contracts for Work in connection with the project be awarded to business concerns which are located in,  
16 or owned in substantial part by persons residing in the area of the project.

17           **(b)**       The parties to this Agreement will comply with the provisions of said Section 3  
18 and the regulations issued pursuant thereto by the Secretary of Housing and Urban Development set forth  
19 in 24 CFR Part 135, and all applicable rules and orders of the Department issued there under prior to the  
20 execution of this contract. The parties to this contract certify and agree that they are under no contractual  
21 or other disability which would prevent them from complying with these requirements.

22           **(c)**       CONTRACTOR will send to each labor organization or representative of workers  
23 with which he has a collective bargaining agreement or other contract or understanding, if any, a notice  
24 advertising the said labor organization or worker's representative of his commitments under this Section  
25 3 clause and shall post copies of the notice in conspicuous places available to employees and applicants  
26 for employment or training.

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1 (d) CONTRACTOR will include these Section 3 clauses in every contract and  
2 subcontract for Work in connection with the project and will, at the direction of the State, take appropriate  
3 action pursuant to the contract upon a finding that the CONSULTANT or any contractor or subcontractor  
4 is in violation of regulations issued by the Secretary of Housing and Urban Development, 24 CFR Part  
5 135 and, will not let any contract unless the CONSULTANT or contractor or subcontractor has first  
6 provided it with a preliminary statement of ability to comply with the requirements of these regulations.

7 (e) Compliance with the provisions of Section 3, the regulations set forth in 24 CFR  
8 Part 135, and all applicable rules and orders of the Department issued thereunder prior to the execution  
9 of the Agreement shall be a condition of the Federal financial assistance provided to the project, binding  
10 upon the CONSULTANT, its successors, and assigns. Failure to fulfill these requirements shall subject  
11 the CONSULTANT, its contractors and subcontractors, its successors, and assigns to those sanctions  
12 specified by the grant or contract through which Federal assistance is provided, and to such sanctions as  
13 are specified by 24 CFR Part 135.

14 **25.4. State Nondiscrimination Clause:**

15 (a) During the performance of this Agreement, CONTRACTOR and its  
16 subcontractors shall not unlawfully discriminate, harass, or allow harassment against any employee or  
17 applicant for employment because of sex, race, color, ancestry, religious creed, national origin, physical  
18 disability (including HIV and AIDS), mental disability, medical condition (cancer), age (over 40), marital  
19 status and denial of family care leave. CONTRACTOR and subcontractors shall ensure that the  
20 evaluation and treatment of their employees and applicants for employment are free from such  
21 discrimination and harassment.

22 (b) CONTRACTOR and subcontractors shall comply with the provisions of the Fair  
23 Employment and Housing Act (Government Code, Section 12900 et seq.) and the applicable  
24 regulations promulgated thereunder (California Code of Regulations, Title 2, Section 7258.0 et seq.)

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1 (c) The applicable regulations of the Fair Employment and Housing Commission  
2 implementing Government Code, Section 12990, set forth in Chapter 5 of Division 4 of Title 2 of the  
3 California Code of Regulations are incorporated into this contract by reference and made a part hereof as  
4 if set forth in full.

5 (d) CONTRACTOR shall include the nondiscrimination and compliance provisions  
6 of this clause in all subcontracts to perform work under the contract. "The CONSULTANT hereby agrees  
7 to abide by the requirement of executive order 11246 and all implement regulations of the Department  
8 of Labor."

9 **26. CDBG REQUIRED "SECTION 3" CLAUSE.**

10 CONSULTANT will comply with Section 3 of the Housing and Urban Development Act of  
11 1968 (12 U.S.C. 1701u), and implementing Regulations at 24 CFR, Part 135.

12 **27. DISPUTE RESOLUTION PROCESS.**

13 The parties shall attempt to resolve any dispute arising out of or relating to this Agreement through  
14 negotiations between the Contract Manager for COUNTY and Project Manager for CONTRACTOR,  
15 who have authority to settle the same.

16 **28. COGNIZANCE OF VIOLATIONS BY COUNTY.**

17 **28.1.** CONTRACTOR understands and agrees that COUNTY shall take cognizance of violations  
18 of Chapter 1 of Part 7 of Division 2 of the California Labor Code committed in the course of the execution  
19 of this Agreement, and shall promptly report any suspected violations to the Labor Commissioner.

20 **28.2.** If COUNTY determines as a result of its own investigation that there has been a violation  
21 of Chapter 1 of Part 7 of Division 2 of the California Labor Code and withholds payment to  
22 CONTRACTOR, the procedures in California Labor Code §1771.6 shall be followed.

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1           **28.3.** CONTRACTOR may bring an action in a court of competent jurisdiction to recover from  
2 COUNTY the difference between the wages actually paid to an employee and the wages that were  
3 required to be paid to an employee pursuant to Chapter 1 of Part 7 of Division 2 of the California Labor  
4 Code, any penalties required to be paid pursuant to Chapter 1 of Part 7 of Division 2 of the California  
5 Labor Code, and costs and attorney’s fees related to the action, if either of the following is true:

6           (a) COUNTY previously affirmatively represented to CONTRACTOR in writing, in  
7 the call for bids, or otherwise, that the Work was not a “public work,” as defined in Chapter 1 of Part 7  
8 of Division 2 of the California Labor Code; or

9           (b) COUNTY received actual written notice from the Department of Industrial  
10 Relations that the Work is a “public work,” as defined in Chapter 1 of Part 7 of Division 2 of the  
11 California Labor Code, and failed to disclose that information to CONTRACTOR before the bid opening  
12 or award of the contract.

13 **29.    PREVAILING WAGE RATES AND PAYROLL RECORDS.**

14           **29.1.** CONTRACTOR agrees to comply with §§1775 and 1776 of the California Labor Code  
15 relating to the payment of prevailing wage and the maintenance of certified payroll records and to make  
16 the certified payroll records available for inspection at all reasonable hours at CONTRACTOR’s  
17 principal office.    The responsibility for compliance with these provisions is fixed with  
18 CONTRACTOR. CONTRACTOR understands and agrees that it shall, as a penalty to COUNTY, forfeit  
19 specific monetary fines for each worker paid less than the prevailing wage rates as determined by the  
20 Labor Commissioner for the work or craft in which the worker is employed for any Work done pursuant  
21 to this Agreement.

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1           **29.2. Prevailing Wage Compliance.** For those Projects subject to Department of Industrial  
2 Relations (DIR) Monitoring and Enforcement, be advised that the CONTRACTOR is responsible for  
3 submitting certified payroll records directly to the State Compliance Monitoring Unit (CMU) The  
4 Compliance Monitoring Unit or “CMU” is a component within the State Division of Labor Standards  
5 Enforcement (DLSE) that was created to monitor and enforce prevailing wage requirements on public  
6 works projects that receive state bond funding and on other projects that are legally required to use the  
7 CMU. **Effective Date and Applicability:** The laws and regulations that govern the new program are  
8 effective January 1, 2012. This project for which the public works contract is awarded is subject to the  
9 CMU requirements. For further information concerning compliance monitoring please visit the website  
10 located at: <http://www.dir.ca.gov/dlse/cmucmu.html>.

11           **29.3.** CONTRACTOR shall be liable for penalties pursuant to this section when a subcontractor  
12 on the Project fails to pay its workers the general prevailing rate of per diem wages and any of the  
13 following conditions are met:

14           (a) CONTRACTOR had knowledge of that failure of the subcontractor to pay the  
15 specified prevailing rate of wages to those workers; or

16           (b) CONTRACTOR fails to comply with all of the following requirements: The  
17 contract executed between CONTRACTOR and the subcontractor for the performance of Work on the  
18 Project shall include a copy of the provisions of California Labor Code §§1771, 1775, 1776, 1777.5,  
19 1813 and 1815; and

20           (c) CONTRACTOR shall monitor the payment of the specified general prevailing rate  
21 of per diem wages by the subcontractor to the employees, by periodic review of the certified payroll  
22 records of the subcontractor; and

23           (d) Upon becoming aware of the failure of the subcontractor to pay his or her workers  
24 the specified prevailing rate of wages, CONTRACTOR shall diligently take corrective action to halt or  
25 rectify the failure, including, but not limited to, retaining sufficient funds due the subcontractor for work  
26 performed on the public works project; and

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1 (e) Prior to making final payment to the subcontractor for Work performed on the  
2 Project, CONTRACTOR shall obtain an affidavit signed under penalty of perjury from the subcontractor  
3 that the subcontractor has paid the specified general prevailing rate of per diem wages to his or her  
4 employees on the Project and any amounts due pursuant to California Labor Code §1813.

5 **30. WORK DAY AND WORK WEEK REQUIREMENTS.**

6 CONTRACTOR agrees to comply with §§1810 through 1815 of the California Labor Code and,  
7 when applicable, sections 103 and 107 of the Contract Work Hours and Safety Standards Act, 40 U.S.C.  
8 §§3700 et seq., as supplemented by the Department of Labor regulations, which provide that  
9 CONTRACTOR's workers and its subcontractor's workers may not be required or permitted to work  
10 more than eight (8) hours in any one (1) calendar day and forty (40) hours in any one (1) calendar week.  
11 Further, work performed by employees of CONTRACTOR or its subcontractor in excess of eight (8)  
12 hours per day, and forty (40) hours during any one (1) week, shall be compensated for all hours worked  
13 in excess of eight (8) hours per day at not less than one and one-half (1½) times the basic rate of pay.  
14 The responsibility for compliance with these provisions is fixed with CONTRACTOR. CONTRACTOR  
15 understands and agrees that it shall, as a penalty to COUNTY, forfeit specific monetary fines to  
16 COUNTY should CONTRACTOR or its subcontractors fail to comply with the provisions contained  
17 within this paragraph.

18 **31. APPRENTICESHIP REQUIREMENTS.**

19 **31.1.** CONTRACTOR agrees to comply with §§1777.5, 1777.6 and 1777.7 of the California  
20 Labor Code relating to the employment of apprentices and to provide COUNTY with copies of any  
21 contract award information and verified statements of the journeyman and apprentice hours performed  
22 pursuant to this Agreement as required by §1777.5(e).

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1           **31.2.** The responsibility for compliance with these provisions is fixed with CONTRACTOR for  
2 all apprenticeable occupations, where journeymen in the craft are employed on the public work, in a ratio  
3 of not less than one (1) apprentice for each five (5) journeymen (unless an exemption is granted in  
4 accordance with §1777.5) and CONTRACTOR and its subcontractors shall not discriminate among  
5 otherwise qualified employees as indentured apprentices on any public work solely on the ground of race,  
6 religious creed, color, national origin, ancestry, sex, or age, except as provided in California Labor Code  
7 §3077. Only apprentices, as defined in California Labor Code §3077, who are in training under  
8 apprenticeship standards and who have signed written apprentice agreements will be employed on public  
9 works in apprenticeable occupations. This section shall not be enforced if the not-to-exceed amount of  
10 this Agreement set forth and/or incorporated in the “COMPENSATION” paragraph is less than thirty  
11 thousand dollars (\$30,000).

12           **31.3.** If the Project falls within the jurisdiction of California Labor Code §1777.5, COUNTY  
13 shall, within five (5) days of the award, send a copy of the award to the Division of Apprenticeship  
14 Standards. In addition, COUNTY shall notify the Division of Apprenticeship Standards of a finding of  
15 any discrepancy regarding the ratio of apprentices to journeymen within five (5) days of the finding.

16 **32.    LABOR STANDARDS COMPLIANCE REQUIREMENTS.**

17           **32.1.** It is CONTRACTOR’s responsibility to provide all labor compliance documentation from  
18 its subcontractors completely and accurately in a timely manner. CONTRACTOR is responsible to  
19 review promptly and then forward on all required documentation to COUNTY per the time  
20 schedules in the Labor Compliance Handout.                   Included with the Labor Compliance Handout,  
21 COUNTY will provide training, documentation requirements, forms, etc., at the preconstruction  
22 conference or at a time designated by COUNTY.

23           **32.2.** In the event, during the review process of labor compliance documentation from  
24 COUNTY’s labor compliance monitor, inaccurate, missing or incomplete information was provided,  
25 the labor compliance monitor will request from CONTRACTOR the items, revisions and documentation  
26 needed. The cost of this additional labor compliance enforcement shall be borne by CONTRACTOR.

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1 **33. SIGNAGE REQUIREMENTS.**

2 **33.1. Project Identity Signage.** CONTRACTOR is required to provide and install the required  
3 project identity signage as detailed in the Plans and Specifications, in the size and at the location indicated  
4 by the Imperial County Community and Economic Development Manager or his/her designee, and to  
5 maintain the signage in good condition for the duration of the Project. The signage may not be removed  
6 until the Notice of Completion is recorded or by written direction of the Economic Development Manager  
7 or his/her designee.

8 **33.2. Required Employee Signage and Posters.** CONTRACTOR is required to provide and install  
9 the Federal and State required employee posters and the required material pertaining to the required labor  
10 standards provisions are posted (including, but not limited to, WH-1321, OSHA 3165 and OFCCP-  
11 English, EFCCP-Spanish) at the worksite in a prominent and accessible place.

12 **33.3. Section 3 Compliant Signage.** If required by COUNTY, CONTRACTOR is directed to  
13 provide and install the “Offer for Employment” signage as detailed in the Plans and Specifications in the  
14 size and at the location indicated by the Imperial County Community & Economic Development  
15 Department Manger or his/her designee and to maintain the signage in good condition for the duration of  
16 the Project. The signage may not be removed until the Notice of Completion is recorded or by written  
17 direction of the Imperial County Community or his/her designee.

18 **34. CONFLICT OF INTEREST AND GRATUITIES.**

19 **34.1.** CONTRACTOR agrees that it presently has no interest and shall not acquire any interest,  
20 direct or indirect, which could conflict in any manner or degree with the performance of services required  
21 to be performed under this Agreement. CONTRACTOR further agrees that in the performance of this  
22 Agreement, no person having any such interest shall be employed.

23 **34.2.** CONTRACTOR agrees to designate such person or persons who have responsibility for  
24 carrying out the services under this Agreement and that such person or persons as may be designated  
25 shall take any and all actions necessary to comply with COUNTY’s Conflict of Interest Code adopted  
26 pursuant to California Government Code §81000 to the extent required thereunder.

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1           **34.3.** If it is found, after notice and hearing by COUNTY, that gratuities (in the form of  
2 entertainment., gifts, or otherwise) were offered or given by CONTRACTOR, or any agent or  
3 representative of CONTRACTOR, to any officer, employee or agent of COUNTY with a view toward  
4 securing a contract or securing favorable treatment with respect to the awarding or amending or the  
5 making of any determinations with respect to the performance of this Agreement, COUNTY may, by  
6 written notice to CONTRACTOR, terminate the right of CONTRACTOR to proceed under this  
7 Agreement and/or may pursue such other rights and remedies provided by law or under this Agreement.

8           **34.4.** In the event this Agreement is terminated as provided herein, COUNTY shall be entitled 1.)  
9 to pursue the same remedies against CONTRACTOR as it could pursue in the event of a breach of the  
10 Agreement by CONTRACTOR, and 2.) as a penalty in addition to any other damages to which it may be  
11 entitled by law, to exemplary damages in an amount (as determined by COUNTY) which shall be not  
12 less than three (3) nor more than ten (10) times the costs incurred by CONTRACTOR in providing any  
13 such gratuities to any such officer, employee or agent.

14 **35.    HOUSING AND URBAN DEVELOPMENT ACT COMPLIANCE.**

15           When applicable, CONTRACTOR agrees to comply with Section 3 of the Housing and Urban  
16 Development Act of 1968 (42 U.S.C. 3601 et seq.) which provides that to the greatest extent feasible,  
17 CONTRACTOR shall provide job training, employment and contracting opportunities for low or very-  
18 low income residents in connection with the Project. The responsibility for compliance with these  
19 provisions is fixed with CONTRACTOR.

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1 **36. COPELAND “ANTI-KICKBACK” ACT COMPLIANCE.**

2 When applicable, CONTRACTOR agrees to comply with the Copeland Act (*18 USC §874 and*  
3 *40 USC §276c; 29 C.F.R. Part 3*) which precludes CONTRACTOR and its subcontractors from in any  
4 way inducing an employee to give up any part of the compensation to which he or she is entitled under  
5 his or her contract of employment. CONTRACTOR and its subcontractors shall submit a weekly  
6 statement of the wages paid to each employee performing on covered work during the preceding payroll  
7 period. CONTRACTOR understands and agrees that should CONTRACTOR its subcontractors induce  
8 an employee working on a covered contract to give up any part of the compensation to which he or she  
9 is entitled, the inducing party may be subject to a five thousand dollar (\$5,000) fine, or imprisonment  
10 for up to five (5) years, or both. CONTRACTOR also understands and agrees that willful falsification  
11 of the statement of compliance may subject the employer to civil or criminal prosecution and may be  
12 cause for contract termination or debarment. The responsibility for compliance with these provisions is  
13 fixed with CONTRACTOR.

14 **37. FAIR LABOR STANDARDS ACT COMPLIANCE.**

15 When applicable, CONTRACTOR agrees to comply with the Fair Labor Standards Act of 1938  
16 as amended (29 U.S.C. 201 et seq.) which establishes minimum wage, overtime pay, recordkeeping, and  
17 youth employment standards affecting full-time and part-time workers on the Project. The responsibility  
18 for compliance with these provisions is fixed with CONTRACTOR.

19 **38. CERTIFICATION REGARDING DEBARMENT, SUSPENSION AND OTHER**  
20 **RESPONSIBILITY MATTERS.**

21 When applicable, CONTRACTOR agrees to execute a certification regarding debarment,  
22 suspension, and other responsibility matters. The responsibility for compliance with this provision is  
23 fixed with CONTRACTOR.

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1 **39. FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT**  
2 **SPECIFICATIONS.**

3 When applicable, CONTRACTOR agrees to incorporate the notice set forth in paragraph (d) of  
4 41 C.F.R. 60-4.2 relating to the “Equal Opportunity Clause” and the “Standard Federal Equal  
5 Employment Specifications.” The responsibility for compliance with this provision is fixed with  
6 CONTRACTOR.

7 **40. CLEAN AIR ACT AND THE FEDERAL WATER POLLUTION CONTROL ACT.**

8 When applicable, CONTRACTOR agrees to comply with all applicable standards, orders or  
9 regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401 et seq.), the Federal Water Pollution  
10 Control Act as amended (33 U.S.C. 1251 et seq.), Presidential Executive Order 11738 and Environmental  
11 Protection Agency regulations set forth at 40 C.F.R. Part 15. CONTRACTOR understands and agrees  
12 that violations shall be reported to the Federal awarding agency and the Regional Office of the  
13 Environmental Protection Agency. The responsibility for compliance with these provisions is fixed with  
14 CONTRACTOR.

15 **41. PROHIBITION ON THE USE OF FEDERAL FUNDS FOR LOBBYING.**

16 When applicable, CONTRACTOR shall file the required certification. Each tier certifies to the  
17 tier above that it will not and has not used Federal appropriated funds to pay any person or organization  
18 for influencing or attempting to influence an officer or employee of any agency, a member of Congress,  
19 officer or employee of Congress, or an employee of a member of Congress in connection with obtaining  
20 any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier shall also disclose  
21 any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award.  
22 Such disclosures are forwarded from tier to tier up to the recipient. The responsibility for compliance  
23 with this provision is fixed with CONTRACTOR.

24 **42. FEDERAL EMPLOYMENT ELIGIBILITY VERIFICATION.**

25 CONTRACTOR shall verify name, date of birth and social security number, along with  
26 immigration information for non-citizens in order to verify the identity and employment eligibility of  
27 both citizen and non-citizen new hires. The responsibility for compliance with this provision is fixed with  
28 CONTRACTOR.

1 **43. THE CIVIL RIGHTS, HCD AND AGE DISCRIMINATION ACT ASSURANCES.**

2 During the performance of this Agreement, CONTRACTOR assures that no otherwise qualified  
3 person shall be excluded from participation or employment, denied program benefits or be subjected  
4 to discrimination based on race, color, national origin, gender, age or handicap, under any program or  
5 activity funded by this Agreement, as required by Title VI of the Civil Rights Act of 1964, Title I of  
6 the Housing and Community Development Act of 1974, as amended, and the Age Discrimination Act  
7 of 1975, and all implementing regulations. The responsibility for compliance with these provisions is  
8 fixed with CONTRACTOR.

9 **44. STANDARD EQUAL OPPORTUNITY CLAUSE.**

10 **44.1.** CONTRACTOR hereby agrees that it will incorporate or cause to be incorporated into any  
11 contract for construction work, or modification thereof, as defined in the regulations of the Secretary of  
12 Labor at 41 C.F.R. Chapter 60, which is paid for in whole or in part with funds obtained from the Federal  
13 Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan  
14 insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract,  
15 loan, insurance, or guarantee, the following equal opportunity clause:

16 “During the performance of this contract, the Contractor agrees as follows:

- 17 (1) The contractor will not discriminate against any employee or applicant for  
18 employment because of race, color, religion, sex, or national origin. The contractor  
19 will take affirmative action to ensure that applicants are employed, and that  
20 employees are treated during employment, without regard to their race, color,  
21 religion, sex, or national origin. Such action shall include, but not be limited to the  
22 following: Employment, upgrading, demotion, or transfer, recruitment or  
23 recruitment advertising; layoff or termination; rates of pay or other forms of  
24 compensation; and selection for training, including apprenticeship. The contractor  
25 agrees to post in conspicuous places, available to employees and applicants for  
26 employment, notices to be provided by the contracting officer setting forth the  
27 provisions of this nondiscrimination clause.

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1 (2) The contractor will, in all solicitations or advertisements for employees placed by  
2 or on behalf of the contractor, state that all qualified applicants will receive consideration  
3 for employment without regard to race, color, religion, sex, or national origin.

4 (3) The contractor will send to each labor union or representative of workers with  
5 which he has a collective bargaining agreement or other contract or understanding, a notice  
6 to be provided by the agency contracting officer, advising the labor union or workers'  
7 representative of the contractor's commitments under section 202 of Executive Order  
8 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places  
9 available to employees and applicants for employment.

10 (4) The contractor will comply with all provisions of Executive Order 11246 of  
11 September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of  
12 Labor.

13 (5) The contractor will furnish all information and reports required by Executive Order  
14 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of  
15 Labor, or pursuant thereto, and will permit access to his books, records, and accounts by  
16 the contracting agency and the Secretary of Labor for purposes of investigation to  
17 ascertain compliance with such rules, regulations, and orders.

18 (6) In the event of the contractor's non-compliance with the nondiscrimination  
19 clauses of this contract or with any of such rules, regulations, or orders, this contract  
20 may be canceled, terminated or suspended in whole or in part and the contractor may be  
21 declared ineligible for further Government contracts in accordance with procedures  
22 authorized in Executive Order 11246 of September 24, 1965, and such other sanctions  
23 may be imposed and remedies invoked as provided in Executive Order 11246 of  
24 September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as  
25 otherwise provided by law.

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1 (7) the contractor will include the provisions of paragraphs (1) through (7) in every  
2 subcontract or purchase order unless exempted by rules, regulations, or orders of the  
3 Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September  
4 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The  
5 contractor will take such action with respect to any subcontract or purchase order as may  
6 be directed by the Secretary of Labor as a means of enforcing such provisions including  
7 sanctions for noncompliance: Provided, however, that in the event the contractor becomes  
8 involved in, or is threatened with, litigation with a subcontractor or vendor as a result of  
9 such direction, the contractor may request the United States to enter into such litigation to  
10 protect the interests of the United States.”

11 **44.2.** CONTRACTOR further agrees that it will be bound by the above equal opportunity clause  
12 with respect to its own employment practices when it participates in federally- assisted construction work;  
13 provided that if CONTRACTOR so participating is a State or local government, the above equal  
14 opportunity clause is not applicable to any agency, instrumentality, or subdivision of such government  
15 which does not participate in work on or under the Agreement.

16 **44.3.** CONTRACTOR agrees that it will assist and cooperate actively with the administering  
17 agency and the Secretary of Labor in obtaining the compliance of Contractors and subcontractors with  
18 the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that  
19 it will furnish the Department and HUD and the Secretary of Labor such information as they may require  
20 for the supervision of such compliance, and that it will otherwise assist the administering agency in the  
21 discharge of the agency’s primary responsibility for securing compliance.

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1           **44.4.** CONTRACTOR further agrees that it will refrain from entering into any contract or contract  
2 modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from,  
3 or who has not demonstrated eligibility for, government contracts and federally-assisted construction  
4 contracts, pursuant to the Executive Order and will carry out such sanctions and penalties for violation  
5 of the equal opportunity clause as may be imposed upon contractors and subcontractors by the  
6 administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In  
7 addition, CONTRACTOR agrees that if it fails or refuses to comply with these undertakings, COUNTY  
8 may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this funding  
9 commitment (contract, loan, grant, insurance, guarantee); refrain from extending any further assistance  
10 to the applicant under the program with respect to which the failure or refund occurred until satisfactory  
11 assurance of future compliance has been received from such Contractor; and refer the case to the  
12 Department of Justice for appropriate legal proceedings.

13 **45. Disadvantaged/Minority/Women Business Enterprise Federal Regulatory Requirements.**

14           When applicable, Contractor will take all necessary affirmative steps to assure that minority firms,  
15 women’s business enterprises, and labor surplus area firms are used when possible. Affirmative steps  
16 shall include:

17           **45.1.** Placing qualified small and minority businesses and women’s business enterprises on  
18 solicitation lists;

19           **45.2.** Assuring that small and minority businesses, and women’s business enterprises are solicited  
20 whenever they are potential sources;

21           **45.3.** Dividing total requirements, when economically feasible, into smaller tasks or quantities  
22 to permit maximum participation by small and minority business, and women’s business enterprises;

23           **45.4.** Establishing delivery schedules, where the requirement permits, which encourage  
24 participation by small and minority business, and women’s business enterprises;

25           **45.5.** Using the Services and assistance of the Small Business Administration, and the Minority  
26 Business Development Agency of the Department of Commerce.

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1 **46. CHILD SUPPORT COMPLIANCE ACT**

2 If the compensation specified in Paragraph 8 exceeds one hundred thousand dollars (\$100,000),  
3 then CONTRACTOR agrees to the following:

4 **46.1.** Recognize the importance of child and family support obligations and fully comply with all  
5 applicable state and federal laws relating to child and family support enforcement, including but not  
6 limited to, disclosure of information and compliance with earnings assignment orders, as provided in  
7 Chapter 8 (commencing with section 5200) of Part 5 of Division 9 of the Family Code; and

8 **46.2.** To the best of its knowledge, is fully comply with the earnings assignment orders of all  
9 employees and is provide the names of all new employees to the New Hire Registry maintained by the  
10 California Employment Development Department

11 **47. ASSIGNMENT OF UNFAIR BUSINESS PRACTICES CLAIMS (CLAYTON ACT AND**  
12 **CARTWRIGHT ACT).**

13 CONTRACTOR and its subcontractors offer and agree to assign to COUNTY all rights, title and  
14 interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. §15) or  
15 under the Cartwright Act (Chapter 2 (commencing with §16700) of Part 2 of Division 7 of the Business  
16 and Professions Code), arising from purchases of goods, services or materials pursuant to this Agreement.  
17 This assignment shall be made and become effective at the time COUNTY tenders final payment to  
18 CONTRACTOR, without further acknowledgment by the Parties.

19 **48. NON-COLLUSION.**

20 CONTRACTOR agrees he/she has executed and submitted with the Bid a Non-Collusion  
21 Affidavit that complies with Cal. Public Code §7106, included in **Exhibit "B"** and incorporated  
22 herein.

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1 **49. NOTICES AND REPORTS.**

2 **49.1.** Any notice and reports under this Agreement shall be in writing and may be given by  
3 personal delivery or by mailing by certified mail, addressed as follows:

4 **COUNTY**

5 Imperial County Department  
6 of Public Works  
7 155 South Eleventh Street,  
8 El Centro, CA 92243

**CONTRACTOR**

[Mail Info]

9 County of Imperial  
10 Clerk of the Board of Supervisors  
11 940 W. Main Street, Suite 209  
12 El Centro, CA 92243

13 **49.2.** Notice shall be deemed to have been delivered only upon receipt by the Party, seventy-two  
14 (72) hours after deposit in the United States mail or twenty-four (24) hours after deposit with an overnight  
15 carrier.

16 **49.3.** The addressees and addresses for purposes of this paragraph may be changed to any other  
17 addressee and address by giving written notice of such change. Unless and until written notice of change  
18 of addressee and/or address is delivered in the manner provided in this paragraph, the addressee and  
19 address set forth in this Agreement shall continue in effect for all purposes hereunder.

20 **50. ENTIRE AGREEMENT.**

21 This Agreement contains the entire Agreement between COUNTY and CONTRACTOR relating  
22 to the transactions contemplated hereby and supersedes all prior or contemporaneous agreements,  
23 understandings, provisions, negotiations, representations, or statements, either written or oral.

24 **51. MODIFICATION.**

25 No modification, waiver, amendment, discharge, or change of this Agreement shall be valid  
26 unless the same is in writing and signed by both Parties.

27 **52. CAPTIONS.**

28 Captions in this Agreement are inserted for convenience of reference only and do not define,  
describe or limit the scope or the intent of this Agreement or any of the terms thereof.

1 **53. PARTIAL INVALIDITY.**

2 If any provision in this Agreement is held by a court of competent jurisdiction to be invalid, void,  
3 or unenforceable, the remaining provisions will nevertheless continue in full force without being impaired  
4 or invalidated in any way.

5 **54. GENDER AND INTERPRETATION OF TERMS AND PROVISIONS.**

6 As used in this Agreement and whenever required by the context thereof, each number, both  
7 singular and plural, shall include all numbers, and each gender shall include a gender. CONTRACTOR  
8 as used in this Agreement or in any other document referred to in or made a part of this Agreement  
9 shall likewise include the singular and the plural, a corporation, a partnership, individual, firm or person  
10 acting in any fiduciary capacity as executor, administrator, trustee or in any other representative  
11 capacity or any other entity. All covenants herein contained on the part of CONTRACTOR shall be  
12 joint and several if more than one person, firm or entity executes the Agreement.

13 **55. WAIVER.**

14 No Waiver of any breach or of any of the covenants or conditions of this Agreement shall be  
15 construed to be a waiver of any other breach or to be consent to any further or succeeding breach of the  
16 same or any other covenant or condition.

17 **56. CHOICE OF LAW.**

18 This Agreement shall be governed by the laws of the State of California. This Agreement is made  
19 and entered into in Imperial County, California. Any action brought by either party with respect to this  
20 agreement shall be brought in a court of competent jurisdiction within said County.

21 **57. AUTHORITY.**

22 **57.1.** Each individual executing this Agreement on behalf of CONTRACTOR represents and  
23 warrants that:

24 (a) She/he is duly authorized to execute and deliver this Agreement on behalf of  
25 CONTRACTOR;

26 (b) Such execution and delivery is in accordance with the terms of the Articles of  
27 Incorporation or Partnership, any by-laws or Resolutions of CONTRACTOR and;

1 (c) This Agreement is binding upon CONTRACTOR accordance with its terms.

2 **57.2.** CONTRACTOR shall deliver to COUNTY evidence acceptable to COUNTY of the foregoing  
3 within thirty (30) days of execution of this Agreement.

4 **58. COUNTERPARTS.**

5 This Agreement (as well as any amendments hereto) may be executed in any number of  
6 counterparts, each of which when executed shall be an original, and all of which together shall constitute  
7 the same Agreement. No counterparts shall be effective until all Parties have executed a counterpart  
8 hereof.

9 **59. REVIEW OF AGREEMENT TERMS.**

10 **59.1.** Each Party has received independent legal advice from its attorneys with respect to the  
11 advisability of making the representations, warranties, covenants and agreements provided for herein,  
12 and with respect to the advisability of executing this Agreement.

13 **59.2.** Each Party represents and warrants to and covenants with the other Party that:

14 (a) This Agreement in its reduction to final written form is a result of extensive good  
15 faith negotiations between the Parties and/or their respective legal counsel;

16 (b) The Parties and their legal counsel have carefully reviewed and examined this  
17 Agreement for execution by said Parties; and

18 **59.3.** Any statute or rule of construction that ambiguities are to be resolved against the drafting  
19 party shall not be employed in the interpretation of this Agreement.

20 **60. NON-APPROPRIATION.**

21 This Agreement is based upon the availability of public funding. In the event that public funds  
22 are unavailable and not appropriated for the performance of the services set forth in this Agreement,  
23 the Agreement shall be terminated without penalty after written notice to CONTRACTOR of the  
24 unavailability and/or non-appropriation of funds.

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1           **IN WITNESS WHEREOF**, the Parties have executed this Agreement on the day and year first  
2 above written.

3  
4 **County of Imperial**

**[Contractor]**

5  
6  
7 By: \_\_\_\_\_  
8 Jesus Eduardo Escobar, Chairman  
9 Imperial County Board of Supervisors

By: \_\_\_\_\_  
[Name],  
[Title]

10 **ATTEST:**

11  
12 \_\_\_\_\_  
13 Blanca Acosta, Clerk of the Board,  
14 County of Imperial, State of California

15 **APPROVED AS TO FORM:**

16 [County Counsel Name]  
17 County Counsel

18 By: \_\_\_\_\_  
19 [Name],  
20 [Title]

**16. NOTICE TO PROCEED**

Dated: \_\_\_\_\_

Project: <b>Seeley Fire Station and Cooling Center</b>	Owner: <b>County of Imperial</b>	Owner's Contract No.:
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Contract:	Engineer's Project No.:
	<b>542.088</b>

Contractor: \_\_\_\_\_

Contractor's Address (send Certified Mail, Return Receipt requested): \_\_\_\_\_

You are notified that the Contract Times under the above contract will commence to run on \_\_\_\_\_. On or before that date, you are to start performing your obligations under the Contract Documents.

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and the Owner must each deliver to the other (with copies to the Engineer and other identified additional insured's) Certificates of Insurance which each is required to purchase and maintain in accordance with the Contract Documents.

You are required to return an acknowledged copy of this NOTICE TO PROCEED to the OWNER.

**County of Imperial**

Contractor	Owner
Given by:	Given by:
Authorized Signature	Authorized Signature
Title	Title
Date	Date

Copy to Engineer

**17. PERFORMANCE BOND**

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

**County of Imperial  
Imperial County Workforce & Economic Development  
2799 South 4th Street  
El Centro, CA 92243**

**CONTRACT**

Date:  
Amount:  
Description: **Seeley Fire Station and Cooling Station**

**BOND**

Bond Number:  
Date (Not earlier than Contract Date):  
Amount:  
Modifications to this Bond Form:

The Surety and the Contractor, intending to be legally bound hereby, subject to the terms hereof, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

**CONTRACTOR AS PRINCIPAL**

**SURETY**

Company:

Signature: \_\_\_\_\_ (Seal)  
Name and Title:

\_\_\_\_\_  
Surety's Name and Corporate Seal

By: \_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: \_\_\_\_\_  
Signature and Title

**CONTRACTOR AS PRINCIPAL**

**SURETY**

Company:

Signature: \_\_\_\_\_ (Seal)  
Name and Title:

\_\_\_\_\_  
Surety's Name and Corporate Seal

By: \_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

Attest: \_\_\_\_\_  
Signature and Title:

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Contract, which is incorporated herein by reference.
2. If the Contractor performs the Contract, the Surety and the Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.
3. If there is no Owner Default, the Surety's obligation under this Bond shall arise after:
  - 3.1 The Owner has notified the Contractor and the Surety, at the addresses described in Paragraph 10 below, that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than **fifteen (15) days** after receipt of such notice to discuss methods of performing the Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and
  - 3.2 The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than **twenty (20) days** after the Contractor and the Surety have received notice as provided in Paragraph 3.1; and
  - 3.3 The Owner has agreed to pay the Balance of the Contract Price to:
    1. The Surety in accordance with the terms of the Contract;
    2. Another Contractor selected pursuant to Paragraph 4.3 to perform the Contract.
4. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
  - 4.1 Arrange for the Contractor, with consent of the Owner, to perform and complete the Contract; or
  - 4.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
  - 4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the Owner and the Contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to the Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor Default; or
  - 4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:
    1. After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, tender payment therefore to the Owner; or
    2. Deny liability in whole or in part and notify the Owner citing reasons therefore.
5. If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond **fifteen (15) days** after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 4.4, and the Owner refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.
6. After the Owner has terminated Contractor's right to complete the Contract, and if the Surety elects to act under Paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the



Contract. To a limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, the Surety is obligated without duplication for:

- 6.1 The responsibilities of the Contractor for correction of defective Work and completion of the Contract;
  - 6.2 Additional Legal, Design Professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 4; and
  - 6.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of the Contractor.
7. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, or successors.
  8. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders, and other obligations.
  9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within **two (2) years** after Contractor Default or within **two (2) years** after the Contractor ceased working or within **two (2) years** after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties

as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the signature page.
11. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted here from and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12. Definitions.

- 12.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other Claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Contract.
- 12.2 Contract: The agreement between the Owner and the Contractor identified on the signature page, including all the Contract Documents and changes thereto.
- 12.3 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
- 12.4 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

<b>FOR INFORMATION ONLY</b>	
<b>(Name, Address and Telephone)</b>	
<b>SURETY AGENCY OR BROKER</b>	_____
	_____
<b>OWNER'S REPRESENTATIVE</b>	_____
	_____

**18. PAYMENT BOND**

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address): \_\_\_\_\_ SURETY (Name and Address of Principal Place of Business): \_\_\_\_\_

OWNER (Name and Address):  
**County of Imperial**  
**Imperial County Workforce & Economic Development**  
**2799 South 4<sup>th</sup> Street**  
**El Centro, CA 92243**

CONTRACT  
Date:  
Amount:  
Description: **Seeley Fire and Cooling Center**

BOND  
Bond Number:  
Date (Not earlier than Contract Date):  
Amount:  
Modifications to this Bond Form:

The Surety and the Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

**CONTRACTOR AS PRINCIPAL**  
Company:

**SURETY**

Signature: \_\_\_\_\_ (Seal)  
Name and Title:

\_\_\_\_\_  
Surety's Name and Corporate Seal

By: \_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: \_\_\_\_\_  
Signature and Title

**CONTRACTOR AS PRINCIPAL**  
Company:

**SURETY**

Signature: \_\_\_\_\_ (Seal)  
Name and Title:

\_\_\_\_\_  
Surety's Name and Corporate Seal

By: \_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

Attest: \_\_\_\_\_  
Signature and Title:

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.
2. With respect to the Owner, this obligation shall be null and void if the Contractor:
  - 2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and
  - 2.2 Defends, indemnifies, and holds harmless the Owner from all claims, demands, liens, or suits alleging non-payment by the Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided the Owner has promptly notified the Contractor and the Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety, and provided there is no Owner Default.
3. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.
4. The Surety shall have no obligation to Claimants under this Bond until:
  - 4.1 Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the addresses described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
  - 4.2 Claimants who do not have a direct contract with the Contractor:
    1. Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within **ninety (90) days** after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
    2. Have either received a rejection in whole or in part from the Contractor, or not received within **thirty (30) days** of furnishing the above notice any communication from the Contractor by which the Contractor had indicated the claim will be paid directly or indirectly; and
    3. Not having been paid within the above **thirty (30) days**, have sent a written notice to the Surety and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.
5. If a notice by a Claimant required by Paragraph 4 is provided by the Owner to the Contractor or to the Surety that is sufficient compliance.
6. When a Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:
  - 6.1 Send an answer to that Claimant, with a copy to the Owner, within **forty-five (45) days** after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
  - 6.2 Pay or arrange for payment of any undisputed amounts.
7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
8. Amounts owed by the Owner to the Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the Work.

- 9. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Contract. The Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.
- 10. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.
- 11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of **one (1) year** from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
- 12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by the Surety, the Owner, or the Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.
- 13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions

conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

- 14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions.

15.1 Claimant: An individual or entity having a direct contract with the Contractor, or with a first-tier subcontractor of the Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, Architectural and Engineering Services required for performance of the Work of the Contractor and the Contractor's Subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

15.2 Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

<b>FOR INFORMATION ONLY</b>	
<b>(Name, Address and Telephone)</b>	
<b>SURETY AGENCY OR BROKER:</b>	_____
	_____
<b>OWNER'S REPRESENTATIVE:</b>	_____
	_____
	_____

**19. CERTIFICATE OF OWNER’S ATTORNEY  
EXHIBIT GC-A**

I, the undersigned, \_\_\_\_\_ the duly authorized and acting legal representative of

**County of Imperial** do hereby certify as follows:

I have examined the attached Contract(s) and performance and payment bond(s) and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements is adequate and has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with the terms, conditions, and provisions thereof.

Signature: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

**20. CERTIFICATE OF SUBSTANTIAL COMPLETION**

Project: <b>Seeley Fire and Cooling Center</b>	Owner: <b>County of Imperial</b>	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.: <b>542.088</b>

**This [tentative] [definitive] Certificate of Substantial Completion applies to:**

- All Work under the Contract Documents:
- The following specified portions:

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\_\_\_\_\_  
Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of the Owner, the Contractor and the Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A (tentative) (revised tentative) (definitive) list of items to be completed or corrected, is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

**The responsibilities between the OWNER and the CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:**

- Amended Responsibilities
- Not Amended

Owner's Amended Responsibilities:

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Contractor's Amended Responsibilities:

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The following documents are attached to and made part of this Certificate:

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This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of the Contractor's obligation to complete the Work in accordance with the Contract Documents.

\_\_\_\_\_  
Executed by Engineer

\_\_\_\_\_  
Date

\_\_\_\_\_  
Accepted by Contractor

\_\_\_\_\_  
Date

\_\_\_\_\_  
Accepted by Owner

\_\_\_\_\_  
Date

## 21. STANDARD GENERAL CONDITIONS

### ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

#### 1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda* – Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
  2. *Agency* – The Federal or State Agency named as such in the Agreement.
  3. *Agreement* – The written instrument which is evidence of the agreement between the Owner and the Contractor covering the Work.
  4. *Application for Payment* – The form acceptable to the Engineer which is to be used by the Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
  5. *Asbestos* – Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
  6. *Bid* – The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
  7. *Bidder* – The individual or entity who submits a Bid directly to the Owner.
  8. *Bidding Documents* – The Bidding Requirements and the proposed Contract Documents (including all Addenda).
  9. *Bidding Requirements* – The Advertisement or Invitation to Bid, Instructions to Bidders, Bid Security of Acceptable Form, if any, and the Bid Form with any supplements.
  10. *Change Order* – A document recommended by the Engineer which is signed by the Contractor and the Owner and Agency and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
  11. *Claim* – A demand or assertion by the Owner or Contractor seeking an adjustment of the Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
  12. *Contract* – The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
  13. *Contract Documents* – Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.



14. *Contract Price* – The moneys payable by the Owner to the Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
15. *Contract Times* – The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by the Engineer's written recommendation of final payment.
16. *Contractor* – The individual or entity with whom the Owner has entered into the Agreement.
17. *Cost of the Work* – See Paragraph 11.01.A for definition.
18. *Drawings* – That part of the Contract Documents prepared or approved by the Engineer which graphically shows the scope, extent, and character of the Work to be performed by the Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
19. *Effective Date of the Agreement* – The date indicated in the Agreement on which it becomes effective; if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
20. *Engineer* – The individual or entity named as such in the Agreement.
21. *Field Order* – A written order issued by the Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Time.
22. *General Requirements* – Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.
23. *Hazardous Environmental Condition* – The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.
24. *Hazardous Waste* – The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
25. *Laws and Regulations; Laws or Regulations* – Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens* – Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
27. *Milestone* – A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to the Substantial Completion of all of the Work.
28. *Notice of Award* – The written notice by the Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, the Owner will sign and deliver the Agreement.
29. *Notice to Proceed* – A written notice given by the Owner to the Contractor fixing the date on which the Contract Time will commence to run and on which the Contractor shall start to perform the Work under the Contract Documents.
30. *Owner* – The individual or entity with whom the Contractor has entered into the Agreement and for whom the Work is to be performed.
31. *PCBs* – Polychlorinated Biphenyls.

32. *Petroleum* – Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
33. *Progress Schedule* – A schedule prepared and maintained by the Contractor, describing the sequence and duration of the activities comprising the Contractor’s plan to accomplish the Work within the Contract Time.
34. *Project* – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
35. *Project Manual* – The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the Table(s) of Contents.
36. *Radioactive Material* – Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
37. *Related Entity* – An officer, director, partner, employee, agent, consultant, or subcontractor.
38. *Resident Project Representative* – The authorized representative of the Engineer who may be assigned to the Site or any part thereof.
39. *Samples* – Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
40. *Schedule of Submittals* – A schedule, prepared and maintained by the Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
41. *Schedule of Values* – A schedule, prepared and maintained by the Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing the Contractor’s Applications for Payment.
42. *Shop Drawings* – All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for the Contractor and submitted by the Contractor to illustrate some portion of the Work.
43. *Site* – Lands or areas indicated in the Contract Documents as being furnished by the Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by the Owner which are designated for the use of the Contractor.
44. *Specifications* – That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
45. *Subcontractor* – An individual or entity having a direct contract with the Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
46. *Substantial Completion* – The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of the Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.

47. *Successful Bidder* – The Bidder submitting a responsive Bid to whom the Owner makes an award.
48. *Supplementary Conditions* – That part of the Contract Documents which amends or supplements these General Conditions.
49. *Supplier* – A manufacturer, fabricator, supplier, distributor, material man, or vendor having a direct contract with the Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by the Contractor or any Subcontractor.
50. *Underground Facilities* – All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
51. *Unit Price Work* – Work to be paid for on the basis of unit prices.
52. *Work* – The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
53. *Work Change Directive* – A written statement to the Contractor issued on or after the Effective Date of the Agreement and signed by the Owner and the Agency upon recommendation of the Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Time but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Time.

1.02 *Terminology*

- A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.
- B. *Intent of Certain Terms or Adjectives*
  1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of Professional Judgment by the Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of the Engineer as to the Work. It is intended that such exercise of Professional Judgment, Action or Determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the Design Concept of the Completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to the Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.
- C. *Day*
  1. The word “day” means a calendar day of **twenty-four (24) hours** measured from midnight to the next midnight.

D. *Defective*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
  - a. Does not conform to the Contract Documents, or
  - b. Does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or
  - c. Has been damaged prior to the Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by the Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide*

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
  2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
  3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
  4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of the Contractor, “provide” is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

**ARTICLE 2 – PRELIMINARY MATTERS**

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. When the Contractor delivers the executed counterparts of the Agreement to the Owner, the Contractor shall also deliver to the Owner such bonds as the Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, the Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which the Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

- A. The Owner shall furnish to the Contractor ten (10) sets of printed or hard copies of the “Issued for Construction” Drawings and “Conformed” Project Manuals. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Time; Notice to Proceed*

- A. The Contract Time will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement.

2.04 *Starting the Work*

- A. The Contractor shall start to perform the Work on the date when the Contract Time commences to run. No Work shall be done at the Site prior to the date on which the Contract Time commences to run.

2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within **ten (10) days** after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), the Contractor shall submit to the Engineer for timely review:
  - 1. A Preliminary Progress Schedule;
  - 2. A Preliminary Schedule of Submittals; and
  - 3. A Preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during the performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference*

- A. Before any Work at the Site is started, a Conference attended by the Owner, Contractor, Engineer, Agency, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required project records.

2.07 *Initial Acceptance of Schedules*

- A. At least **ten (10) days** before submission of the first Application for Payment a conference attended by the Contractor, Engineer, and others as appropriate will be held to review for acceptability to the Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. The Contractor shall have an additional **five (5) days** to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to the Contractor until acceptable schedules are submitted to the Engineer.
  - 1. The Progress Schedule will be acceptable to the Engineer if it provides an orderly progression of the Work to completion within the Contract Time. Such acceptance will not impose on the Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve the Contractor from the Contractor's full responsibility therefore.
  - 2. The Contractor's Schedule of Submittals will be acceptable to the Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
  - 3. The Contractor's Schedule of Values will be acceptable to the Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

**ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE**

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to the Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by the Engineer as provided in Article 9.

3.02 *Reference Standards*

- A. *Standards, Specifications, Codes, Laws, and Regulations*
  - 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
  - 2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of the Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to the Owner, or Engineer, or any of their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies*
  - 1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, the Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. The Contractor shall promptly report in writing to the Engineer any conflict, error, ambiguity, or discrepancy which the Contractor may discover and shall obtain a written interpretation or clarification from the Engineer before proceeding with any Work affected thereby.
  - 2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, the Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, the Contractor shall promptly report it to the Engineer in writing. The Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
  - 3. The Contractor shall not be liable to the Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless the Contractor knew or reasonably should have known thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
  - a. The provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or
  - b. The provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
  1. A Field Order;
  2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3) or
  3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. The Contractor and any Subcontractor or Supplier shall not:
  1. Have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of the Engineer or the Engineer's consultants, including electronic media editions; or
  2. Reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without the written consent of the Owner and Engineer and specific written verification or adaptation by the Engineer.
- B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude the Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

- A. Copies of data furnished by the Owner or Engineer to the Contractor or the Contractor to the Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies shall govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within **sixty (60) days**, after which the receiving party shall be deemed to have

accepted the data thus transferred. Any errors detected within the **sixty (60) days** acceptance period will be corrected by the transferring party.

- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

**ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS; HAZARDOUS ENVIRONMENTAL CONDITIONS**

4.01 *Availability of Lands*

- A. The Owner shall furnish the Site. The Owner shall notify the Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which the Contractor must comply in performing the Work. The Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If the Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in the Owner's furnishing the Site or a part thereof, the Contractor may make a Claim therefore as provided in Paragraph 10.05.
- B. Upon reasonable written request, the Owner shall furnish the Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and the Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. The Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:*
- B. The Supplementary Conditions identify:
  - 1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that the Engineer has used in preparing the Contract Documents; and
  - 2. Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that the Engineer has used in preparing the Contract Documents.
- C. *Limited Reliance by the Contractor on Technical Data Authorized:*
- D. The Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," the Contractor may not rely upon or make any claim against the Owner or Engineer, or any of their Related Entities with respect to:
  - 1. The completeness of such reports and drawings for the Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by the Contractor, and safety precautions and programs incident thereto; or
  - 2. Other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or



3. Any Contractor interpretation of or conclusion drawn from any “technical data” or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

- A. *Notice:* If the Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. Is of such a nature as to establish that any “technical data” on which the Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
2. Is of such a nature as to require a change in the Contract Documents; or
3. Differs materially from that shown or indicated in the Contract Documents; or
4. Is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;
5. then the Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify the Owner and the Engineer in writing about such condition. The Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

- B. *Engineer’s Review:* After receipt of written notice as required by Paragraph 4.03.A, the Engineer will promptly review the pertinent condition, determine the necessity of the Owner obtaining additional exploration or tests with respect thereto, and advise the Owner in writing (with a copy to the Contractor) of the Engineer’s findings and conclusions.

- C. *Possible Price and Time Adjustments*

1. The Contract Price or the Contract Time, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in the Contractor’s cost of, or time required for, performance of the Work; subject, however, to the following:
  - a. Such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
  - b. With respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. The Contractor shall not be entitled to any adjustment in the Contract Price or Contract Time if:
  - a. The Contractor knew of the existence of such conditions at the time the Contractor made a final commitment to the Owner with respect to the Contract Price and Contract Time by the submission of a Bid or becoming bound under a negotiated contract; or
  - b. The existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for the Contractor prior to the Contractor’s making such final commitment; or
  - c. The Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If the Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Time, or both, a Claim may be made therefore as provided in

Paragraph 10.05. However, the Owner and Engineer, and any of their Related Entities shall not be liable to the Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) sustained by the Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated*: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to the Owner or Engineer by the owners of such Underground Facilities, including the Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. The Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and
2. the cost of all of the following will be included in the Contract Price, and the Contractor shall have full responsibility for:
  - a. Reviewing and checking all such information and data,
  - b. Locating all Underground Facilities shown or indicated in the Contract Documents,
  - c. Coordination of the Work with the owners of such Underground Facilities, including the Owner, during construction, and
  - d. The safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, the Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to the Owner and Engineer. The Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, the Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If the Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Time, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that the Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If the Owner and Contractor are unable to agree upon entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Time, the Owner or Contractor may make a Claim therefore as provided in Paragraph 10.05.

4.05 *Reference Points*

A. The Owner shall provide engineering surveys to establish reference points for construction which in the Engineer's judgment are necessary to enable the Contractor to proceed with the Work. The Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property

monuments, and shall make no changes or relocations without the prior written approval of the Owner. The Contractor shall report to the Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the “technical data” contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such “technical data” is identified in the Supplementary Conditions. Except for such reliance on such “technical data,” Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:
  - 1. the completeness of such reports and drawings for Contractor’s purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
  - 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
  - 3. any Contractor interpretation of or conclusion drawn from any “technical data” or any such other data, interpretations, opinions or information.
- C. The Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the Scope of the Work. The Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by the Contractor, Subcontractors, Suppliers, or anyone else for whom the Contractor is responsible.
- D. If the Contractor encounters a Hazardous Environmental Condition or if the Contractor or anyone for whom the Contractor is responsible creates a Hazardous Environmental Condition, the Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify the Owner and Engineer (and promptly thereafter confirm such notice in writing). The Owner shall promptly consult with the Engineer concerning the necessity for the Owner to retain a Qualified Expert to evaluate such condition or take corrective action, if any.
- E. The Contractor shall not be required to resume Work in connection with such condition or in any affected area until after the Owner has obtained any required permits related thereto and delivered to the Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If the Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Time, or both, as a result of such Work stoppage or such special conditions under which the Work is agreed to be resumed by the Contractor, either party may make a Claim therefore as provided in Paragraph 10.05.
- F. If after receipt of such written notice the Contractor does not agree to resume such Work based upon a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then the Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If the Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an

adjustment in the Contract Price or Contract Time as a result of deleting such portion of the Work, then either party may make a Claim therefore as provided in Paragraph 10.05. The Owner may have such deleted portion of the Work performed by the Owner's own forces or others in accordance with Article 7.

- G. To the fullest extent permitted by Laws and Regulations, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom the Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate the Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. To the fullest extent permitted by Laws and Regulations, the Contractor shall indemnify and hold harmless the Owner and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by the Contractor or by anyone for whom the Contractor is responsible. Nothing in Paragraph 4.06. H shall obligate the Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

## ARTICLE 5 – BONDS AND INSURANCE

### 5.01 *Performance, Payment, and Other Bonds*

- A. The Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of the Contractor's obligations under the Contract Documents. These bonds shall remain in effect until **one (1) year** after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. The Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.
- C. If the surety on any bond furnished by the Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, the Contractor shall promptly notify the Owner and Engineer and shall, within **twenty (20) days** after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

### 5.02 *Licensed Sureties and Insurers*

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by the Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the

jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverage's so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

- A. The Contractor shall deliver to the Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by the Owner or any other additional insured) which the Contractor is required to purchase and maintain.
- B. The Owner shall deliver to the Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by the Contractor or any other additional insured) which the Owner is required to purchase and maintain.

5.04 *Contractor's Liability Insurance*

- A. The Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and shall provide protection from claims set forth below which may arise out of or result from the Contractor's performance of the Work and the Contractor's other obligations under the Contract Documents, whether it is to be performed by the Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

- 1. Claims under workers' compensation, disability benefits, and other similar employee benefit acts;
- 2. Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- 3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- 4. Claims for damages insured by reasonably available personal injury liability coverage which are sustained:
  - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
  - b. by any other person for any other reason;
- 5. Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting there from; and
- 6. Claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

- B. The policies of insurance required by this Paragraph 5.04 shall:

- 1. With respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insurer (subject to any customary exclusion regarding professional liability) the Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insurers, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insurers, and the insurance afforded to these additional insurers shall provide primary coverage for all claims covered thereby;
- 2. Include at least the specific coverage's and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. Include completed operations insurance;
4. Include contractual liability insurance covering the Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
5. Contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least **thirty (30) days** prior written notice has been given to the Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
6. Remain in effect at least until final payment and at all times thereafter when the Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
7. With respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least **two (2) years** after final payment.
  - a. The Contractor shall furnish the Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to the Owner and any such additional insured of continuation of such insurance at final payment and **one (1) year** thereafter.

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by the Contractor under Paragraph 5.04, the Owner, at the Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect the Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, the Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (the Contractor shall be responsible for any deductible or self-insured retention.). This insurance shall:
  1. Include the interests of the Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;
  2. Be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;
  3. Include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of Engineers and Architects);
  4. Cover materials and equipment stored at the Site or at another location that was agreed to in writing by the Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by the Engineer;
  5. Allow for partial utilization of the Work by the Owner;

6. Include testing and startup; and
  7. Be maintained in effect until final payment is made unless otherwise agreed to in writing by the Owner, Contractor, and Engineer within **thirty (30) days** written notice to each other additional insured to whom a certificate of insurance has been issued.
- B. The Contractor shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of the Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least **thirty (30) days** prior written notice has been given to the Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. The Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of the Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by the Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

5.07 *Waiver of Rights*

- A. The Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect the Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insured or additional insured there under. The Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and the Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by the Contractor as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against the Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:
1. Loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to the Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by the Owner; and
  2. Loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project

or part thereof by the Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

- C. Any insurance policy maintained by the Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against the Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with the Contractor and made payable to the Contractor as fiduciary for the insured, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. The Contractor shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof.
- B. The Contractor as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within **fifteen (15) days** after the occurrence of loss to the Contractor's exercise of this power. If such objection be made, the Contractor as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, the Contractor as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, the Contractor as fiduciary shall provide a bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either the Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within **ten (10) days** after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. The Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If the Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.



**ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES**

6.01 *Supervision and Superintendence*

- A. The Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. The Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. The Contractor shall not be responsible for the negligence of the Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, the Contractor shall assign a competent Resident Superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be the Contractor’s representative at the Site and shall have authority to act on behalf of the Contractor. All communications given to or received from the superintendent shall be binding on the Contractor.

6.02 *Labor; Working Hours*

- A. The Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. The Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. The Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without the Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to the Engineer.

6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, the Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of the Owner. If required by the Engineer, the Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

- A. The Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. The Contractor shall submit to the Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Time. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
2. Proposed adjustments in the Progress Schedule that will change the Contract Time shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Time may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to the Engineer for review under the circumstances described below.

1. "*Or-Equal*" Items: If in the Engineer's sole discretion an item of material or equipment proposed by the Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by the Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in the Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. In the exercise of reasonable judgment the Engineer determines that:

- 1) It is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
- 2) It will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
- 3) It has a proven record of performance and availability of responsive service; and

b. The Contractor certifies that, if approved and incorporated into the Work:

- 1) There will be no increase in cost to the Owner or increase in Contract Time, and
- 2) It will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items

- a. If in the Engineer's sole discretion an item of material or equipment proposed by the Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. The Contractor shall submit sufficient information as provided below to allow the Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefore. Requests for review of proposed substitute items of material or equipment will not be accepted by the Engineer from anyone other than the Contractor.

- c. The procedural requirements for review by the Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as the Engineer may decide is appropriate under the circumstances.
  - d. The Contractor shall make written application to the Engineer for review of a proposed substitute item of material or equipment that the Contractor seeks to furnish or use. The application:
    - 1) *Shall certify that the proposed substitute item will:*
      - 1. Perform adequately the functions and achieve the results called for by the general design,
      - 2. be similar in substance to that specified, and be suited to the same use as that specified;
    - 2) *Will state:*
      - 1. The extent, if any, to which the use of the proposed substitute item will prejudice the Contractor's achievement of Substantial Completion on time;
      - 2. whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with the Owner for other work on the Project) to adapt the design to the proposed substitute item; and
      - 3. whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
    - 3) *Will identify:*
      - 1. All variations of the proposed substitute item from that specified and available engineering,
      - 2. sales, maintenance, repair, and replacement services;
    - 4) And shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other Contractors affected by any resulting change.
- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, the Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by the Engineer. The Contractor shall submit sufficient information to allow the Engineer, in the Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by the Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* The Owner may require the Contractor to furnish at the Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* The Engineer will record the Engineer's costs in evaluating a substitute proposed or submitted by the Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not the Engineer approves a substitute item so proposed or submitted by the Contractor, the Contractor shall reimburse the Owner for the charges of the Engineer for evaluating each such proposed substitute. The Contractor shall also reimburse the Owner for the charges of the Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with the Owner) resulting from the acceptance of each proposed substitute.

- F. *Contractor's Expense:* The Contractor shall provide all data in support of any proposed substitute or "or-equal" at the Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. The Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to the Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom the Owner may have reasonable objection. The Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom the Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to the Owner in advance for acceptance by the Owner by a specified date prior to the Effective Date of the Agreement, and if the Contractor has submitted a list thereof in accordance with the Supplementary Conditions, the Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. The Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by the Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of the Owner or Engineer to reject defective Work.
- C. The Contractor shall be fully responsible to the Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as the Contractor is responsible for the Contractor's own acts and omissions. Nothing in the Contract Documents:
  - 1. Shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between the Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor
  - 2. Shall anything in the Contract Documents create any obligation on the part of the Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. The Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with the Contractor.
- E. The Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with the Engineer through the Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control the Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for the Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of the Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against the Owner, Contractor, and Engineer, and all other individuals or entities identified in the

Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, the Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

- A. The Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of the Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by the Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, the Contractor shall indemnify and hold harmless the Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, the Contractor shall obtain and pay for all construction permits and licenses. The Owner shall assist the Contractor, when necessary, in obtaining such permits and licenses. The Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. The Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. The Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither the Owner nor the Engineer shall be responsible for monitoring the Contractor's compliance with any Laws or Regulations.
- B. If the Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, the Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be the Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve the Contractor of the Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in the Contract Price or the Contract Times. If the Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefore as provided in Paragraph 10.05.

6.10 *Taxes*

- A. The Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by the Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. The Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. The Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
2. Should any claim be made by any such owner or occupant because of the performance of the Work, the Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, the Contractor shall indemnify and hold harmless the Owner and the Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against the Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris during Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

- C. *Cleaning:* Prior to Substantial Completion of the Work, the Contractor shall clean the Site and the Work and make it ready for utilization by the Owner. At the completion of the Work the Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading Structures:* The Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall the Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

- A. The Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to the Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings shall be delivered to the Engineer.

6.13 *Safety and Protection*

- A. The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. The Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
  - 1. All persons on the Site or who may be affected by the Work;
  - 2. All the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
  - 3. Other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. The Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. The Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by the Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by the Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of the Owner or Engineer, or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- D. The Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and the Engineer has issued a notice to the Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. The Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. The Contractor shall be responsible for coordinating any exchange of Material Safety Data Sheets (MSDS) or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with applicable Laws or Regulations.

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, the Contractor is obligated to act to prevent threatened damage, injury, or loss. The Contractor shall give the Engineer prompt written notice if the Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If the Engineer determines that a change in the Contract Documents is required because of the action taken by the Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

- A. The Contractor shall submit Shop Drawings and Samples to the Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as the Engineer may require.
  - 1. *Shop Drawings*
    - a. Submit number of copies specified in the General Requirements.
    - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show the Engineer the services, materials, and equipment that the Contractor proposes to provide and to enable the Engineer to review the information for the limited purposes required by Paragraph 6.17.D.
  - 2. *Samples*
    - a. Submit number of Samples specified in the Specifications.
    - b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which it is intended and other data to enable the Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to the Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of the Contractor.
- C. *Submittal Procedures*
  - 1. Before submitting each Shop Drawing or Sample, the Contractor shall have determined and verified:
    - a. All field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
    - b. The suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
    - c. All information relative to the Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and
    - d. Shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.
  - 2. Each submittal shall bear a stamp or specific written certification that the Contractor has satisfied the Contractor's obligations under the Contract Documents with respect to the Contractor's review and approval of that submittal.
  - 3. With each submittal, the Contractor shall give the Engineer specific written notice of any variation, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to the Engineer for review and approval of each such variation.
- D. *Engineer's Review*



1. The Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to the Engineer. The Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. The Engineer's review and approval will not extend to the means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. The Engineer's review and approval shall not relieve the Contractor from responsibility for any variation from the requirements of the Contract Documents unless the Contractor has complied with the requirements of Paragraph 6.17.C.3 and the Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. The Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures*

1. The Contractor shall make corrections required by the Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. The Contractor shall direct specific attention in writing to revisions other than the corrections called for by the Engineer on previous submittals.

6.18 *Continuing the Work*

- A. The Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with the Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as the Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. The Contractor warrants and guarantees to the Owner that all Work shall be in accordance with the Contract Documents and will not be defective. The Engineer and its Related Entities shall be entitled to rely on representation of the Contractor's warranty and guarantee.
- B. The Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
  1. Abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom the Contractor is responsible; or
  2. Normal wear and tear under normal usage.
- C. The Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of the Contractor's obligation to perform the Work in accordance with the Contract Documents:
  1. Observations by Engineer;
  2. Recommendation by Engineer or payment by Owner of any progress or final payment;

3. The issuance of a certificate of Substantial Completion by the Engineer or any payment related thereto by the Owner;
4. Use or occupancy of the Work or any part thereof by the Owner;
5. Any review and approval of a Shop Drawing or Sample Submittal or the issuance of a Notice of Acceptability by the Engineer;
6. Any inspection, test, or approval by others; or
7. Any correction of defective Work by the Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, the Contractor shall indemnify and hold harmless the Owner and the Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting there from but only to the extent caused by any negligent act or omission of the Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against the Owner or the Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of the Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of the Contractor under Paragraph 6.20.A shall not extend to the liability of the Engineer and the Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:
  1. The preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications.

6.21 *Delegation of Professional Design Services*

- A. The Contractor will not be required to provide Professional Design Services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out the Contractor's responsibilities for the construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide Professional Services in violation of applicable law.
- B. If Professional Design Services or Certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Engineer will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified

by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Engineer.

- C. The Owner and the Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided the Owner and the Engineer have specified to the Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, the Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. The Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. The Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

## **ARTICLE 7 – OTHER WORK AT THE SITE**

### **7.01 *Related Work at Site***

- A. The Owner may perform other work related to the Project at the Site with the Owner's employees or via other direct contracts therefore, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
  - 1. Written notice thereof will be given to the Contractor prior to starting any such other work; and
  - 2. If the Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefore as provided in Paragraph 10.05.
- B. The Contractor shall afford each other Contractor who is a party to such a direct contract, each utility owner and the Owner, if the Owner is performing other work with the Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. The Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of the Engineer and the others whose work will be affected. The duties and responsibilities of the Contractor under this Paragraph are for the benefit of such utility owners and other Contractors to the extent that there are comparable provisions for the benefit of the Contractor in said direct contracts between the Owner and such utility owners and other Contractors.
- C. If the proper execution or results of any part of the Contractor's Work depends upon work performed by others under this Article 7, the Contractor shall inspect such other work and promptly report to the Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of the Contractor's Work. The Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with the Contractor's Work except for latent defects and deficiencies in such other work.

### **7.02 *Coordination***

- A. If the Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in the Supplementary Conditions:

1. The individual or entity who will have authority and responsibility for coordination of the activities among the various Contractors will be identified;
  2. The specific matters to be covered by such authority and responsibility will be itemized; and
  3. The extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, the Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of the Owner.
- B. Each other direct contract of the Owner under Paragraph 7.01.A shall provide that the other Contractor is liable to the Owner and the Contractor for the reasonable direct delay and disruption costs incurred by the Contractor as a result of the other contractor's inactions.
- C. The Contractor shall be liable to the Owner and any other Contractor for the reasonable direct delay and disruption costs incurred by such other Contractor as a result of the Contractor's actions or inactions.

**ARTICLE 8 – OWNER’S RESPONSIBILITIES**

8.01 *Communications to the Contractor*

- A. Except as otherwise provided in these General Conditions, the Owner shall issue all communications to the Contractor through the Engineer.

8.02 *Replacement of the Engineer*

- A. In the case of termination of the employment of the Engineer, the Owner shall appoint an Engineer to whom the Contractor makes no reasonable objection and whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

- A. The Owner shall promptly furnish the data required of the Owner under the Contract Documents.

8.04 *Pay When Due*

- A. The Owner shall make payments to the Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

- A. The Owner's duties with respect to providing land and easements and providing Engineering Surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to the Owner's identifying and making available to the Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by the Engineer in preparing the Contract Documents.

8.06 *Insurance*

- A. The Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. The Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. The Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on the Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, the Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of the Contractor to comply with the Laws and Regulations applicable to the performance of the Work. The Owner will not be responsible for the Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. The Owner's responsibility with respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent the Owner has agreed to furnish the Contractor reasonable evidence that financial arrangements have been made to satisfy the Owner's obligations under the Contract Documents, the Owner's responsibility with respect thereof will be as set forth in the Supplementary Conditions.

**ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION**

9.01 *Owner's Representative*

A. The Engineer will be the Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of the Engineer as the Owner's representative during construction are set forth in the Contract Documents and will not be changed without the written consent of the Owner and the Engineer.

9.02 *Visits to Site*

A. The Engineer will make visits to the Site at intervals appropriate to the various stages of construction as the Engineer deems necessary in order to observe as an experienced and Qualified Design Professional the progress that has been made and the quality of the various aspects of the Contractor's executed Work. Based upon information obtained during such visits and observations, the Engineer, for the benefit of the Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. The Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. The Engineer's efforts will be directed toward providing for the Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, the Engineer will keep the Owner informed of the progress of the Work and will endeavor to guard the Owner against defective Work.

B. The Engineer's visits and observations are subject to all the limitations on the Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of the Engineer's visits or observations of the Contractor's Work the Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures

of construction, or the safety precautions and programs incident thereto, or for any failure of the Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

- A. The Engineer shall furnish a Resident Project Representative to assist the Engineer in providing more extensive observation of the Work. The authority and responsibilities of the Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If the Owner designates another representative or agent to represent the Owner at the Site who is not the Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

- A. The Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Time and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on the Owner and also on the Contractor, who shall perform the Work involved promptly. If the Owner or the Contractor believes that a Field Order justifies an adjustment in the Contract Price or the Contract Time, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefore as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. The Engineer will have authority to reject Work which the Engineer believes to be defective, or that the Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. The Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with the Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with the Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of Professional Design Services, if any, see Paragraph 6.21.
- C. In connection with the Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with the Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. The Engineer will determine the actual quantities and classifications of Unit Price Work performed by the Contractor. The Engineer will review with the Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). The Engineer's written decision thereon will be final and binding (except as modified by the Engineer to reflect changed factual conditions or more accurate data) upon the Owner and the Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. The Engineer will be the initial interpreter of the requirements of the Contract Documents and the judge of the acceptability of the Work there under. All matters in question and other matters between the Owner and the Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to the Engineer in writing within **thirty (30) days** of the event giving rise to the question.
- B. The Engineer will, with reasonable promptness, render a written decision on the issue referred. If the Owner or the Contractor believes that any such decision entitles them to an adjustment in the Contract Price or the Contract Times or both, a Claim may be made under Paragraph 10.05. The date of the Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. The Engineer's written decision on the issue referred will be final and binding on the Owner and the Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, the Engineer will not show partiality to the Owner or the Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither the Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by the Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by the Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by the Engineer to the Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. The Engineer will not supervise, direct, control, or have authority over or be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of the Contractor to comply with Laws and Regulations applicable to the performance of the Work. The Engineer will not be responsible for the Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. The Engineer will not be responsible for the acts or omissions of the Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. The Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative and assistants, if any.

**ARTICLE 10 – CHANGES IN THE WORK; CLAIMS**

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, the Owner may, subject to written approval by the Agency at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, the Contractor shall

promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

- B. If the Owner and the Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Time, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefore as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

- A. The Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Time with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

10.03 *Execution of Change Orders*

- A. The Owner and the Contractor shall execute appropriate Change Orders recommended by the Engineer covering:
  - 1. Changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or the Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
  - 2. Changes in the Contract Price or Contract Time which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
  - 3. Changes in the Contract Price or Contract Time which embody the substance of any written decision rendered by the Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, the Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

- A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Time) is required by the provisions of any bond to be given to a surety, the giving of any such notice will be the Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by the Engineer shall be required as a condition precedent to any exercise by the Owner or the Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations with respect to such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to the Engineer and the other party to the Contract promptly (but in no event later than **thirty (30) days** after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within **sixty (60) days** after the start of such event (unless the Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in the Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in the Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by the claimant's written statement that the



adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to the Engineer and the claimant within **thirty (30) days** after receipt of the claimant's last submittal (unless the Engineer allows additional time).

- C. *Engineer's Action:* The Engineer will review each Claim and, within **thirty (30) days** after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
  - 1. Deny the Claim in whole or in part,
  - 2. Approve the Claim, or
  - 3. Notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that the Engineer does not take action on a Claim within said **thirty (30) days**, the Claim shall be deemed denied.
- E. The Engineer's written action under the Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon the Owner and the Contractor, unless the Owner or the Contractor invoke the dispute resolution procedure set forth in Article 16 within **thirty (30) days** of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Time will be valid if not submitted in accordance with this Paragraph 10.05.

## **ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK**

### 11.01 *Cost of the Work*

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by the Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to the Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by the Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.
  - 1. Payroll costs for employees in the direct employ of the Contractor in the performance of the Work under schedules of job classifications agreed upon by the Owner and the Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by the Owner.
  - 2. The Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to the Contractor unless the Owner deposits funds with the Contractor with which to make payments, in which case the cash discounts shall accrue to the Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to the Owner, and the Contractor shall make provisions so that they may be obtained.

3. Payments made by the Contractor to Subcontractors for Work performed by the Subcontractors. If required by the Owner, the Contractor shall obtain competitive bids from subcontractors acceptable to the Owner and the Contractor and shall deliver such bids to the Owner, who will then determine, with the advice of the Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as the Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
  4. Costs of special consultants (including but not limited to Engineers, Architects, Testing Laboratories, Surveyors, Attorneys, and Accountants) employed for services specifically related to the Work.
  5. Supplemental costs including the following:
    - a. The proportion of necessary transportation, travel, and subsistence expenses of the Contractor's employees incurred in discharge of duties connected with the Work.
    - b. The Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of the Contractor.
    - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from the Contractor or others in accordance with rental agreements approved by the Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
    - d. Sales, consumer, use, and other similar taxes related to the Work, and for which the Contractor is liable, imposed by Laws and Regulations.
    - e. Deposits lost for causes other than negligence of the Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
    - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by the Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of the Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of the Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining the Contractor's fee.
    - g. The cost of utilities, fuel, and sanitary facilities at the Site.
    - h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressages, and similar petty cash items in connection with the Work.
    - i. The costs of premiums for all bonds and insurance that the Contractor is required by the Contract Documents to purchase and maintain.
- B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of the Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by the Contractor, whether at the Site or in the Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
  2. Expenses of the Contractor's principal and branch offices other than the Contractor's office at the Site.
  3. Any part of the Contractor's capital expenses, including interest on the Contractor's capital employed for the Work and charges against the Contractor for delinquent payments.
  4. Costs due to the negligence of the Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
  5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.
- C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, the Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, the Contractor shall establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to the Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to the Owner and the Engineer.
- B. *Cash Allowances:*
1. The Contractor agrees that:
    - a. The cash allowances include the cost to the Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
    - b. The Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance*
1. The Contractor agrees that a contingency allowance, if any, is for the sole use of the Owner to cover unanticipated costs.

- D. Prior to final payment, an appropriate Change Order will be issued as recommended by the Engineer to reflect actual amounts due the Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work and Lump Sum Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of the Comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by the Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by the Contractor to be adequate to cover the Contractor's overhead and profit for each separately identified item.
- D. The Owner or the Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
  - 1. The Bid price of a particular item of Unit Price Work amounts to more than five percent (5%) of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by the Contractor differs by more than twenty-five percent (25%) from the estimated quantity of such item indicated in the Agreement; and
  - 2. There is no corresponding adjustment with respect to any other item of Work; and
  - 3. The Contractor believes that the Contractor is entitled to an increase in the Contract Price as a result of having incurred additional expense or the Owner believes that the Owner is entitled to a decrease in the Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.
- E. Lump Sum amount Bid Form items will be deemed to include an amount considered by the Contractor to be adequate to cover the contractor's overhead and profit for each lump sum bid form item.

**ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES**

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
  - 1. Where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
  - 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. Where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. A mutually acceptable fixed fee; or
2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
  - a. For costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be fifteen percent (15%);
  - b. For costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent (5%);
  - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of fifteen percent (15%) of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent (5%) of the amount paid to the next lower tier Subcontractor;
  - d. No fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
  - e. The amount of credit to be allowed by the Contractor to the Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in the Contractor's fee by an amount equal to five percent (5%) of such net decrease; and
  - f. When both additions and credits are involved in any one change, the adjustment in the Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

#### 12.02 *Change of Contract Time*

- A. The Contract Time may only be changed by a Change Order. Any Claim for an adjustment in the Contract Time shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Time covered by a Change Order or any Claim for an adjustment in the Contract Time will be determined in accordance with the provisions of this Article 12.

#### 12.03 *Delays*

- A. Where the Contractor is prevented from completing any part of the Work within the Contract Time due to delay beyond the control of the Contractor, the Contract Time will be extended in an amount equal to the time lost due to such delay if a Claim is made therefore as provided in Paragraph 12.02.A. Delays beyond the control of the Contractor shall include, but not be limited to, acts or neglect by the Owner, acts or neglect of utility owners or other Contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If the Owner, Engineer, or other Contractors or utility owners performing other work for the Owner as contemplated by Article 7, or anyone for whom the Owner is responsible, delays, disrupts, or interferes with

the performance or progress of the Work, then the Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Time, or both. The Contractor's entitlement to an adjustment of the Contract Time is conditioned on such adjustment being essential to the Contractor's ability to complete the Work within the Contract Time.

- C. If the Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of the Owner, or other causes not the fault of and beyond control of the Owner and the Contractor, then the Contractor shall be entitled to an equitable adjustment in the Contract Time, if such adjustment is essential to the Contractor's ability to complete the Work within the Contract Time. Such an adjustment shall be the Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.B.
- D. The Owner, the Engineer and the Related Entities of each of them shall not be liable to the Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) sustained by the Contractor on or in connection with any other project or anticipated project.
- E. The Contractor shall not be entitled to an adjustment in the Contract Price or Contract Time for delays within the control of the Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of the Contractor.

**ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

13.01 *Notice of Defects*

- A. Prompt notice of all defective Work of which the Owner or the Engineer has actual knowledge will be given to the Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

- A. The Owner, the Engineer, their consultants and other representatives and personnel of the Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. The Contractor shall provide them proper and safe conditions for such access and advise them of the Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

- A. The Contractor shall give the Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. The Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
  - 1. For inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
  - 2. That costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and
  - 3. As otherwise specifically provided in the Contract Documents.

- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, the Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish the Engineer the required certificates of inspection or approval.
- D. The Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for the Owner's and the Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to the Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to the Owner and the Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by the Contractor without written concurrence of the Engineer, it must, if requested by the Engineer, be uncovered for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at the Contractor's expense unless the Contractor has given the Engineer timely notice of the Contractor's intention to cover the same and the Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of the Engineer, it must, if requested by the Engineer, be uncovered for the Engineer's observation and replaced at the Contractor's expense.
- B. If the Engineer considers it necessary or advisable that covered Work be observed by the Engineer or inspected or tested by others, the Contractor, at the Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as the Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, the Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and the Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, the Owner may make a Claim therefore as provided in Paragraph 10.05.
- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, the Contractor may make a Claim therefore as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- A. If the Work is defective, or the Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, the Owner may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of notice, the Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by the Engineer, remove it from the Project and

replace it with Work that is not defective. The Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, the Contractor shall take no action that would void or otherwise impair the Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within **one (1) year** after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by the Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, the Contractor shall promptly, without cost to the Owner and in accordance with the Owner's written instructions:
  - 1. Repair such defective land or areas; or
  - 2. Correct such defective Work; or
  - 3. If the defective Work has been rejected by the Owner, remove it from the Project and replace it with Work that is not defective, and
  - 4. Satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting there from.
- B. If the Contractor does not promptly comply with the terms of the Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, the Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by the Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting there from) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of **one (1) year** after such correction or removal and replacement has been satisfactorily completed.
- E. The Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, the Owner (and, prior to the Engineer's recommendation of final payment, the Engineer) prefers to accept it, the Owner may do so. The Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other



dispute resolution costs) attributable to the Owner's evaluation of and determination to accept such defective Work (such costs to be approved by the Engineer as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by the Contractor pursuant to this sentence. If any such acceptance occurs prior to the Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and the Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, the Owner may make a Claim therefore as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by the Contractor to the Owner.

13.09 *Owner May Correct Defective Work*

- A. If the Contractor fails within a reasonable time after written notice from the Engineer to correct defective Work or to remove and replace rejected Work as required by the Engineer in accordance with Paragraph 13.06.A, or if the Contractor fails to perform the Work in accordance with the Contract Documents, or if the Contractor fails to comply with any other provision of the Contract Documents, the Owner may, after **seven (7) days** written notice to the Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, the Owner shall proceed expeditiously. In connection with such corrective or remedial action, the Owner may exclude the Contractor from all or part of the Site, take possession of all or part of the Work and suspend the Contractor's services related thereto, take possession of the Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which the Owner has paid the Contractor but which are stored elsewhere. The Contractor shall allow the Owner, the Owner's representatives, agents and employees; the Owner's other Contractors, and the Engineer and the Engineer's Consultants access to the Site to enable the Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by the Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against the Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and the Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, the Owner may make a Claim therefore as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of the Contractor's defective Work.
- D. The Contractor shall not be allowed an extension of the Contract Time because of any delay in the performance of the Work attributable to the exercise by the Owner of the Owner's rights and remedies under this Paragraph 13.09.

**ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION**

14.01 *Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to the Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

- A. *Applications for Payments*
  - 1. At least **twenty (20) days** before the date established in the Agreement for each progress payment (but not more often than once a month), the Contractor shall submit to the Engineer for review an Application for

Payment filled out and signed by the Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that the Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect the Owner's interest therein, all of which must be satisfactory to the Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of the Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge the Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

*B. Review of Applications*

1. The Engineer will, within **ten (10) days** after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to the Owner or return the Application to the Contractor indicating in writing the Engineer's reasons for refusing to recommend payment. In the latter case, the Contractor may make the necessary corrections and resubmit the Application.
2. The Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by the Engineer to the Owner, based on the Engineer's observations on the Site of the executed Work as an experienced and qualified design professional and on the Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of the Engineer's knowledge, information and belief:
  - a. The Work has progressed to the point indicated;
  - b. The quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and
  - c. The conditions precedent to the Contractor's being entitled to such payment appear to have been fulfilled in so far as it is the Engineer's responsibility to observe the Work.
3. By recommending any such payment the Engineer will not thereby be deemed to have represented that:
  - a. Inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to the Engineer in the Contract Documents; or
  - b. That there may not be other matters or issues between the parties that might entitle the Contractor to be paid additionally by the Owner or entitle the Owner to withhold payment to the Contractor.
4. Neither the Engineer's review of the Contractor's Work for the purposes of recommending payments nor the Engineer's recommendation of any payment, including final payment, will impose responsibility on the Engineer:
  - a. To supervise, direct, or control the Work, or

- b. For the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
  - c. For the Contractor's failure to comply with Laws and Regulations applicable to the Contractor's performance of the Work, or
  - d. To make any examination to ascertain how or for what purposes the Contractor has used the moneys paid on account of the Contract Price, or
  - e. To determine that title to any of the Work, materials, or equipment has passed to the Owner free and clear of any Liens.
5. The Engineer may refuse to recommend the whole or any part of any payment if, in the Engineer's opinion, it would be incorrect to make the representations to the Owner stated in Paragraph 14.02.B.2. The Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in the Engineer's opinion to protect the Owner from loss because:
- a. The Work is defective, or completed Work has been damaged, requiring correction or replacement;
  - b. The Contract Price has been reduced by Change Orders;
  - c. The Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
  - d. The Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

*C. Payment Becomes Due*

1. **Ten (10) days** after presentation of the Application for Payment to the Owner with the Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by the Owner to the Contractor.

*D. Reduction in Payment*

1. The Owner may refuse to make payment of the full amount recommended by the Engineer because:
  - a. Claims have been made against the Owner on account of the Contractor's performance or furnishing of the Work;
  - b. Liens have been filed in connection with the Work, except where the Contractor has delivered a specific bond satisfactory to the Owner to secure the satisfaction and discharge of such Liens;
  - c. The Contractor's performance or furnishing of the Work is inconsistent with funding Agency requirements;
  - d. There are other items entitling the Owner to a set-off against the amount recommended; or
  - e. The Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If the Owner refuses to make payment of the full amount recommended by the Engineer, the Owner will give the Contractor immediate written notice (with a copy to the Engineer) stating the reasons for such action and promptly pay the Contractor any amount remaining after deduction of the amount so withheld.

The Owner shall promptly pay the Contractor the amount so withheld, or any adjustment thereto agreed to by the Owner and the Contractor, when the Contractor corrects to the Owner's satisfaction the reasons for such action.

3. If it is subsequently determined that the Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.03 *Contractor's Warranty of Title*

- A. The Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to the Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

- A. When the Contractor considers the entire Work ready for its intended use the Contractor shall notify the Owner and the Engineer in writing that the entire Work is substantially complete (except for items specifically listed by the Contractor as incomplete) and request that the Engineer issue a certificate of Substantial Completion.
- B. Promptly after the Contractor's notification, the Owner, Agency, Contractor, and Engineer shall make a pre-final inspection of the Work to determine the status of completion. If the Engineer does not consider the Work substantially complete, the Engineer will notify the Contractor in writing giving the reasons therefore.
- C. If the Engineer considers the Work substantially complete, the Engineer will deliver to the Owner a Tentative Certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. The Owner shall have **seven (7) days** after receipt of the Tentative Certificate during which to make written objection to the Engineer as to any provisions of the certificate or attached list. If, after considering such objections, the Engineer concludes that the Work is not substantially complete, the Engineer will within **fourteen (14) days** after submission of the Tentative Certificate to the Owner notify the Contractor in writing, stating the reasons therefore. If, after consideration of the Owner's objections, the Engineer considers the Work substantially complete, the Engineer will within said **fourteen (14) days** execute and deliver to the Owner and the Contractor a Definitive Certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as the Engineer believes justified after consideration of any objections from the Owner.
- D. At the time of delivery of the Tentative Certificate of Substantial Completion, the Engineer will deliver to the Owner and the Contractor a written recommendation as to division of responsibilities pending final payment between the Owner and the Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless the Owner and the Contractor agree otherwise in writing and so inform the Engineer in writing prior to the Engineer's issuing the Definitive Certificate of Substantial Completion, the Engineer's aforesaid recommendation will be binding upon the Owner and the Contractor until final payment.
- E. The Owner shall have the right to exclude the Contractor from the Site after the date of Substantial Completion subject to allowing the Contractor reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

- A. Prior to the Substantial Completion of all the Work, the Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which the Owner, the Engineer, and the Contractor agree constitutes a separately functioning and usable part of the Work that can be used by the Owner for its intended purpose without significant interference with the Contractor's performance of the remainder of the Work, subject to the following conditions.

1. The Owner at any time may request the Contractor in writing to permit the Owner to use or occupy any such part of the Work which the Owner believes to be ready for its intended use and substantially complete. If and when the Contractor agrees that such part of the Work is substantially complete, the Contractor will certify to the Owner and the Engineer that such part of the Work is substantially complete and request the Engineer to issue a certificate of Substantial Completion for that part of the Work.
2. The Contractor at any time may notify the Owner and the Engineer in writing that the Contractor considers any such part of the Work ready for its intended use and substantially complete and request the Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, the Owner, the Contractor, and the Engineer shall make an inspection of that part of the Work to determine its status of completion. If the Engineer does not consider that part of the Work to be substantially complete, the Engineer will notify the Owner and the Contractor in writing giving the reasons therefore. If the Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to Certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

- A. Upon written notice from the Contractor that the entire Work or an agreed portion thereof is complete, the Engineer will promptly make a final inspection with the Owner, the Agency, and the Contractor and will notify the Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. The Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment*

1. After the Contractor has, in the opinion of the Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, the Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
  - a. All documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;
  - b. Consent of the surety, if any, to final payment;
  - c. A list of all Claims against the Owner that the Contractor believes are unsettled; and
  - d. Complete and legally effective releases or waivers (satisfactory to the Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by the Owner, the Contractor may furnish receipts or releases in full and an affidavit of the Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which the Owner or the Owner's property might in any way be responsible have been paid or otherwise satisfied. If

any Subcontractor or Supplier fails to furnish such a release or receipt in full, the Contractor may furnish a bond or other collateral satisfactory to the Owner to indemnify the Owner against any Lien.

B. *Engineer's Review of Application and Acceptance*

1. If, on the basis of the Engineer's observation of the Work during construction and final inspection, and the Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, the Engineer is satisfied that the Work has been completed and the Contractor's other obligations under the Contract Documents have been fulfilled, the Engineer will, within **ten (10) days** after receipt of the final Application for Payment, indicate in writing the Engineer's recommendation of payment and present the Application for Payment to the Owner for payment. At the same time the Engineer will also give written notice to the Owner and the Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, the Engineer will return the Application for Payment to the Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case the Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due*

1. **Thirty (30) days** after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum the Owner is entitled to set off against the Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by the Owner to the Contractor.

14.08 *Final Completion Delayed*

- A. If, through no fault of the Contractor, final completion of the Work is significantly delayed, and if the Engineer so confirms, the Owner shall, upon receipt of the Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of the Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by the Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims. The remaining balance of any sum included in the final Application for Payment but held by the Owner for Work not fully completed and accepted will become due when the Work is fully completed and accepted.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
  1. A waiver of all Claims by the Owner against the Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from the Contractor's continuing obligations under the Contract Documents; and
  2. A waiver of all Claims by the Contractor against the Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by the Owner in writing as still unsettled.

**ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION**

15.01 *Owner May Suspend Work*

- A. At any time and without cause, the Owner may suspend the Work or any portion thereof for a period of not more than **ninety (90) consecutive days** by notice in writing to the Contractor and the Engineer which will fix the date on which Work will be resumed. The Contractor shall resume the Work on the date so fixed. The Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Time, or both, directly attributable to any such suspension if the Contractor makes a Claim therefore as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:
  - 1. The Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
  - 2. The Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
  - 3. The Contractor's disregard of the authority of the Engineer; or
  - 4. The Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, the Owner may, after giving the Contractor (and surety) **seven (7) days** written notice of its intent to terminate the services of the Contractor:
  - 1. Exclude the Contractor from the Site, and take possession of the Work and of all the Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by the Contractor (without liability to the Contractor for trespass or conversion),
  - 2. Incorporate in the Work all materials and equipment stored at the Site or for which the Owner has paid the Contractor but which are stored elsewhere, and
  - 3. Complete the Work as the Owner may deem expedient.
- C. If the Owner proceeds as provided in Paragraph 15.02.B, the Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) sustained by the Owner arising out of or relating to completing the Work, such excess will be paid to the Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, the Contractor shall pay the difference to the Owner. Such claims, costs, losses, and damages incurred by the Owner will be reviewed by the Engineer as to their reasonableness and, when so approved by the Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph the Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, the Contractor's services will not be terminated if the Contractor begins within **seven (7) days** of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than **thirty (30) days** of receipt of said notice.

- E. Where the Contractor's services have been so terminated by the Owner, the termination will not affect any rights or remedies of the Owner against the Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due the Contractor by the Owner will not release the Contractor from liability.
- F. If and to the extent that the Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon **seven (7) days** written notice to the Contractor and the Engineer, the Owner may, without cause and without prejudice to any other right or remedy of the Owner, terminate the Contract. In such case, the Contractor shall be paid for (without duplication of any items):
  - 1. Completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
  - 2. Expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
  - 3. All claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
  - 4. Reasonable expenses directly attributable to termination.
- B. The Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of the Contractor, (i) the Work is suspended for more than **ninety (90) consecutive days** by the Owner or under an order of court or other public authority, or (ii) the Engineer fails to act on any Application for Payment within **thirty (30) days** after it is submitted, or (iii) the Owner fails for **thirty (30) days** to pay the Contractor any sum finally determined to be due, then the Contractor may, upon **seven (7) days** written notice to the Owner and the Engineer, and provided the Owner or the Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from the Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if the Engineer has failed to act on an Application for Payment within **thirty (30) days** after it is submitted, or the Owner has failed for **thirty (30) days** to pay the Contractor any sum finally determined to be due, the Contractor may, **seven (7) days** after written notice to the Owner and the Engineer, stop the Work until payment is made of all such amounts due the Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude the Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Time or otherwise for expenses or damage directly attributable to the Contractor's stopping the Work as permitted by this Paragraph.

**ARTICLE 16 – DISPUTE RESOLUTION**

16.01 *Methods and Procedures*

- A. The Owner and the Contractor may mutually request mediation of any Claim submitted to the Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be



governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

- B. The Owner and the Contractor shall participate in the mediation process in good faith. The process shall be concluded within **sixty (60) days** of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the claim is not resolved by mediation, the Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding **thirty (30) days** after termination of the mediation unless, within that time period, the Owner or the Contractor:
  - 1. Elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or
  - 2. Agrees with the other party to submit the Claim to another dispute resolution process, or
  - 3. Gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

## ARTICLE 17 – MISCELLANEOUS

### 17.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
  - 1. Delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or
  - 2. Delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

### 17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

### 17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

### 17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the State of California.

17.06 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

**ARTICLE 18 – FEDERAL REQUIREMENTS**

18.01 *Agency Not a Party*

- A. This Contract is expected to be funded in part with funds provided by the Agency. Neither the Agency, nor any of its departments, entities, or employees is a party to this Contract.

18.02 *Contract Approval*

- A. The Owner and the Contractor will furnish the Owner’s attorney such evidence as required so that the Owner’s attorney can complete and execute the following “Certificate of Owner’s Attorney” (Exhibit GC-A) before the Owner submits the executed Contract Documents to the Agency for approval.
- B. Concurrence by Agency in the award of the Contract is required before the Contract is effective.

18.03 *Conflict of Interest*

- A. The Contractor may not knowingly contract with a supplier or manufacturer if the individual or entity who prepared the plans and specifications has a corporate or financial affiliation with the supplier or manufacturer.
- B. The Owner’s officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when: (i) the employee, officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest in the Contractor. The Owner’s officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from the Contractor or subcontractors.

18.04 *Gratuities*

- A. If the Owner finds after a notice and hearing that the Contractor, or any of the Contractor’s agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of the Owner or the Agency in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, the Owner may, by written notice to the Contractor, terminate this Contract. The Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which the Owner bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract.
- B. In the event this Contract is terminated as provided in paragraph 18.04.A, the Owner may pursue the same remedies against the Contractor as it could pursue in the event of a breach of this Contract by the Contractor. As a penalty, in addition to any other damages to which it may be entitled by law, the Owner may pursue exemplary damages in an amount (as determined by the Owner) which shall not be less than three (3) nor more than ten (10) times the costs the Contractor incurs in providing any such gratuities to any such officer or employee.

18.05 *Audit and Access to Records*

- A. For all negotiated contracts and negotiated modifications (except those of \$10,000 or less), the Owner, the Agency, the Controller General, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the Contractor, which are pertinent to the Contract, for the purpose of making audits, examinations, excerpts and transcriptions. The Contractor shall maintain all required records for **three (3) years** after final payment is made and all other pending matters are closed.

18.06 *Small, Minority and Women's Businesses*

- A. If the Contractor intends to let any subcontracts for a portion of the work, the Contractor shall take affirmative steps to assure that small, minority and women's businesses are used when possible as sources of supplies, equipment, construction, and services. Affirmative steps shall consist of: (1) including qualified small, minority and women's businesses on solicitation lists; (2) assuring that small, minority and women's businesses are solicited whenever they are potential sources; (3) dividing total requirements when economically feasible, into small tasks or quantities to permit maximum participation of small, minority, and women's businesses; (4) establishing delivery schedules, where the requirements of the work permit, which will encourage participation by small, minority and women's businesses; (5) using the services and assistance of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce; (6) requiring each party to a subcontract to take the affirmative steps of this section; and (7) the Contractor is encouraged to procure goods and services from labor surplus area firms.

18.07 *Anti-Kickback*

- A. The Contractor shall comply with the Copeland Anti-Kickback Act (18 USC 874 and 40 USC 276c) as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Buildings or Public Works Financed in Whole or in Part by Loans or Grants of the United States"). The Act provides that the Contractor or subcontractor shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public facilities, to give up any part of the compensation to which they are otherwise entitled. The Owner shall report all suspected or reported violations to the Agency.

18.08 *Clean Air and Pollution Control Acts*

- A. If this Contract exceeds **\$100,000**, the Contractor shall comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 USC 7401 *et seq.*) and the Federal Water Pollution Control Act as amended (33 USC 1251 *et seq.*). The Contractor will report violations to the Agency and the Regional Office of the EPA.

18.09 *State Energy Policy*

- A. The Contractor shall comply with the Energy Policy and Conservation Act (P.L. 94-163). Mandatory standards and policies relating to energy efficiency, contained in any applicable State Energy Conservation Plan, shall be utilized.

18.10 *Equal Opportunity Requirements*

- A. If this Contract exceeds **\$10,000**, the Contractor shall comply with Executive Order 11246, "Equal Employment Opportunity," as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR Part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."
- B. Contractor's compliance with Executive Order 11246 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the Standard Federal Equal Employment Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4 and its

efforts to meet the goals established for the geographical area where the Contract is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the Contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the Contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

- C. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within **ten (10) working days** of award of any construction subcontract in excess of **\$10,000** at any tier for construction work under the Contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number; estimated dollar amount of subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the Contract is to be performed.

18.11 *Restrictions on Lobbying*

- A. The Contractor and each subcontractor shall comply with Restrictions on Lobbying (Public Law 101-121, Section 349) as supplemented by applicable Agency regulations. This Law applies to the recipients of contracts and subcontracts that exceed **\$100,000** at any tier under a Federal loan that exceeds **\$150,000** or a Federal grant that exceeds **\$100,000**. If applicable, the Contractor must complete a certification form on lobbying activities related to a specific Federal loan or grant that is a funding source for this Contract. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 34 USC 1354. Each tier shall disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Certifications and disclosures are forwarded from tier to tier up to the Owner. Necessary certification and disclosure forms shall be provided by the Owner.

18.12 *Environmental Requirements*

- A. When constructing a project involving trenching and/or other related earth excavations, the Contractor shall comply with the following environmental constraints:
  - 1. *Wetlands* – When disposing of excess spoil, or other construction materials on public or private property, the Contractor shall not fill in or otherwise convert wetlands.
  - 2. *Floodplains* – When disposing of excess, spoil, or other construction materials on public or private property, the Contractor shall not fill in or otherwise convert one-hundred (100) year floodplain areas delineated on the latest Federal Emergency Management Agency Floodplain Maps, or other appropriate maps, i.e., alluvial soils on NRCS Soil Survey Maps.
  - 3. *Historic Preservation* – Any excavation by the Contractor that uncovers an historical or archaeological artifact shall be immediately reported to the Owner and a representative of the Agency. Construction shall be temporarily halted pending the notification process and further directions issued by the Agency after consultation with the State Historic Preservation Officer (SHPO).
  - 4. *Endangered Species* – The Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of the Contractor, the Contractor will immediately report this evidence to the Owner and a representative of the Agency. Construction shall be temporarily halted pending the notification process and further directions issued by the Agency after consultation with the U.S. Fish and Wildlife Service.

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## 22. SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract Funding Agency Edition (No. C-710, 2002 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions will have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof. Every effort has been made to already have incorporated the following into the General Conditions.

**SC-1.01.A.2 Add the following language to the end of Paragraph 1.01.A.2:**

The Project is financed in whole or in part by the California Department of Housing and Community Development (HCD) through its Community Development Block Grant (CDBG) Program. Agency refers to HCD as administered through the CDBG Division.

**SC-1.01.A.4 Add the following language to the end of Paragraph 1.01.A.4:**

The Application for Payment form to be used on this Project is EJCDC No. C-620. The Agency must approve all Applications for Payment before payment is made.

**SC-1.01.A.10 Add the following language to the end of Paragraph 1.01.A.10:**

The Change Order form to be used on this Project is EJCDC No. C-941. Agency approval is required before Change Orders are effective.

**SC - 1.01. A.18 Delete paragraph SC-1.01.A.18 and replace with the following:**

That part of the Contract Documents prepared or approved by the Engineer or Architect which graphically shows the scope, extent, and character of the Work to be performed by the Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined. The Drawings for this project consist of the following documents:

### CIVIL DRAWINGS

All Civil Drawings are dated 07/08/2022.

- C1.01 TITLE SHEET
- C1.02 SHEET INDEX/SITE PLAN
- C1.03 EXISTING DEMOLITION SITE PLAN
- C1.04 GRADING IMPROVEMENT PLAN
- C1.05 GRADING IMPROVEMENT PLAN
- C1.06 FENCING/UTILITY PLAN
- C1.07 HANDICAP PARKING LOT BLOW-UP DETAIL
- C1.08 GRADING AND FINISH SURFACE SECTION
- C1.09 WATER, SANITARY SEWER, PAVING AND SITE GRADING DETAIL SHEET
- C1.10 SOLID WASTE ENCLOSURE PLAN
- C1.11 WATER AND SANITARY SEWER DETAIL SHEET
- C1.12 CHAIN LINK FENCE DETAIL SHEET
- C1.13 MISCELLANEOUS DETAIL SHEET
- C1.14 SOLID WASTE ENCLOSURE SECTIONS AND DETAILS
- C1.15 EROSION CONTROL PLAN AND CONTRACTOR STAGING AREA
- C1.16 EROSION CONTROL DETAILS
- C1.17 HORIZONTAL CONTROL PLAN
- C2.01 EVAN HEWES HIGHWAY WATER AND SANITARY SEWER PLAN AND PROFILE SHEET
- C2.02 STORM WATER DRAINAGE SWALE AND SECTIONS

- C2.03 WATER AND SEWER DETAIL SHEET
- C2.04 WATER, SEWER AND DEPRESSED CURB & GUTTER DETAIL SHEET
- C2.05 TRAFFIC CONTROL PLAN
- C2.06 SIGNAGE AND STRIPING PLAN

**ARCHITECTURAL DRAWINGS**

All Architectural Drawings are dated 07/08/2022.

- A0.00 COVER
- A0.01 DRAWING INDEX/SYMBOLS & ABBREVIATIONS
- A0.02 ADA REQUIREMENTS
- A0.03 ADA REQUIREMENTS
- A0.04 ADA REQUIREMENTS
- A0.05 ADA REQUIREMENTS
- A0.10 LIFE SAFETY PLAN
- A0.21 THERMAL & MOISTURE PROTECTION
- A1.00 OVERALL SITE PLAN
- A1.10 SITE PLAN DETAILS
- A3.00 FLOOR PLAN – DIMENSIONS
- A3.10 FLOOR PLAN – ANNOTATIONS
- A3.20 ARCHITECTURAL FOUNDATION PLAN
- A3.30 ENLARGED PLANS
- A4.00 REFLECTED CEILING PLAN
- A5.00 EXTERIOR ELEVATIONS
- A6.00 BUILDING SECTIONS
- A6.10 WALL SECTIONS
- A7.00 INTERIOR ELEVATIONS
- A7.20 MILLWORK DETAILS
- A9.00 FINISH FLOOR PLAN & SCHEDULES
- A9.10 FINISH DETAILS
- A9.20 DOOR, WINDOW & HARDWARE SCHEDULES
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- A9.60 UL ASSEMBLIES
- A9.80 CALGREEN NON RESIDENTIAL MANDATORY MEASURES NOTES
- A9.81 CALGREEN NON RESIDENTIAL MANDATORY MEASURES NOTES
- A9.82 CALGREEN NON RESIDENTIAL MANDATORY MEASURES NOTES

**STRUCTURAL DRAWINGS**

All Structural Drawings are dated 07/08/2022.

- S0.00 STRUCTURAL LEGENDS AND SPECS
- S1.01 FOUNDATION PLAN
- S2.01 CONCRETE FOUNDATION – SCHEDULE
- S2.02 CONCRETE REINFORCING
- S3.01 FOUNDATION DETAILS

**MECHANICAL DRAWINGS**

All Mechanical Drawings are dated 07/25/2022.

- M0.00 HVAC COVER SHEET
- M0.01 HVAC CALCULATIONS



M0.02 HVAC – TITLE 24 SHEETS  
M0.03 HVAC – TITLE 24 SHEETS  
M0.04 HVAC – TITLE 24 SHEETS  
M2.11 HVAC PLAN  
M3.00 HVAC – SCHEDULES  
M4.00 HVAC – DETAILS  
M4.01 HVAC – DETAILS

**ELECTRICAL DRAWINGS**

All Electrical Drawings are dated 07/25/2022

E0.00 ELECTRICAL COVER SHEET  
E0.01 TITLE 24 ENERGY COMPLIANCE FORMS  
E0.02 TITLE 24 ENERGY COMPLIANCE FORMS  
E0.03 TITLE 24 ENERGY COMPLIANCE FORMS  
E1.00 ELECTRICAL SITE PLAN  
E1.11 ELECTRICAL LIGHTING PLAN  
E2.11 ELECTRICAL POWER PLAN  
E3.00 PANEL SCHEDULES  
E4.00 ONE-LINE DIAGRAM & DETAILS

**PLUMBING DRAWINGS**

All Plumbing Drawings are dated 07/25/2022.

P0.00 PLUMBING – COVER SHEET  
P0.01 PLUMBING – CALCULATIONS  
P1.11 PLUMBING – WASTE & VENT PLAN  
P2.11 PLUMBING – WATER & GAS PLAN  
P3.00 PLUMBING – SCHEDULE  
P4.00 PLUMBING – DETAILS

**SC-1.01.A.20 Add the following language to the end of Paragraph 1.01.A.20:**

The Architect and Engineer for this project is: **The Holt Group, Inc. , 1601 N. Imperial Avenue, El Centro, California 92243 – Phone (760) 337-3883.**

**SC – 1.01.A.30 Add the following sentences to the end of Paragraph 1.01.A.30:**

The Owner for this Project is the County of Imperial. The words “County of Imperial” are used within this document interchangeably with the word “Owner” and have the same meaning.

**SC – 1.01.A.35 Delete the second sentence and replace the second sentence of SC-1.01.A.35 with the following sentence:**

The Project Manual includes the following items:

1. Advertisement for Bids
2. Instruction for Bidders
3. Wage Requirements
4. Bid Form
5. Non Collusion Affidavit
6. Bid Bond

7. Compliance Statement
  - 7A. Notice to Prospective Subcontractors of Requirements for Certifications of Non-Segregated Facilities
8. Federal and State Contract Language Inclusion – January 1, 2014 – Exhibit “A”
9. Certification for Contracts, Grants and Loans
10. Contractor’s Certification regarding Worker’s Compensation Insurance
11. Tabulation of Subcontractors
12. Bidder Qualifications Statement
13. Tabulation of Major Material Suppliers
14. Notice of Award
  - 14A. Acceptance Notice
15. Agreement
16. Notice to Proceed
17. Performance Bond
18. Payment Bond
19. Certificate of Owner’s Attorney
20. Certificate of Substantial Completion
21. Standard General Conditions
22. Supplementary Conditions
23. Special Conditions
24. Technical Conditions

**SC-1.02 Delete Paragraph 1.02.B.1. Replace with the following:**

*B. Intent of Certain Terms or Adjectives*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of Professional Judgment by the **Architect, Engineer or Construction Manager**. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of the **Architect, Engineer or Construction Manager** as to the Work. It is intended that such exercise of Professional Judgment, Action or Determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the Design Concept of the Completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to the **Architect, Engineer or Construction Manager** any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

**SC-1.02 Delete Paragraph 1.02.D.1.C. and replace with the following:**

- c. Has been damaged prior to the **Construction Manager’s** recommendation of final payment (unless responsibility for the protection thereof has been assumed by the Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

**SC-1.02 Add the following sentence to the end of Paragraph SC-1.02.E.3**

The word “construct” shall be used within this document interchangeably with the words “perform” and “provide” and have the same meaning.

**SC-2.03.A Delete Paragraph 2.03.A in its entirety and insert the following in its place:**

- A. The Contract Times will commence to run on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within **thirty (30) days** after the Effective Date of the Agreement.

**SC-2.06. Delete Paragraph 2.06.A. Replace with the following:**

- A. Before any Work at the Site is started, a Pre-Construction Conference attended by the Owner, Contractor, **Architect, Engineer, Construction Manager**, Agency, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required project records.

**SC-2.07. Delete Paragraph 2.07 in its entirety. Replace with the following:**

- A. At least **ten (10) days** before submission of the first Application for Payment a conference attended by the Contractor, **Construction Manager**, and others as appropriate will be held to review for acceptability to the **Construction Manager** as provided below the schedules submitted in accordance with Paragraph 2.05.A. The Contractor shall have an additional **five (5) days** to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to the Contractor until acceptable schedules are submitted to the **Construction Manager**.
  - 1. The Progress Schedule will be acceptable to the **Construction Manager** if it provides an orderly progression of the Work to completion within the Contract Time. Such acceptance will not impose on the **Construction Manager** responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve the Contractor from the Contractor's full responsibility therefore.
  - 2. The Contractor's Schedule of Submittals will be acceptable to the **Architect, Engineer and Construction Manager** if it provides a workable arrangement for reviewing and processing the required submittals.
  - 3. The Contractor's Schedule of Values will be acceptable to the **Construction Manager** as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

**SC-3.02. Delete Paragraph 3.02.A.1 and 3.02.A.2. Replace with the following:**

- A. *Standards, Specifications, Codes, Laws, and Regulations*
  - 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
  - 2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of the Owner, Contractor, **Engineer, Architect or Construction Manager**, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to the Owner, **Engineer, Architect, Construction Manager**, or any of their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

**SC-3.03. Delete Paragraph 3.03.A.1. and 3.03.A.2. Replace with the following:**

- A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, the Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. The Contractor shall promptly report in writing to the **Construction Manager** any conflict, error, ambiguity, or discrepancy which the Contractor may discover and shall obtain a written interpretation or clarification from the **Construction Manager** before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, the Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, the Contractor shall promptly report it to the **Construction Manager** in writing. The Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

**SC-3.04. Delete Paragraph 3.04.B. Replace with the following:**

- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
  1. A Field Order;
  2. Engineer or Architects approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3) or
  3. Engineer or Architects written interpretation or clarification.

**SC-4.02 Add the following Article Subsection 4.02.E immediately after Article Subsection 4.02.D:**

- E. In the preparation of Drawings and Specifications, the Engineer relied upon the following reports of exploration and tests of subsurface conditions at the Site:
  1. **Report of Geotechnical Investigation – County of Imperial Fire Station and Cooling Center – Seeley, California – Sierra Material Testing and Inspection Project Number EC957 dated July 7, 2022**

**SC-4.03. Delete Paragraph 4.03.A.5. Replace with the following:**

5. then the Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify the Owner, **Engineer** and the **Construction Manager** in writing about such condition. The Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

**SC-4.03. Delete Paragraph 4.03.B. Replace with the following:**

- B. *Construction Manager and Engineer's Review:* After receipt of written notice as required by Paragraph 4.03.A, the **Construction Manager and Engineer** will promptly review the pertinent condition, determine the necessity of the Owner obtaining additional exploration or tests with respect thereto, and advise the Owner in writing (with a copy to the Contractor) of the **Construction Manager and Engineer's** findings and conclusions.

**SC-4.04. Delete Paragraph 4.04.B.1. and 4.04.B.2. Replace with the following:**

*B. Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, the Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to the Owner and **Construction Manager**. The **Construction Manager** will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, the Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If the **Construction Manager** concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Time, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that the Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If the Owner and Contractor are unable to agree upon entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Time, the Owner or Contractor may make a Claim therefore as provided in Paragraph 10.05.

**SC-4.06 Delete Paragraphs 4.06.A and 4.06.B in their entirety and insert the following:**

- A. No Hazard Environmental Conditions reports or explorations or tests of subsurface conditions at or contiguous to the Site are known to the Owner or the Engineer.

**SC-4.06.D Amend the beginning of Paragraph 4.06.D to read as follows:**

If the Contractor encounters a Hazardous Environmental Condition or material that the Contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law, or if the Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, the Contractor shall immediately:

**SC-5.01. Delete Paragraph 5.01.C. Replace with the following:**

- C. If the surety on any bond furnished by the Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, the Contractor shall promptly notify the Owner and **Construction Manager** and shall, within **twenty (20) days** after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

**SC-5.03 Add the following new paragraph immediately after Paragraph 5.03.B:**

- C. Failure of the Owner to demand such certificates or other evidence of full compliance with these insurance requirements or failure of the Owner to identify a deficiency from evidence provided shall not be construed as a waiver of Contractor’s obligation to maintain such insurance.

**SC-5.04 Add the following new paragraph immediately after Paragraph 5.04.B:**

- C. The limits of liability for insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:
  - 1. Workers’ Compensation and related coverage under Paragraphs 5.04.A.1 and A.2 of the General Conditions:
 

a. State:	Statutory
b. Employer’s Liability	\$1,000,000
  - 2. Contractor’s General Liability under Paragraphs 5.04.A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverage and eliminate the exclusion with respect to property under the care, custody, and control of the Contractor:
 

a. General Aggregate	\$3,000,000
b. Products – Completed Operations Aggregate	\$1,000,000
c. Personal and Advertising Injury	\$1,000,000
d. Each Occurrence (Bodily Injury and Property Damage)	\$1,000,000
e. Excess or Umbrella Liability	
1) General Aggregate	\$2,000,000
2) Each Occurrence	\$2,000,000
  - 3. Builders Risk Insurance \$7,000,000
  - 4. Automobile Liability under paragraph 5.04.6 of the General Conditions:
 

a. Combined Single Limit	\$1,000,000
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  - 5. Property Damage liability insurance will provide Explosion, Collapse and Underground (X,C,U) coverage where applicable.
  - 6. Contractual Liability coverage required by Paragraph 5.04.B.4 of the General Conditions shall be provided as part of the General Liability coverage.
  - 7. The Owner and the Engineer are to be included as additional insureds.

**SC-5.06. Delete Paragraph 5.06.A.4. and 5.06.A.7. Replace with the following:**

4. Cover materials and equipment stored at the Site or at another location that was agreed to in writing by the Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by the **Construction Manager**;
7. Be maintained in effect until final payment is made unless otherwise agreed to in writing by the Owner, Contractor, and **Construction Manager** within **thirty (30) days** written notice to each other additional insured to whom a certificate of insurance has been issued.

**SC-6.02. Delete Paragraph 6.02.B. Replace with the following:**

- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. The Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without the Owner's written consent (which will not be unreasonably withheld) given after prior written notice to the **Construction Manager**.

**SC-6.03. Delete Paragraph 6.03.B. Replace with the following:**

- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of the Owner. If required by the **Architect, Engineer or Construction Manager**, the Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

**SC-6.04. Delete Paragraph 6.04.A.1. Replace with the following:**

1. The Contractor shall submit to the **Construction Manager** for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Time. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

**SC-6.05. Delete Section 6.05 in its entirety. Replace with the following:**

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to the **Architect, Engineer** for review under the circumstances described below.
  1. "*Or-Equal*" Items: If in the **Architect or Engineer's** sole discretion an item of material or equipment proposed by the Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by the **Architect or Engineer** as an "or-equal" item, in which case review and approval of the proposed item may, in the **Architect or Engineer's** sole discretion, be accomplished without compliance with some or all of the requirements for approval of

proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

- a. In the exercise of reasonable judgment, the **Architect or Engineer** determines that:
  - 1) It is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics.
  - 2) It will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole.
  - 3) It has a proven record of performance and availability of responsive service; and
- b. The Contractor certifies that, if approved and incorporated into the Work:
  - 1) There will be no increase in cost to the Owner or increase in Contract Time, and
  - 2) It will conform substantially to the detailed requirements of the item named in the Contract Documents.

## 2. Substitute Items

- a. If in the **Architect or Engineer's** sole discretion an item of material or equipment proposed by the Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. The Contractor shall submit sufficient information as provided below to allow the **Architect or Engineer** to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefore. Requests for review of proposed substitute items of material or equipment will not be accepted by the **Architect or Engineer** from anyone other than the Contractor.
- c. The procedural requirements for review by the **Architect or Engineer** will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as the **Architect or Engineer** may decide is appropriate under the circumstances.
- d. The Contractor shall make written application to the **Construction Manager** for review of a proposed substitute item of material or equipment that the Contractor seeks to furnish or use. The **Construction Manager** will forward the application to the **Architect or Engineer** for review. The application shall include the following:
  - 1) *Shall certify that the proposed substitute item will:*
    1. Perform adequately the functions and achieve the results called for by the general design,
    2. be similar in substance to that specified, and be suited to the same use as that specified;
  - 2) *Will state:*
    1. The extent, if any, to which the use of the proposed substitute item will prejudice the Contractor's achievement of Substantial Completion on time;
    2. whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with the Owner for other work on the Project) to adapt the design to the proposed substitute item; and
    3. whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;



- 3) *Will identify:*
    1. All variations of the proposed substitute item from that specified and available engineering,
    2. sales, maintenance, repair, and replacement services;
  - 4) And shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other Contractors affected by any resulting change.
- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, the Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by the **Architect or Engineer**. The Contractor shall submit sufficient information to allow the **Architect or Engineer**, in the **Architect or Engineer's** sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by the **Construction Manager** will be similar to those provided in Paragraph 6.05.A.2.
- C. *Architect or Engineers Evaluation:* **Architect or Engineer** will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. **Architect or Engineer** may require Contractor to furnish additional data about the proposed substitute item. **Architect or Engineer** will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until **Architect or Engineer's** review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." **Architect or Engineer** will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* The Owner may require the Contractor to furnish at the Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Architect or Engineer's Cost Reimbursement:* The **Architect or Engineer** will record the **Architect or Engineer's** costs in evaluating a substitute proposed or submitted by the Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not the **Architect or Engineer** approves a substitute item so proposed or submitted by the Contractor, the Contractor shall reimburse the Owner for the charges of the **Architect or Engineer** for evaluating each such proposed substitute. The Contractor shall also reimburse the Owner for the charges of the **Architect or Engineer** for making changes in the Contract Documents (or in the provisions of any other direct contract with the Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* The Contractor shall provide all data in support of any proposed substitute or "or-equal" at the Contractor's expense.

**SC-6.06. Delete Section 6.06 in its entirety. Replace with the following:**

- A. The Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to the Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom the Owner may have reasonable objection. The Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom the Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to the Owner in advance for acceptance by the Owner by a specified date prior to the Effective Date of the Agreement, and if the Contractor has submitted a list thereof in accordance with the Supplementary Conditions, the Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. The Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will

be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by the Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of the Owner or **Architect or Engineer** to reject defective Work.

- C. The Contractor shall be fully responsible to the Owner, **Architect, Engineer and Construction Manager** for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as the Contractor is responsible for the Contractor's own acts and omissions. Nothing in the Contract Documents:
1. Shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between the Owner, **Architect, Engineer or Construction Manager** and any such Subcontractor, Supplier or other individual or entity, nor
  2. Shall anything in the Contract Documents create any obligation on the part of the Owner, **Architect or Construction Manager** to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. The Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with the Contractor.
- E. The Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with the **Construction Manager** through the Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control the Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for the Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of the Owner, **Architect, Engineer and Construction Manager**. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against the Owner, Contractor, **Architect, Engineer and Construction Manager**, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, the Contractor will obtain the same.
- H. The Contractor shall not award work valued at more than **eighty percent (80%)** of the Contract Price to Subcontractor(s), without prior written approval of the Owner.

**SC-6.12. Delete Paragraph 6.12.A. Replace with the following:**

- A. The Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to the **Construction Manager** for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings shall be delivered to the **Construction Manager**.

**SC-6.13. Add the following language to the end of paragraph 6.13.B:**

For all excavations in excess of five (5) feet, the Contractor shall, pursuant to Labor Code Section 6705, submit in advance of any excavation hereunder a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from caving ground. No such excavation shall be made until said detailed plan is submitted by the Contractor and accepted by the Engineer.

**SC-6.13. Delete Paragraph 6.13.D. Replace with the following:**

- D. The Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and the **Construction Manager** has issued a notice to the Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

**SC-6.16. Delete Paragraph 6.16.A. Replace with the following:**

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, the Contractor is obligated to act to prevent threatened damage, injury, or loss. The Contractor shall give the **Construction Manager** prompt written notice if the Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If the **Construction Manager** determines that a change in the Contract Documents is required because of the action taken by the Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

**SC-6.17. Delete Section 6.17 in its entirety. Replace with the following:**

- A. The Contractor shall submit Shop Drawings and Samples to the **Construction Manager** for distribution to the Architect and Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as the **Architect and Engineer** requires.
  - 1. *Shop Drawings*
    - a. Submit number of copies specified in the General Requirements.
    - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show the **Architect or Engineer** the services, materials, and equipment that the Contractor proposes to provide and to enable the **Architect or Engineer** to review the information for the limited purposes required by Paragraph 6.17.D.
  - 2. *Samples*
    - a. Submit number of Samples specified in the Specifications.
    - b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which it is intended and other data to enable the **Architect or Engineer** to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to the **Architect or Engineer's** review and approval of the pertinent submittal will be at the sole expense and responsibility of the Contractor.
- C. *Submittal Procedures*

1. Before submitting each Shop Drawing or Sample, the Contractor shall have determined and verified:
  - a. All field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
  - b. The suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
  - c. All information relative to the Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and
  - d. Shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.
2. Each submittal shall bear a stamp or specific written certification that the Contractor has satisfied the Contractor's obligations under the Contract Documents with respect to the Contractor's review and approval of that submittal.
3. With each submittal, the Contractor shall give the **Architect or Engineer** specific written notice of any variation, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to the **Architect or Engineer** for review and approval of each such variation.

**D. Architect or Engineer's Review**

1. The **Architect or Engineer** will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to the **Architect or Engineer**. The **Architect or Engineer's** review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. The **Architect or Engineer's** review and approval will not extend to the means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. The **Architect or Engineer's** review and approval shall not relieve the Contractor from responsibility for any variation from the requirements of the Contract Documents unless the Contractor has complied with the requirements of Paragraph 6.17.C.3 and the **Architect or Engineer** has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. The **Architect or Engineer's** review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures*

1. The Contractor shall make corrections required by the **Architect or Engineer** and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. The Contractor shall direct specific attention in writing to revisions other than the corrections called for by the **Architect or Engineer** on previous submittals.

**SC-6.19. Delete Paragraph 6.19.C. Replace with the following:**

- B. The Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of the Contractor's obligation to perform the Work in accordance with the Contract Documents:
1. Observations by **Architect, Engineer or Construction Manager**;
  2. Recommendation by **Construction Manager** or payment by Owner of any progress or final payment;
  3. The issuance of a certificate of Substantial Completion by the **Construction Manager** or any payment related thereto by the Owner;
  4. Use or occupancy of the Work or any part thereof by the Owner;
  5. Any review and approval of a Shop Drawing or Sample Submittal or the issuance of a Notice of Acceptability by the **Architect or Engineer**.
  6. Any inspection, test, or approval by others; or
  7. Any correction of defective Work by the Owner.

**SC-6.20.Delete Paragraph 6.20.C in its entirety:**

**SC-6.21. Delete Section 6.21 in its entirety. Replace with the following:**

- A. The Contractor will not be required to provide Professional Design Services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out the Contractor's responsibilities for the construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide Professional Services in violation of applicable law.
- B. If Professional Design Services or Certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the **Architect or Engineer** will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the **Architect or Engineer**.
- C. The Owner, **Architect, Engineer and Construction Manager** shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided the Owner, **Architect, Engineer and Construction Manager** have specified to the Contractor all performance and design criteria that such services must satisfy.

- D. Pursuant to this Paragraph 6.21, the **Architect or Engineer's** review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. The **Architect or Engineer's** review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. The Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

**SC-7.01. Delete Paragraph 7.01.B and 7.01.C. Replace with the following:**

- B. The Contractor shall afford each other Contractor who is a party to such a direct contract, each utility owner and the Owner, if the Owner is performing other work with the Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. The Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of the **Construction Manager** and the others whose work will be affected. The duties and responsibilities of the Contractor under this Paragraph are for the benefit of such utility owners and other Contractors to the extent that there are comparable provisions for the benefit of the Contractor in said direct contracts between the Owner and such utility owners and other Contractors.
- C. If the proper execution or results of any part of the Contractor's Work depends upon work performed by others under this Article 7, the Contractor shall inspect such other work and promptly report to the **Construction Manager** in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of the Contractor's Work. The Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with the Contractor's Work except for latent defects and deficiencies in such other work.

**SC-8.01. Delete Paragraph 8.01.A. Replace with the following:**

*8.01 Communications to the Contractor*

- A. Except as otherwise provided in these General Conditions, the Owner shall issue all communications to the Contractor through the **Construction Manager**.

**SC-8.02. Delete Paragraph 8.02.A. Replace with the following:**

*8.02 Replacement of the Construction Manager*

- A. In the case of termination of the employment of the **Construction Manager**, the Owner shall appoint an **Construction Manager** to whom the Contractor makes no reasonable objection and whose status under the Contract Documents shall be that of the former **Construction Manager**.

**SC-9. The Title of Article 9 shall be changed from "Engineer's Status During Construction" to "Construction Manager's Status During Construction."**

**SC-9. Article 9 shall be deleted in its entirety and replaced with the following:**

**ARTICLE 9 – CONSTRUCTION MANAGER’S STATUS DURING CONSTRUCTION**

9.01 *Owner’s Representative*

- A. The **Construction Manager** will be the Owner’s representative during the construction period. The duties and responsibilities and the limitations of authority of the **Construction Manager** as the Owner’s representative during construction are set forth in the Contract Documents and will not be changed without the written consent of the Owner and the **Construction Manager**.

9.02 *Visits to Site*

- A. The **Construction Manager** will make visits to the Site at intervals appropriate to the various stages of construction as the **Construction Manager** deems necessary in order to observe as an experienced and Qualified Design Professional the progress that has been made and the quality of the various aspects of the Contractor’s executed Work. Based upon information obtained during such visits and observations, the **Construction Manager**, for the benefit of the Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. The **Construction Manager** will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. The **Construction Manager’s** efforts will be directed toward providing for the Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, the **Construction Manager** will keep the Owner informed of the progress of the Work and will endeavor to guard the Owner against defective Work.
- B. The **Construction Manager’s** visits and observations are subject to all the limitations on the **Construction Manager’s** authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of the **Construction Manager’s** visits or observations of the Contractor’s Work the **Construction Manager** will not supervise, direct, control, or have authority over or be responsible for Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of the Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

- A. The **Construction Manager** shall furnish a Resident Project Representative to assist the **Construction Manager** in providing more extensive observation of the Work. The authority and responsibilities of the Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If the Owner designates another representative or agent to represent the Owner at the Site who is not the **Construction Manager’s** consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

The Duties, Responsibilities, and Limitations of Authority of the owner’s representative, the construction manager, will be stated in the Agreement for Construction Management Services executed between the Construction Manager and the Owner for this Project.

9.04 *Authorized Variations in Work*

- A. The **Construction Manager** may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Time and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on the Owner and also on the Contractor, who shall perform the Work involved promptly. If the Owner or the Contractor believes that a Field Order justifies an adjustment in the Contract Price or the Contract Time, or both, and the

parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefore as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. The **Construction Manager** will have authority to reject Work which the **Construction Manager** believes to be defective, or that the **Construction Manager** believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. The **Construction Manager** will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. The Contractor shall forward Shop Drawings and Submittals to the **Construction Manager**. The **Construction Manager** shall forward the Shop Drawings and Submittals to the **Architect or Engineer**. The **Architect or Engineer** shall forward reviewed Shop Drawings or Submittals to the **Construction Manager**. The **Construction Manager** shall forward the reviewed Shop Drawings and Submittals to the Contractor.
- B. In connection with the **Architect and Engineer's** authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of Professional Design Services, if any, see Paragraph 6.21.
- C. In connection with the **Construction Manager's** authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with the **Construction Manager's** authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. The **Construction Manager** will determine the actual quantities and classifications of Unit Price Work performed by the Contractor. The **Construction Manager** will review with the Contractor the **Construction Manager's** preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). The **Construction Manager's** written decision thereon will be final and binding (except as modified by the **Construction Manager** to reflect changed factual conditions or more accurate data) upon the Owner and the Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. The **Architect or Engineer** will be the initial interpreter of the requirements of the Contract Documents and the judge of the acceptability of the Work there under. All matters in question and other matters between the Owner and the Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to the **Construction Manager** in writing within **thirty (30) days** of the event giving rise to the question. The **Construction Manager** will forward the written correspondence regarding the acceptability of the work to the **Architect or Engineer** for review and determination.
- B. The **Architect or Engineer** will, with reasonable promptness, render a written decision on the issue referred. If the Owner or the Contractor believes that any such decision entitles them to an adjustment in the Contract Price or the Contract Times or both, a Claim may be made under Paragraph 10.05. The date of the **Architect or Engineer's** decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. The **Architect or Engineer's** written decision on the issue referred will be final and binding on the Owner and the Contractor, subject to the provisions of Paragraph 10.05.



- D. When functioning as interpreter and judge under this Paragraph 9.08, the **Architect or Engineer** will not show partiality to the Owner or the Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Construction Manager's Authority and Responsibilities*

- A. Neither the **Architect's, Engineer's or Construction Manager's** authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by the **Architect, Engineer or Construction Manager** in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by the **Architect, Engineer or Construction Manager** shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by the **Architect, Engineer or Construction Manager** to the Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. The **Architect, Engineer and Construction Manager** will not supervise, direct, control, or have authority over or be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of the Contractor to comply with Laws and Regulations applicable to the performance of the Work. The **Architect, Engineer and Construction Manager** will not be responsible for the Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. The **Architect, Engineer and Construction Manager** will not be responsible for the acts or omissions of the Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. The **Construction Manager's** review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative and assistants, if any.

**SC-10.03. Delete Section 10.03 in its entirety. Replace with the following:**

*10.03 Execution of Change Orders*

- A. The Owner and the Contractor shall execute appropriate Change Orders recommended by the **Construction Manager** covering:
  - 1. Changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or the Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
  - 2. Changes in the Contract Price or Contract Time which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
  - 3. Changes in the Contract Price or Contract Time which embody the substance of any written decision rendered by the **Construction Manager** pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, the Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

**SC-10.05. Delete Section 10.05 in its entirety. Replace with the following:**

*10.05 Claims*

- A. **Construction Manager's Decision Required:** All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the **Construction Manager** for decision. A decision by the **Construction Manager** shall be required as a condition precedent to any exercise by the Owner or the Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations with respect to such Claims.
- B. **Notice:** Written notice stating the general nature of each Claim shall be delivered by the claimant to the **Construction Manager** and the other party to the Contract promptly (but in no event later than **thirty (30) days** after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the **Construction Manager** and the other party to the Contract within **sixty (60) days** after the start of such event (unless the **Construction Manager** allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in the Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in the Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to the **Construction Manager** and the claimant within **thirty (30) days** after receipt of the claimant's last submittal (unless the **Construction Manager** allows additional time).
- C. **Construction Manager's Action:** The **Construction Manager** will review each Claim and, within **thirty (30) days** after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
1. Deny the Claim in whole or in part,
  2. Approve the Claim, or
  3. Notify the parties that the **Construction Manager** is unable to resolve the Claim if, in the **Construction Manager's** sole discretion, it would be inappropriate for the **Construction Manager** to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that the **Construction Manager** does not take action on a Claim within said **thirty (30) days**, the Claim shall be deemed denied.
- E. The **Construction Manager's** written action under the Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon the Owner and the Contractor, unless the Owner or the Contractor invoke the dispute resolution procedure set forth in Article 16 within **thirty (30) days** of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Time will be valid if not submitted in accordance with this Paragraph 10.05.
- G. If this is a "Public Works Contract" as defined in Section 22200 of the California Public Contract Code, claims shall be resolved pursuant to Sections 20104 et seq. of the California Public Contract Code. These sections are summarized as follows:
1. Claim means a separate demand by the Contractor for (a) a time extension, (b) payment of money or damages arising from work done by, or on behalf of the Contractor, pursuant to this Contract, payment not

otherwise expressly provided in the Contract, or (c) any separate demand by the Contractor, the amount of which is disputed by the Owner.

2. For claims less than \$50,000, the Owner shall respond in writing to all written claims within **forty-five (45) days** of receipt of the claim, or may request in writing, within **thirty (30) days** of receipt of the claim, any additional documentation supporting the claim or relating to any defenses the Owner may have against such claim. The Owner's written response to the claim, as further documented, will be submitted to the Contractor within **fifteen (15) days** from receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional documentation, whichever is greater.

3. For claims over \$50,000 and less than or equal to \$375,000, the Owner shall respond in writing to all written claims within **sixty (60) days** of receipt of the claim, or may request in writing, within **thirty (30) days** of receipt of the claim, any additional documentation supporting the claim or relating to any defenses the Owner may have against such claim. The Owner's written response to the claim, as further documented, will be submitted to the Contractor within **thirty (30) days** from receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional documentation, whichever is greater.

4. If the Contractor disputes the Owner's written response, or the Owner fails to respond within the time specified, the Contractor may notify the Owner in writing within either **fifteen (15) days** of receipt of the Owner's response, or within **fifteen (15) days** of the Owner's failure to respond within the statutorily prescribed time, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon demand, the Owner shall schedule a meet and confer conference within **thirty (30) days** for settlement of the dispute.

5. Following the meet and confer conference, if the claim or any portion remains in dispute, the Contractor may file a claim pursuant to Government Code Sections 900, et seq. The period of time within which to file such a claim shall be defined in Public Contract Code Section 20104.2(e).

**SC-11.01. Delete Paragraph 11.01.A.3. Replace with the following:**

3. Payments made by the Contractor to Subcontractors for Work performed by the Subcontractors. If required by the Owner, the Contractor shall obtain competitive bids from subcontractors acceptable to the Owner and the Contractor and shall deliver such bids to the Owner, who will then determine, with the advice of the **Construction Manager**, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as the Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

**SC-11.01. Delete Paragraph 11.01.A.5.c. Replace with the following:**

- c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from the Contractor or others in accordance with rental agreements approved by the Owner with the advice of **Construction Manager**, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

**SC-11.01. Delete Paragraph 11.01.D. Replace with the following:**

- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, the Contractor shall establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to the **Construction Manager** an itemized cost breakdown together with supporting data.

**SC-11.02. Delete Paragraph 11.02.D. Replace with the following:**

- D. Prior to final payment, an appropriate Change Order will be issued as recommended by the **Construction Manager** to reflect actual amounts due the Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

**SC-12.01. Delete Paragraph 12.01.A. Replace with the following:**

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the **Construction Manager** and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

**SC-12.02. Delete Paragraph 12.02.A. Replace with the following:**

- A. The Contract Time may only be changed by a Change Order. Any Claim for an adjustment in the Contract Time shall be based on written notice submitted by the party making the Claim to the **Construction Manager** and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

**SC-12.03. Delete Paragraph 12.03.B. Replace with the following:**

- B. If the Owner, **Construction Manager**, or other Contractors or utility owners performing other work for the Owner as contemplated by Article 7, or anyone for whom the Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then the Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Time, or both. The Contractor's entitlement to an adjustment of the Contract Time is conditioned on such adjustment being essential to the Contractor's ability to complete the Work within the Contract Time.

**SC-12.03. Delete Paragraph 12.03.D. Replace with the following:**

- D. The Owner, **Architect, Engineer, Construction Manager** and the Related Entities of each of them shall not be liable to the Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of the Contractor, Subcontractors, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) sustained by the Contractor on or in connection with any other project or anticipated project.

**SC-13. Delete Article 13 in its entirety. Replace with the following:**

**ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

13.01 *Notice of Defects*

- B. Prompt notice of all defective Work of which the Owner or the **Construction Manager** has actual knowledge will be given to the Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

- B. The Owner, **Architect, Engineer and Construction Manager**, their consultants and other representatives and personnel of the Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. The Contractor shall provide them proper and safe conditions for such access and advise them of the Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

- B. The Contractor shall give the **Construction Manager** timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- C. The Contractor shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
  - 1. For inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
  - 2. That costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and
  - 3. As otherwise specifically provided in the Contract Documents.
- D. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, the Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish the **Construction Manager** the required certificates of inspection or approval.
- E. The Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for the Owner's and the **Construction Manager's** acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to the Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to the Owner and the **Construction Manager**.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by the Contractor without written concurrence of the **Construction Manager**, it must, if requested by the **Construction Manager**, be uncovered for observation.
- G. Uncovering Work as provided in Paragraph 13.03.E shall be at the Contractor's expense unless the Contractor has given the **Construction Manager** timely notice of the Contractor's intention to cover the same and the **Construction Manager** has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

- B. If any Work is covered contrary to the written request of the **Construction Manager**, it must, if requested by the **Construction Manager**, be uncovered for the **Construction Manager's** observation and replaced at the Contractor's expense.
- C. If the **Construction Manager** considers it necessary or advisable that covered Work be observed by the **Construction Manager** or inspected or tested by others, the Contractor, at the **Construction Manager's** request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as the **Construction Manager** may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- D. If it is found that the uncovered Work is defective, the Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of **Construction Managers**, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and the

Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, the Owner may make a Claim therefore as provided in Paragraph 10.05.

- E. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, the Contractor may make a Claim therefore as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- B. If the Work is defective, or the Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, the Owner may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- B. Promptly after receipt of notice, the Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by the **Construction Manager**, remove it from the Project and replace it with Work that is not defective. The Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of **Construction Managers**, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- C. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, the Contractor shall take no action that would void or otherwise impair the Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- B. If within **one (1) year** after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by the Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, the Contractor shall promptly, without cost to the Owner and in accordance with the Owner's written instructions:
  - 1. Repair such defective land or areas; or
  - 2. Correct such defective Work; or
  - 3. If the defective Work has been rejected by the Owner, remove it from the Project and replace it with Work that is not defective, and
  - 4. Satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting there from.
- C. If the Contractor does not promptly comply with the terms of the Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, the Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of **Construction Managers**, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating

to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by the Contractor.

- D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- E. Where defective Work (and damage to other Work resulting there from) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of **one (1) year** after such correction or removal and replacement has been satisfactorily completed.
- F. The Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- B. If, instead of requiring correction or removal and replacement of defective Work, the Owner (and, prior to the **Construction Manager's** recommendation of final payment) prefers to accept the defective work, the Owner may do so. The Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of the **Architect, Engineer, Construction Manager** Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) attributable to the Owner's evaluation of and determination to accept such defective Work (such costs to be approved by the **Construction Manager** as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by the Contractor pursuant to this sentence. If any such acceptance occurs prior to the **Construction Manager's** recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and the Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, the Owner may make a Claim therefore as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by the Contractor to the Owner.

13.09 *Owner May Correct Defective Work*

- B. If the Contractor fails within a reasonable time after written notice from the **Construction Manager** to correct defective Work or to remove and replace rejected Work as required by the **Construction Manager** in accordance with Paragraph 13.06.A, or if the Contractor fails to perform the Work in accordance with the Contract Documents, or if the Contractor fails to comply with any other provision of the Contract Documents, the Owner may, after **seven (7) days** written notice to the Contractor, correct or remedy any such deficiency.
- C. In exercising the rights and remedies under this Paragraph 13.09, the Owner shall proceed expeditiously. In connection with such corrective or remedial action, the Owner may exclude the Contractor from all or part of the Site, take possession of all or part of the Work and suspend the Contractor's services related thereto, take possession of the Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which the Owner has paid the Contractor but which are stored elsewhere. The Contractor shall allow the Owner, the Owner's representatives, agents and employees; the Owner's other Contractors, and the **Construction Manager** and the **Construction Manager's** Consultants access to the Site to enable the Owner to exercise the rights and remedies under this Paragraph.
- D. All claims, costs, losses, and damages (including but not limited to all fees and charges of **Construction Managers, Architects, Attorneys, and other Professionals** and all court or arbitration or other dispute resolution costs) incurred or sustained by the Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against the Contractor, and a Change Order will be issued incorporating the

necessary revisions in the Contract Documents with respect to the Work; and the Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, the Owner may make a Claim therefore as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of the Contractor's defective Work.

- E. The Contractor shall not be allowed an extension of the Contract Time because of any delay in the performance of the Work attributable to the exercise by the Owner of the Owner's rights and remedies under this Paragraph 13.09.

**SC-14.01. Delete Paragraph 14.01.A. Replace with the following:**

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to the **Construction Manager and Owner**. Progress payments on account of Unit Price Work will be based on the number of units completed.

**SC-14.02. Delete Paragraph 14.02.A.1. Replace with the following:**

- 1. At least **twenty (20) days** before the date established in the Agreement for each progress payment (but not more often than once a month), the Contractor shall submit to the **Construction Manager** for review an Application for Payment filled out and signed by the Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that the Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect the Owner's interest therein, all of which must be satisfactory to the Owner.

**SC-14.02.A.3 Add the following language at the end of paragraph 14.02.A.3:**

No payments will be made that would deplete the retainage, place in escrow any funds that are required for retainage, or invest the retainage for the benefit of the Contractor.

**SC-14.02. Delete Paragraph 14.02.B. Replace with the following:**

B. *Review of Applications*

- 1. The **Construction Manager** will, within **ten (10) days** after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to the Owner or return the Application to the Contractor indicating in writing the **Construction Manager's** reasons for refusing to recommend payment. In the latter case, the Contractor may make the necessary corrections and resubmit the Application.
- 2. The **Construction Manager's** recommendation of any payment requested in an Application for Payment will constitute a representation by the **Construction Manager** to the Owner, based on the **Construction Manager's** observations on the Site of the executed Work as an experienced and qualified design professional and on the **Construction Manager's** review of the Application for Payment and the accompanying data and schedules, that to the best of the **Construction Manager's** knowledge, information and belief:
  - a. The Work has progressed to the point indicated;



- b. The quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and
- c. The conditions precedent to the Contractor's being entitled to such payment appear to have been fulfilled in so far as it is the **Construction Manager's** responsibility to observe the Work.

**SC-14.02.C.1. Delete Paragraph 14.02.C.1 in its entirety and insert the following in its place:**

- 1. **Thirty (30) days** after presentation of the Application for Payment to the Owner with the **Construction Manager's** recommendation, the amount recommended will (subject to the provisions of paragraph 14.02.D) become due, and when due will be paid by the Owner to the Contractor.

**SC-14.02. Delete Paragraph 14.02.D. Replace with the following:**

*D. Reduction in Payment*

- 1. The Owner may refuse to make payment of the full amount recommended by the **Construction Manager** because:
  - a. Claims have been made against the Owner on account of the Contractor's performance or furnishing of the Work;
  - b. Liens have been filed in connection with the Work, except where the Contractor has delivered a specific bond satisfactory to the Owner to secure the satisfaction and discharge of such Liens;
  - c. The Contractor's performance or furnishing of the Work is inconsistent with funding Agency requirements;
  - d. There are other items entitling the Owner to a set-off against the amount recommended; or
  - e. The Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
- 2. If the Owner refuses to make payment of the full amount recommended by the **Construction Manager**, the Owner will give the Contractor immediate written notice (with a copy to the **Construction Manager**) stating the reasons for such action and promptly pay the Contractor any amount remaining after deduction of the amount so withheld. The Owner shall promptly pay the Contractor the amount so withheld, or any adjustment thereto agreed to by the Owner and the Contractor, when the Contractor corrects to the Owner's satisfaction the reasons for such action.
- 3. If it is subsequently determined that the Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

**SC-14.04. Delete Paragraph 14.04. Replace with the following:**

*14.04 Substantial Completion*

- A. When the Contractor considers the entire Work ready for its intended use the Contractor shall notify the Owner and the **Construction Manager** in writing that the entire Work is substantially complete (except for items specifically listed by the Contractor as incomplete) and request that the **Construction Manager** issue a certificate of Substantial Completion.

- B. Promptly after the Contractor's notification, the Owner, Agency, Contractor, **Architect, Engineer and Construction Manager** shall make a pre-final inspection of the Work to determine the status of completion. If the **Construction Manager** does not consider the Work substantially complete, the **Construction Manager** will notify the Contractor in writing giving the reasons therefore.
- C. If the **Construction Manager** considers the Work substantially complete, the **Construction Manager** will deliver to the Owner a Tentative Certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. The Owner shall have **seven (7) days** after receipt of the Tentative Certificate during which to make written objection to the **Construction Manager** as to any provisions of the certificate or attached list. If, after considering such objections, the **Construction Manager** concludes that the Work is not substantially complete, the **Construction Manager** will within **fourteen (14) days** after submission of the Tentative Certificate to the Owner notify the Contractor in writing, stating the reasons therefore. If, after consideration of the Owner's objections, the **Construction Manager** considers the Work substantially complete, the **Construction Manager** will within said **fourteen (14) days** execute and deliver to the Owner and the Contractor a Definitive Certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as the **Construction Manager** believes justified after consideration of any objections from the Owner.
- D. At the time of delivery of the Tentative Certificate of Substantial Completion, the **Construction Manager** will deliver to the Owner and the Contractor a written recommendation as to division of responsibilities pending final payment between the Owner and the Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless the Owner and the Contractor agree otherwise in writing and so inform the **Construction Manager** in writing prior to the **Construction Manager's** issuing the Definitive Certificate of Substantial Completion, the **Construction Manager's** aforesaid recommendation will be binding upon the Owner and the Contractor until final payment.
- E. The Owner shall have the right to exclude the Contractor from the Site after the date of Substantial Completion subject to allowing the Contractor reasonable access to complete or correct items on the tentative list.

**SC-14.05. Delete Paragraph 14.05. Replace with the following:**

*14.05 Partial Utilization*

- A. Prior to the Substantial Completion of all the Work, the Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which the Owner, the **Construction Manager**, and the Contractor agree constitutes a separately functioning and usable part of the Work that can be used by the Owner for its intended purpose without significant interference with the Contractor's performance of the remainder of the Work, subject to the following conditions.
  - 1. The Owner at any time may request the Contractor in writing to permit the Owner to use or occupy any such part of the Work which the Owner believes to be ready for its intended use and substantially complete. If and when the Contractor agrees that such part of the Work is substantially complete, the Contractor will certify to the Owner and the **Construction Manager** that such part of the Work is substantially complete and request the **Construction Manager** to issue a certificate of Substantial Completion for that part of the Work.
  - 2. The Contractor at any time may notify the Owner and the **Construction Manager** in writing that the Contractor considers any such part of the Work ready for its intended use and substantially complete and request the **Construction Manager** to issue a certificate of Substantial Completion for that part of the Work.
  - 3. Within a reasonable time after either such request, the Owner, the Contractor, and the **Construction Manager** shall make an inspection of that part of the Work to determine its status of completion. If the **Construction Manager** does not consider that part of the Work to be substantially complete, the

**Construction Manager** will notify the Owner and the Contractor in writing giving the reasons therefore. If the **Construction Manager** considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to Certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

**SC-14.06. Delete Paragraph 14.06. Replace with the following:**

*14.06 Final Inspection*

- A. Upon written notice from the Contractor that the entire Work or an agreed portion thereof is complete, the **Construction Manager** will promptly make a final inspection with the Owner, **Architect, Engineer** and the Agency, and the Contractor and will notify the Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. The Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

**SC-14.07. Delete Paragraph 14.07.A. Replace with the following:**

*A. Application for Payment*

1. After the Contractor has, in the opinion of the **Construction Manager**, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, the Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
  - a. All documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;
  - b. Consent of the surety, if any, to final payment;
  - c. A list of all Claims against the Owner that the Contractor believes are unsettled; and
  - d. Complete and legally effective releases or waivers (satisfactory to the Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by the Owner, the Contractor may furnish receipts or releases in full and an affidavit of the Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which the Owner or the Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, the Contractor may furnish a bond or other collateral satisfactory to the Owner to indemnify the Owner against any Lien.

**SC-14.07. Delete Paragraph 14.07.B. Replace with the following:**

*B. Construction Manager's Review of Application and Acceptance*

1. If, on the basis of the **Construction Manager's** observation of the Work during construction and final inspection, and the **Construction Manager's** review of the final Application for Payment and

accompanying documentation as required by the Contract Documents, the **Construction Manager** is satisfied that the Work has been completed and the Contractor's other obligations under the Contract Documents have been fulfilled, the **Construction Manager** will, within **ten (10) days** after receipt of the final Application for Payment, indicate in writing the **Construction Manager's** recommendation of payment and present the Application for Payment to the Owner for payment. At the same time the **Construction Manager** will also give written notice to the Owner and the Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, the **Construction Manager** will return the Application for Payment to the Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case the Contractor shall make the necessary corrections and resubmit the Application for Payment.

**SC-14.07.C Delete Paragraph 14.07.C1 in its entirety and insert the following in its place:**

1. **Thirty-five (35) days** after the filing of a Notice of Completion with the County Recorder and after presentation to the Owner of the Application for Payment and accompanying documentation, the amount recommended by the **Construction Manager**, less any sum the Owner is entitled to set off against the **Construction Manager's** recommendation, including but not limited to liquidated damages, will become due and will be paid by the Owner to the Contractor.

**SC-14.08. Delete Paragraph 14.08.A. Replace with the following:**

A. If, through no fault of the Contractor, final completion of the Work is significantly delayed, and if the **Construction Manager** so confirms, the Owner shall, upon receipt of the Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of the **Construction Manager**, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by the Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the **Construction Manager** with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims. The remaining balance of any sum included in the final Application for Payment but held by the Owner for Work not fully completed and accepted will become due when the Work is fully completed and accepted.

**SC-15. Delete Article 15 in its entirety. Replace with the following:**

**ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION**

15.01 *Owner May Suspend Work*

A. At any time and without cause, the Owner may suspend the Work or any portion thereof for a period of not more than **ninety (90) consecutive days** by notice in writing to the Contractor and the **Construction Manager** which will fix the date on which Work will be resumed. The Contractor shall resume the Work on the date so fixed. The Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Time, or both, directly attributable to any such suspension if the Contractor makes a Claim therefore as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. The Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. The Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
  3. The Contractor's disregard of the authority of the **Construction Manager**; or
  4. The Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, the Owner may, after giving the Contractor (and surety) **seven (7) days** written notice of its intent to terminate the services of the Contractor:
1. Exclude the Contractor from the Site, and take possession of the Work and of all the Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by the Contractor (without liability to the Contractor for trespass or conversion),
  2. Incorporate in the Work all materials and equipment stored at the Site or for which the Owner has paid the Contractor but which are stored elsewhere, and
  3. Complete the Work as the Owner may deem expedient.
- C. If the Owner proceeds as provided in Paragraph 15.02.B, the Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of **Construction Managers**, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) sustained by the Owner arising out of or relating to completing the Work, such excess will be paid to the Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, the Contractor shall pay the difference to the Owner. Such claims, costs, losses, and damages incurred by the Owner will be reviewed by the **Construction Manager** as to their reasonableness and, when so approved by the **Construction Manager**, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph the Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, the Contractor's services will not be terminated if the Contractor begins within **seven (7) days** of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than **thirty (30) days** of receipt of said notice.
- E. Where the Contractor's services have been so terminated by the Owner, the termination will not affect any rights or remedies of the Owner against the Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due the Contractor by the Owner will not release the Contractor from liability.
- F. If and to the extent that the Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon **seven (7) days** written notice to the Contractor and the **Construction Manager**, the Owner may, without cause and without prejudice to any other right or remedy of the Owner, terminate the Contract. In such case, the Contractor shall be paid for (without duplication of any items):
1. Completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
  2. Expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. All claims, costs, losses, and damages (including but not limited to all fees and charges of **Construction Managers**, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
  4. Reasonable expenses directly attributable to termination.
- B. The Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of the Contractor, (i) the Work is suspended for more than **ninety (90) consecutive days** by the Owner or under an order of court or other public authority, or (ii) the **Construction Manager** fails to act on any Application for Payment within **thirty (30) days** after it is submitted, or (iii) the Owner fails for **thirty (30) days** to pay the Contractor any sum finally determined to be due, then the Contractor may, upon **seven (7) days** written notice to the Owner and the **Construction Manager**, and provided the Owner or the **Construction Manager** do not remedy such suspension or failure within that time, terminate the Contract and recover from the Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if the **Construction Manager** has failed to act on an Application for Payment within **thirty (30) days** after it is submitted, or the Owner has failed for **thirty (30) days** to pay the Contractor any sum finally determined to be due, the Contractor may, **seven (7) days** after written notice to the Owner and the **Construction Manager**, stop the Work until payment is made of all such amounts due the Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude the Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Time or otherwise for expenses or damage directly attributable to the Contractor's stopping the Work as permitted by this Paragraph.

**SC-16. Delete Article 16 in its entirety. Replace with the following:**

**ARTICLE 16 – DISPUTE RESOLUTION**

16.01 *Methods and Procedures*

- A. The Owner and the Contractor may mutually request mediation of any Claim submitted to the **Construction Manager** for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. The Owner and the Contractor shall participate in the mediation process in good faith. The process shall be concluded within **sixty (60) days** of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the claim is not resolved by mediation, the **Construction Manager's** action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding **thirty (30) days** after termination of the mediation unless, within that time period, the Owner or the Contractor:
1. Elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or
  2. Agrees with the other party to submit the Claim to another dispute resolution process, or

3. Gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

**SC-18.08 Delete paragraph 18.08.A in its entirety and insert the following in its place:**

- A. If this Contract exceeds **\$100,000**, the Contractor shall comply with all applicable standards, orders, or requirements issued under Section 306 of the Clean Air Act (42 USC §1857(h)), Section 508 of the Clean Water Act (33 USC §1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR Part 15).

**SC-19 Add the following new paragraphs:**

**ARTICLE 19 - ADDITIONAL STATE REQUIREMENTS**

19.01 In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or Subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties.

19.02 Unless otherwise indicated in the Contract Documents, all utility lines, conduits, wires, or structures shall be maintained by the Contractor and shall not be disturbed, disconnected, or damaged by him during the progress of the Work, provided, that should the Contractor in the performance of the Work disturb, disconnect, or damage any of the above, all expenses arising from such disturbance or in the replacement or repair thereof shall be borne by the Contractor. However, in accordance with Section 4215 of the California Government Code, the Contractor shall be compensated for all costs of locating and repairing damage to main or trunkline utility facilities located on the work site and for costs of operating equipment on the work site necessarily idled during such work where the Contractor has exercised reasonable care in removing or relocating utility facilities which are inaccurately indicated in the Contract Documents.



**Seeley Fire Station  
and  
Cooling Center**

**Project Manual**

**Special  
Conditions**

**Volume 2 of 4**

**July 8, 2022**

**THG #542.088**



**SPECIAL CONDITIONS  
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## **1. PROJECT DESCRIPTION**

The project description is located on plan sheet C-101, the Title Sheet of the Civil Improvement Plans. The project description is also located in Section 00 11 50 of the Technical Specifications (Project Manual 3 of 4).

**END SPECIAL CONDITION SECTION 1**

## **2. PROJECT MANUAL, IMPROVEMENT PLANS AND PROPOSAL FORMS**

### **PROJECT MANUAL**

The Project Manual is defined in the General Conditions in Article 1.01.A.35 on page 00710-3 as, "The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in each Project Manual Table of Contents." Supplementary General Condition item SC – 1.01.A.35 on pages 00800-5 and 00800-6 list the items included in the Project Manual.

The Project Manuals for this project are comprised of four (4) volumes as follows:

- 1. Volume 1 of 4** – Volume 1, Contract Documents, contains the Advertisement for Bids, Instruction for Bidders, Wage Requirements, Bid Form and documents to be included with the Bid Form, Contract Documents, Standard General Conditions and Supplementary Conditions. Refer to SC-1.01.A.35 or the Volume 1 Table of Contents for a complete listing of the items contained in Project Manual – Contract Documents Volume 1 of 4.
- 2. Volume 2 of 4** – Volume 2 contains the Special Conditions Section of the Specifications.
- 3. Volume 3 of 4** – Volume 3 contains the first portion of the Technical Specifications.
- 4. Volume 4 of 4** – Volume 4 contains the last portion of the Technical Specifications.

### **IMPROVEMENT PLANS**

The Improvement Plans for this project consist of the Civil, Architectural, Mechanical, Electrical, Plumbing and Structural plans. The hard copy Civil Plans and have been bound separately from the Architectural, Mechanical, Electrical, Plumbing and Structural plans. There is an index on cover sheet C1.01 of the Civil Plans listing the Civil Plan sheets. There is an index on plan sheet A0.01 of the Architectural Plans listing the Civil, Architectural, Mechanical, Electrical, Plumbing and Structural Plan sheets. The official listing of plan sheets, which includes the dates on the various plan sheets, is contained in Supplementary Condition item SC-1.01.A.18 on pages 00800-3, 00800-4 and 00800-5.

## **PROPOSAL FORMS**

There is a lump sum Bid for this project which includes all work required to be performed for this project and all items required to be completed as contained in the Project Manual and the Improvement Plans. The contractor is responsible to perform and include all costs relative to the General Requirements as contained in Technical Conditions Division 01, complete all required Surveying and Project Environmental Controls included in Technical Condition Division 02, complete all geotechnical testing at the project site as included in Technical Conditions Division 31, obtain and pay for all required permits and comply with all required County, District or Utility permit requirements and similar items as included in the Project Description contained in Technical Specification Section 00 11 50 and on Civil Plan sheet C1.01 and complete all other items contained in the Project Manual and Improvement Plans.

The contractor shall assume all items contained within the Project Manual, Improvement Plans or Addendum(a) are to be completed by the Contractor. The contractor is directed to carefully review Contract Document Instruction for Bidders Article 4 on pages 00200-2, 00200-3 and 00200-4. The contractor shall direct any questions regarding work to be performed or ambiguities to the Engineer/Architect during the project bidding phase. Failure to clarify work related questions or ambiguities during the bidding phase shall not relieve the contractor from the obligation to complete the work at the contractor's expense during the construction phase.

The contractor is directed to review Standard General Condition Article 2.2.05 on page 00710-6 regarding forwarding a Preliminary Schedule of Values to the Engineer for review within 10 days after the effective date of the Agreement.

**END SPECIAL CONDITION SECTION 2**

### 3. SEQUENCE OF CONSTRUCTION

The County of Imperial currently owns the total 2.47 Acre project site as illustrated on Civil Plan Sheets C1.02, C1.03, C1.06 and C1.15. The Seeley Fire Station and Parking Lot Structure, parking lot, driveway entrances, retention basins and other supporting facilities are to be constructed on the area noted on the plan sheets as *“Total Area to be Developed 1.45 Acres”*. The remaining project site area is noted on the plans as *“Total Area not to be Developed 1.02 Acres”*.

A note on Civil plan sheet C1.03 states, “The surface native material across the entire area to be developed is to be removed and stockpiled on the site *not to be developed* to elevation 955.75. The native earth at the base of the excavation is to be scarified and compacted at 90 percent of maximum density per ASTM D-1557 at 2 percent over optimum water content to a depth of 955.00. Native earth is to be moved from the stockpile and placed in maximum 9 inch lifts across the entire project site to be developed. Each 9 inch lift shall be compacted to 90 percent of maximum density per ASTM D1557 at 2 percent over optimum water content. Install native material in 9 inch lifts to an elevation of 958.00 across the entire project site. Controlled fill material consisting of Class 2 base or granular sand shall be placed above the 958.00 elevation. Native borrow material can be obtained in the area *not to be developed* as needed. The borrowed material shall be obtained evenly across the entire site *not to be developed*. See the Earthwork Technical Specification for a detailed description of the site earthwork requirements.”

Civil plan sheet C1.15, illustrates a note directed at the *area not to be developed*. The note calls out the *area not to be developed* as a borrow and staging area. A class 2 base parking area to be used during the construction project is illustrated on plan sheet C1.15 within the *area not to be developed*. There is no area close to the project site for vehicles to safely park during the construction of the Seeley Fire Station and Cooling Center. It is not safe to park along Evan Hewes Highway road shoulders. It shall be necessary for the class 2 base parking lot to be constructed prior to the commencement of construction activities. A note on plan sheet C1.15 also notes that the contractor shall be allowed to install a permanent 6 foot chain link fence around the *area not to be developed* at the commencement of the project as security fencing. Please review the full contents of the not on plan sheet C1.15.

The following items shall be completed in sequential order at the commencement of construction activities prior to completing the remaining project construction items:

1. Complete demolition activities across the project site as required by plan sheet C1.03.

2. Remove the existing native earth across the entire *total area to be developed* to elevation 955.75. Stockpile the removed existing native earth on the *area to be developed*.
3. Scarify and compact the bottom excavation of the entire *total area to be developed* per the plans and Technical Condition Section 31 23 00 – Subsection 3.05. Move native material from the stockpile and place and compact the native material in 9 inch lifts across the entire *total area to be developed* to an elevation of 958.00. Native borrow material can be obtained from the *area not to be developed* in 1 foot lifts across the entire project site. The *area not to be developed* shall be graded to 0.10 feet of the same elevation across the entire *area not to be developed* after the borrow material is removed.
4. Construct the class 2 base construction parking lot as illustrated on plan sheet C1.15. Secure the staging area in conformance with the requirements of the project manual.
5. Complete the remaining construction activities per the approved project schedule.

**END SPECIAL CONDITION SECTION 3**

## 4. PERMITS

The permits required for this project are listed below. The Contractor shall pay for all permit costs. The contractor shall include the below anticipated cost of the permits in the contractors bid. The actual permit cost will not be known until the contractor obtains the permit. If the actual permit cost is more than the amount illustrated under the below anticipated permit column, then the contractor will be compensated for the difference between the actual permit cost and the anticipated permit cost by means of a positive change order. If the actual permit cost is less than the amount under the below anticipated permit cost, then the County of Imperial will be compensated for the difference between the actual permit cost and the anticipated permit cost by means of a negative change order.

### PROJECT PERMITS

<u>Type of Permit</u>	<u>Issuing Agency</u>	<u>Anticipated Cost of Permit</u>
Grading/Encroachment Permit	County of Imperial Public Works Department	\$6,500.00
Building Permit including deferred submittal reviews	County of Imperial Planning and Development Services Department – Building Division	\$25,000.00
Air Pollution Control - No Permit Anticipated. To be determined during County Building Permit Application Issuance.	County of Imperial Air Pollution Control District	\$0.00
Contractor's Construction Trailer Permit	County of Imperial Planning and Development Services Department	\$1,800.00
Imperial Irrigation District Power Division Customer Service Proposal – for Trailer only – Not for the Building CSP	Imperial Irrigation District Power Division	\$1,000.00

### END SPECIAL CONDITION SECTION 4

## **5. IMPERIAL IRRIGATION DISTRICT – ELECTRICAL POWER SERVICES – CUSTOMER SERVICE PROPOSAL**

The Imperial Irrigation District (IID) Issued an approved CSP for the Seeley Fire Station and Cooling Center Project on September 6<sup>th</sup>, 2022. The County of Imperial is responsible to pay the Imperial Irrigation District CSP Seeley Fire Station and Cooling Center fees for this project. The approved IID CSP is located immediately after this Special Condition Section. This is not to be confused with the Imperial Irrigation District CSP fee for the construction trailer. Per Special Condition Section 4, the contractor shall pay for the construction trailer CSP fee.

***The Contractor shall be required to complete the electrical work at the project site according the CSP requirements.***

**END SPECIAL CONDITION SECTION 5**





# IID

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SEP - 6 2022  
**COMPLETE**

- CUSTOMER
- DISTRIBUTION SUPERVISOR
- DISTRIBUTION
- PROJECT MANAGER
- INSPECTOR
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

## PROJECT SITE



**SEELEY  
LOCATION MAP**  
NOT TO SCALE



## CONTRACTOR NOTES

**THIS WORK REQUIRES IID UNDERGROUND INSPECTION.** FOR THE UNDERGROUND INSPECTION PROCESS, SEE DETAIL PAGES 7 THRU 11 FROM THE DEVELOPER ENERGY PLANNING GUIDE. ALL EQUIPMENT OR MATERIAL INSTALLED, COVERED, OR ENCLOSED BY THE CONTRACTOR PRIOR TO IID INSPECTION SHALL BE REMOVED OR UNCOVERED FOR INSPECTION, AND REINSTALLED, AT NO EXPENSE TO IID. IID WILL NOT ACCEPT OR ENERGIZE FACILITIES THAT FAIL TO MEET THE REQUIREMENTS OUTLINED IN THE PROCESS.

### DETAIL PAGES

DETAIL PAGES REFER TO THE DEVELOPER ENERGY PLANNING GUIDE (D.E.P.G.) REV. 5.0 2020, IT CAN BE OBTAINED ON THE IID WEBSITE [WWW.IID.COM/ENERGY/NEW-CONSTRUCTION](http://WWW.IID.COM/ENERGY/NEW-CONSTRUCTION)



**CAUTION: ENERGIZED STRUCTURES & CABLE**  
DO NOT PERFORM ANY TYPE OF WORK ON OR AROUND ENERGIZED STRUCTURES. A QUALIFIED IID ELECTRICAL WORKER MUST BE PRESENT AT JOB SITE BEFORE ANY CONDUIT OR ANY TYPE OF WORK IS PERFORMED. PLEASE CONTACT IID INSPECTION DESK AT LA QUINTA @:(760) 398-5828 ; IMPERIAL @:(760) 482-3300. INSPECTION SCHEDULES ARE SUBJECT TO A MINIMUM 48 HOUR ADVANCE NOTICE AND ARE BY APPOINTMENT ONLY.

1862 W EVAN HEWES HWY  
SEELEY, CA

CUSTOMER CONTACT: JACK HOLT  
PHONE NUMBER: 760-337-3883

PROJECT MANAGER: IGNACIO ROMO  
DISTRIBUTION ESTIMATOR: LUIS FLORES

SERVICE NOTIFICATION: 4031928  
SERVICE ORDER: 60134048

SHEET 1 OF 2

### UNDERGROUND SERVICE ALERT

1-800-422-4133  
CALL USA/SC

FOR UNDERGROUND LOCATING  
2 WORKING DAYS BEFORE YOU DIG



IMPERIAL IRRIGATION DISTRICT  
IMPERIAL, CA  
IMPERIAL VALLEY ENERGY PROJECT

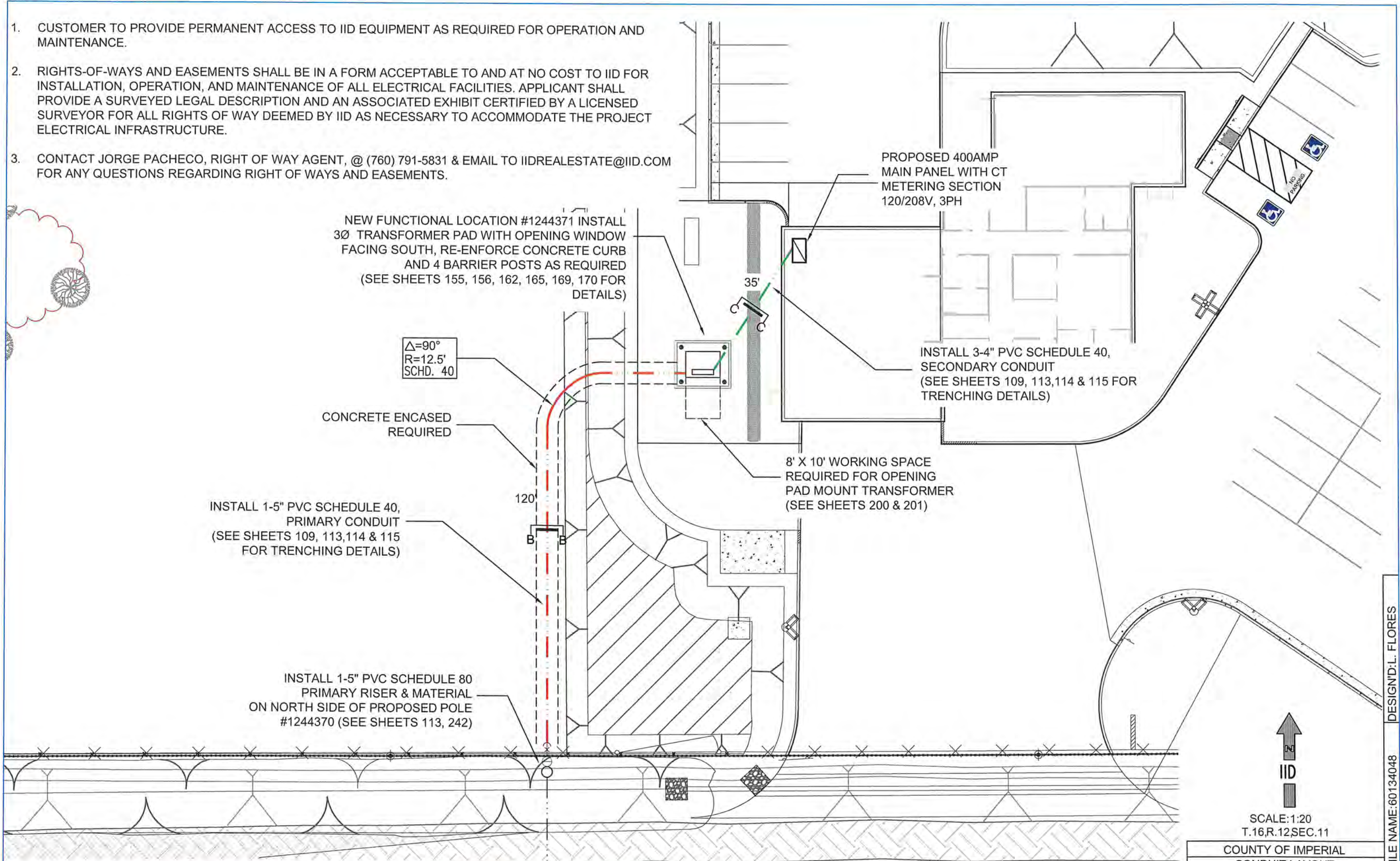
U.G. DISTRIBUTION  
COUNTY OF IMPERIAL  
CONDUIT LAYOUT

FILE NAME: 60134048

REV.#	PG#	DATE	BY	DESCRIPTION

APPROVED: <u>AO</u>	DATE: <u>9/6/22</u>
CHECKED BY: <u>I. Romo</u>	<u>8/29/22</u>
DESIGN'D: L. FLORES	DATE: 08/26/2022

1. CUSTOMER TO PROVIDE PERMANENT ACCESS TO IID EQUIPMENT AS REQUIRED FOR OPERATION AND MAINTENANCE.
2. RIGHTS-OF-WAYS AND EASEMENTS SHALL BE IN A FORM ACCEPTABLE TO AND AT NO COST TO IID FOR INSTALLATION, OPERATION, AND MAINTENANCE OF ALL ELECTRICAL FACILITIES. APPLICANT SHALL PROVIDE A SURVEYED LEGAL DESCRIPTION AND AN ASSOCIATED EXHIBIT CERTIFIED BY A LICENSED SURVEYOR FOR ALL RIGHTS OF WAY DEEMED BY IID AS NECESSARY TO ACCOMMODATE THE PROJECT ELECTRICAL INFRASTRUCTURE.
3. CONTACT JORGE PACHECO, RIGHT OF WAY AGENT, @ (760) 791-5831 & EMAIL TO IIDREALESTATE@IID.COM FOR ANY QUESTIONS REGARDING RIGHT OF WAYS AND EASEMENTS.



SCALE: 1:20  
T.16,R.12,SEC.11

COUNTY OF IMPERIAL  
CONDUIT LAYOUT



# IMPERIAL IRRIGATION DISTRICT

Customer Project Development • 333 S. Waterman Ave • El Centro, CA 92243

**NOTE: CONTACT IID AT (760) 482-3300 TO SCHEDULE A PRE-CONSTRUCTION MEETING BEFORE PROJECT TRENCHING GETS UNDERWAY AND TO REVIEW U.G. INSPECTION SCHEDULE.**

## UNDERGROUND INSPECTION PROCESS

1. Pre -construction meeting with Electrical Contractor.
  - A. IID Inspector and Contractor to meet **BEFORE** any construction or excavating. IID Inspector will explain and/or highlight general installation notes according to the job. IID Inspector will also answer any questions the contractor has to avoid any delays in the future.
2. Trench depth and inspection of primary or secondary conduit installation.
  - A. Verify minimum primary and secondary trench depth is met.
  - B. Verify correct conduit(s) is being used, schedule 40 for below ground and schedule 80 for above ground use.
  - C. Verify approved diameter of conduit is being installed; see Contractor's Notes (drawing).
  - D. Verify spacing between conduits (3") is met and spacers are installed at every six feet.
3. Concrete encasement of conduit(s) where required or 12 inches of "native soil or sand."
  - A. Concrete encasement is required for street crossings, parking lots, driveways, and sidewalks. Encasement to be three sack mix at 2,000 p.s.i sand slurry. When these applications are not the case, then two sack slurry mix to be used.
  - B. Verify there is a three-inch envelope of encasement all around conduit (spacers must be installed prior to encasing)
4. Caution tape over encasement or 12 inch of backfill.
5. Cadweld connection of ground wire to ground rod located at the bottom of the trench for all transformer precast pads, single phase sector precast pads, and three phase sector sleeves.
  - A. Verify ground rods are 5/8" x 10'
  - B. Verify copper strand is 2/0 wire.
6. Backfill of trench and compaction.
  - A. Backfill of trench shall or excavated areas must be a minimum of 90% compaction.



# IMPERIAL IRRIGATION DISTRICT

Customer Project Development • 333 S. Waterman Ave • El Centro, CA 92243

Continued:

7. Stub out markers are installed where applicable.
8. Backfill of all transformer precast pads, single phase sector precast pads, and sector sleeve locations.
9. Verification of compaction test results for all transformer precast pads and all single phase sector precast pads.
  - A. Location of all transformer precast pad and single phase sector precast pads to be a compaction of 90% minimum by contractor/developer.
  - B. Compaction will be performed at a minimum of 2' beyond proposed transformer and single phase sector precast pads on all four sides.
  - C. Contractor to contact IID Inspector after compaction has been completed. IID Inspector must pass visual compaction prior to compaction test.
  - D. After IID Inspector passes compaction by contractor, the contractor will obtain a compaction test.
    - a) **NOTE:** A maximum of 1/2" of sand fill will be approved for leveling of compaction area. If the sand fill exceeds the maximum requirement, the IID Inspector will fail the compaction.
  - E. All transformer and single phase sector precast pads will not be installed until compaction test report has been received and reviewed by IID Inspector.
  - F. After compaction test report is reviewed by IID Inspector, the inspector must be present when contractor installs all transformer precast pads.
    - a) **NOTE:** After compaction test has been reviewed by IID Inspector, transformer precast pad must be installed within 24 hours. If transformer precast pad is not installed within allotted time, IID will require a re-test of compaction from contractor/developer.
10. Installation of any concrete vault, transformer precast pad, sector sleeve or secondary pullbox.
  - A. Verify there are no visible cracks on all transformer precast pads, single phase sector precast pads, concrete vaults, and sector sleeves.
  - B. Verify vaults, all transformer precast pads, sector sleeves, and secondary pullboxes are installed above their appropriate final grade (See Developers Energy Planning Guide).

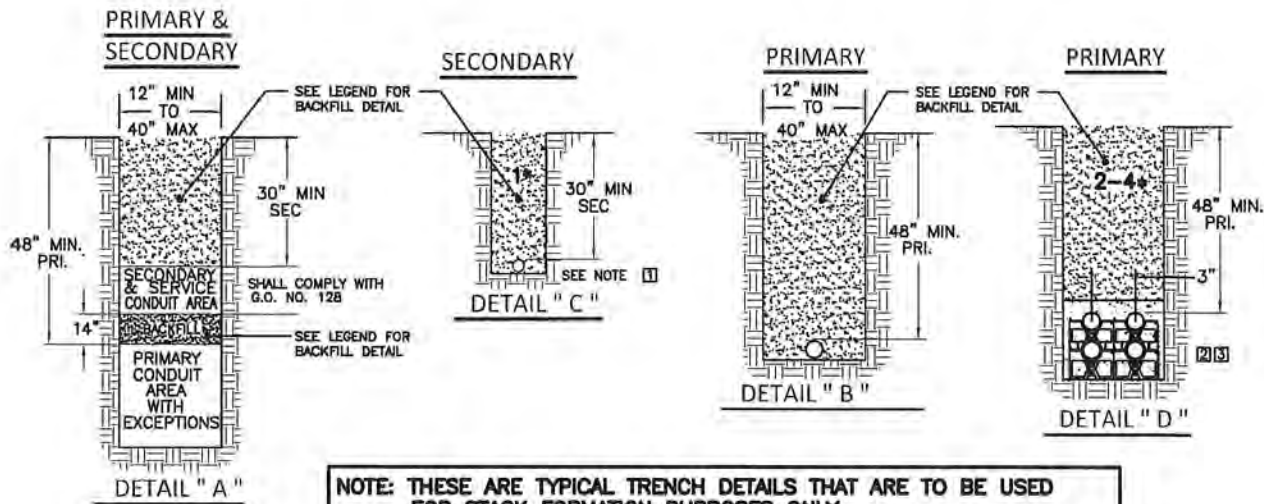


# IMPERIAL IRRIGATION DISTRICT

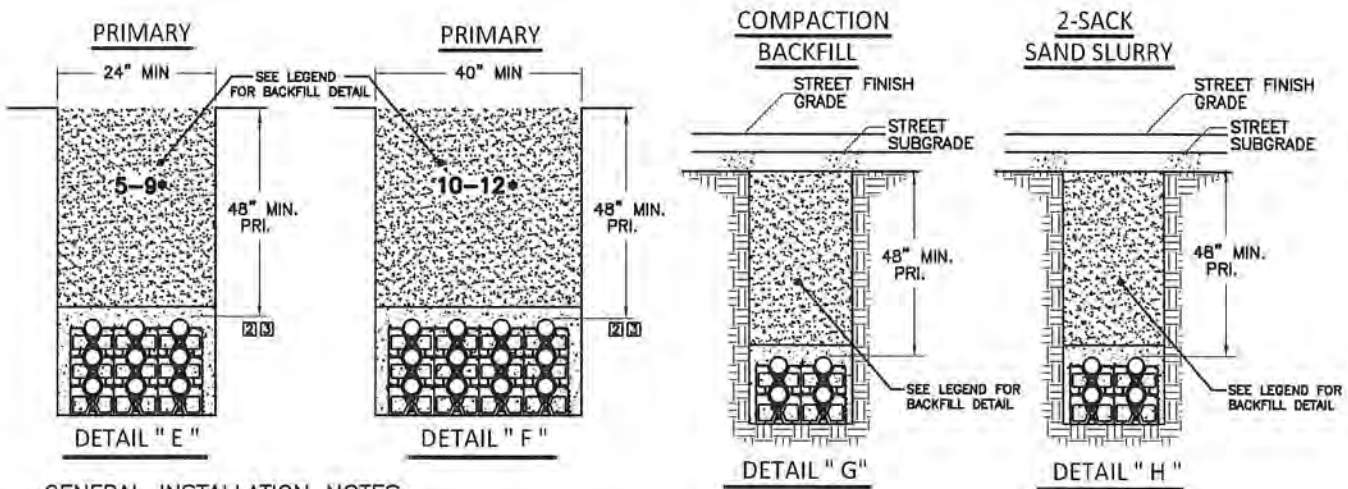
Customer Project Development • 333 S. Waterman Ave • El Centro, CA 92243

Continued:

11. Framing and pouring concrete pad for customer meter panel.
12. Installation of customer meter panel.
13. Barrier post installation (when applicable).
  - A. Verify footing is 36" in depth and 18" in diameter.
  - B. Barrier post is set 30" below finish grade.
  - C. Barrier post is 4" steel pipe.
  - D. Barrier post is painted High Visibility Yellow.
14. Final: Cold and/or hot mandrel inspection.



**NOTE: THESE ARE TYPICAL TRENCH DETAILS THAT ARE TO BE USED FOR STACK FORMATION PURPOSES ONLY. MIN. DEPTH WILL BE (PRI. 48", SEC. 30") AT ANY DEPTH.**



**GENERAL INSTALLATION NOTES**

1. USE PLASTIC SPACERS THAT PROVIDE 3" SEPARATION.
2. PLASTIC SPACERS SHALL BE USED ON CONDUIT RUNS TO BE CONCRETE ENCASED BOTH AS SINGLE OR BANKED INSTALLATIONS AND ON DUCT BANKS NOT ENCASED. (REFER TO NOTE 3.48).
3. CONDUIT RUNS SHALL NOT CROSS EACH OTHER WHEN ON THE SAME LEVEL AND/OR PLANE. (REFER NOTE 3.23)
4. THE MAXIMUM OBTAINABLE SEPARATION BETWEEN POWER FACILITIES AND ALL OTHER SUBSTRUCTURES SHALL BE MAINTAINED AT ALL TIMES, 12" MIN. WHEN PARALLELING AND 12" MIN. WHEN CROSSING ENCASED IN CONCRETE.
5. WHEN CONCRETE ENCASEMENT IS SPECIFIED ON THE JOB, ENCASEMENT SHALL BE A 3 SACK MIX (2000 PI) WITH SAND SLURRY WILL BE USED BELOW STREETS, PARKING LOTS, DRIVEWAYS, AND SIDEWALKS. WHEN STREETS, PARKING LOTS, DRIVEWAYS, AND SIDEWALKS DO NOT EXIST OVER THE DUCT SYSTEM, A 2 SACK SAND SLURRY MAY BE USED. (REFER TO NOTES 3.18, 3.19).
6. ENCASE IN CONCRETE 3" ENVELOPE WHERE REQUIRED. SEE CONDUIT LAYOUT SHEETS (JOB COPY) FOR LOCATION OF CONCRETE TRENCHES.
7. LINE GUARD TAPE REQUIRED IN ALL TRENCHES. (REFER TO NOTE 3.46 STANDARD 100.5).

\*IDENTIFY # OF CONDUITS

**LEGEND**

- CONDUIT
- 3 SACK MIX SAND SLURRY
- 2 SACK SAND SLURRY
- 90% COMPACTION BACKFILL (BACKFILL TO BE NATIVE SOIL OR CALTRANS CLASS 2 AGGREGATE BASE OR CRUSHER FINE WITH 3/8 INCH ROCK).

DRAWN BY		 <b>100.3</b>	<b>TRENCH DETAILS</b>
DRAWN BY	<i>JR</i>		
REVIEWED	<i>PD</i>		
APPROVED	<i>MS</i>		
REVISION	REV 6		
DATE	9-27-2016		

3.38.1 Table 5 Riser Sweep Radius – Vertical

RISER SWEEP RADIUS INDEX (VERTICAL) TABLE 5						
SECONDARY Conduit Dia.	Radius	Pole Riser PVC SCH	Equip. Riser PVC SCH	Trans. Pad PVC SCH	Secondary PVC SCH	Meter Panels PVC SCH
2"	24" Radius	N/A	40	40	40	40
3"	36" Radius	80	40	40	40	40
4"	*36"-48" Radius	80	40	40	40	40
PRIMARY Conduit Dia.	Radius	Pole Riser PVC SCH	Equip. Riser PVC SCH	Trans. Pad PVC SCH	Secondary PVC SCH	Meter Panels PVC SCH
4"	48" Radius	80	40	40	N/A	N/A
5"	*48"-60" Radius	80	40	40	N/A	N/A
6"	60" Radius	80	N/A	N/A	N/A	N/A

\*Contact your IID Customer Service Project Manager for instructions.  
N/A = Not Applicable

3.39 The installation of the conduit system will be conducted by a single contractor or other entity to give the project continuity, reducing the possibility of deviations from the G.O. 128 regulations, Authority having jurisdiction, and IID standards. Developer/Contractor will accept the most strict or highest requirements from the entities mentioned above.

3.40 Marking Tape over Conduits:

3.40.1 Contractor shall install 2 inch line guard III tape, red in color with black lettering **"CAUTION BURIED ELECTRIC LINE BELOW"** (See 3.46, Standard 100.5)

3.40.2 Contractor will install tape 12 inches (1') above the power conduits. When conduit(s) is/are encased in concrete, Developer/Contractor shall back fill with compacted (90%) native soil to meet the 12 inch (1') requirement. (See 3.46, Standard 100.5)

3.41 Mandrel

3.41.1 The installation contractor shall mandrel all primary ducts and secondary service ducts. IID shall provide the mandrel and the IID inspector for the mandrel process. Refer to 3.41.1 Pulling Rope, Table 8 Conduit rope/Measured Rope Requirements for Primary Pulls. Inspection field check schedules are subject to a minimum 48 hour advance notice and are by appointment only; Imperial (760) 482-3300; La Quinta (760) 398-5828

3.41.2 IID Inspector will conduct a field check prior to mandrel test to ensure IID structures are:

3.41.2.1 Not damaged

3.41.2.2 Clear of debris

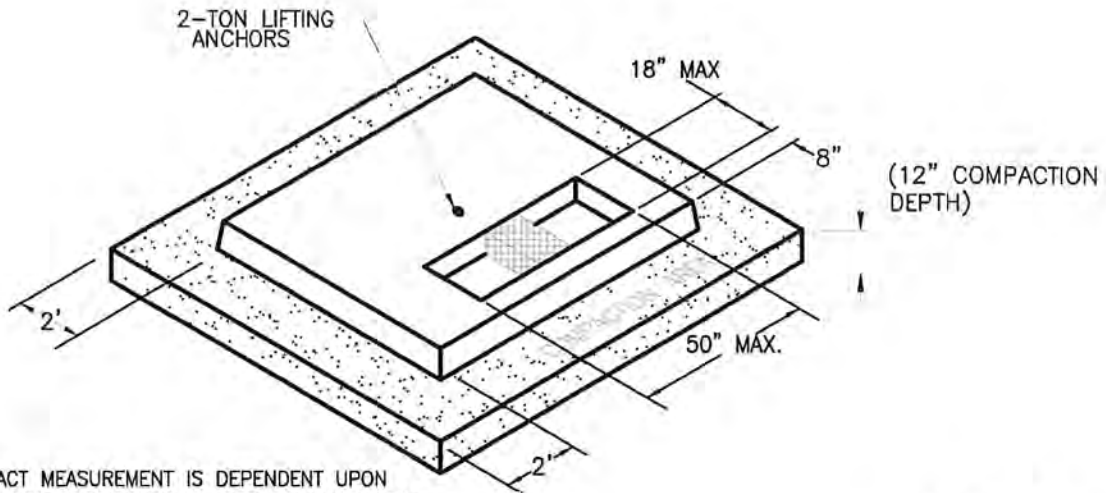
3.41.2.3 No obstructions to IID structures (accessibility)

3.41.3 If mandrel is requested from IID structure to meter panel, IID Inspector will field check the following:

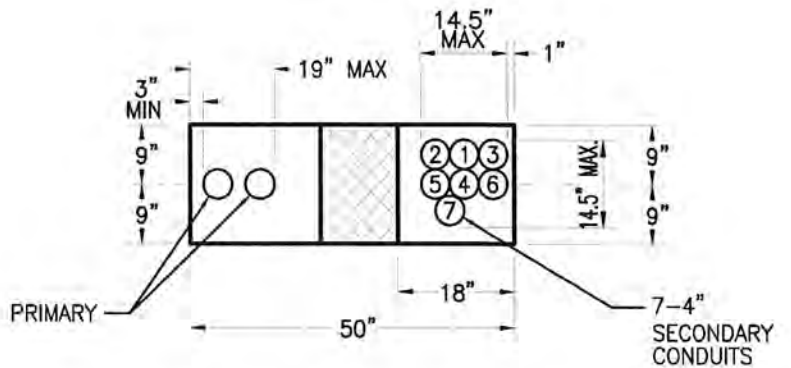
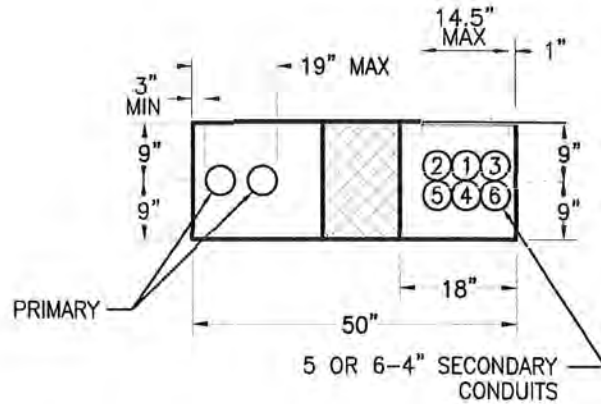
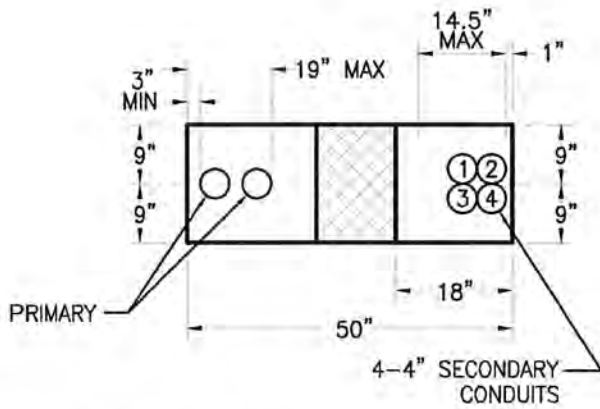
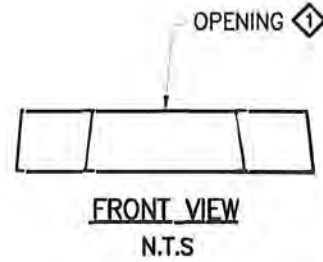
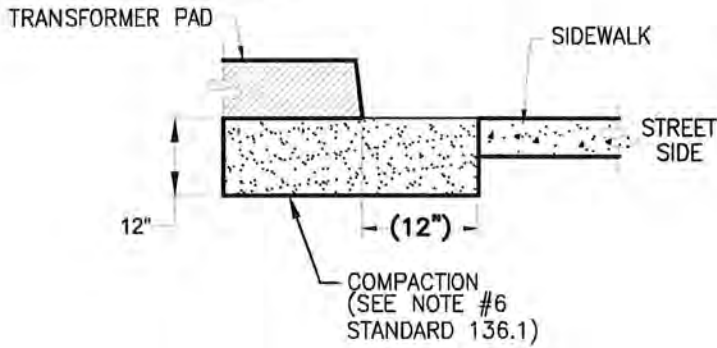
- 3.41.3.1 Scratch coat or brown coat must be installed on residence/building
- 3.41.3.2 Wallboard must be installed on the wall the meter panel is located.
- 3.42 After field checks are approved by IID Inspector:
  - 3.42.1 Cold Mandrel: Can continue per IID Inspectors instructions
  - 3.42.2 Hot Mandrel: Will be scheduled at a later date to an IID Troubleshooter
- 3.43 IID Inspector is required to be in attendance on all mandrel tests
- 3.44 Pulling rope: In all duct runs, the installation contractor is to furnish and install the following:
  - 3.44.1 Polypropylene rope usually yellow in color is acceptable
  - 3.44.2 All conduits may be filled with polypropylene rope, knots & splices are not allowed at any time.
    - 3.44.2.1 Note: If pulling wire at a later date (any time after construction), Developer/Contractor is responsible and required to pull in new rope that have no splices.
    - 3.44.2.2 Note: When multiple conduits are installed, Mule tape, ½" wide with foot markers, is required in one conduit. Mule tape will meet or exceed 1,250 lbs. tensile strength.
    - 3.44.2.3 Note: Detectable mule tape, rope, or wire is prohibited
- 3.45 Table 8 Conduit Rope/Measured Rope Requirements

CONDUIT ROPE/MEASURED ROPE REQUIREMENTS			
Rope Type	Conduit Length	Conduit which will contain Wire	Rope Tensile Strength (Average Breaking Strength)
1) Polypropylene ¾"	0' – 1000'	No Knots	1,250 lbs. Min.
2) Polypropylene ½"	1000' – Greater	No Knots	2,500 lbs. Min.





\*NOTE: EXACT MEASUREMENT IS DEPENDENT UPON MANUFACTURER SPECIFICATIONS. SEE STANDARD 136.1, CONSTRUCTION NOTE 2. APPROVED MANUFACTURERS AND STRUCTURERS.



SHADED AREA TO BE CLEAR OF ALL CONDUIT

NOTE:

① WINDOW OPENING ON TOP OF PAD IS SLIGHTLY SMALLER THAN BOTTOM OPENING A RESULT OF FORM CONSTRUCTION

IMPERIAL IRRIGATION DISTRICT	
DRAWN BY	<i>JR</i>
REVIEWED	<i>MB</i>
APPROVED	<i>MB</i>
REVISION	REV 7
DATE	9-27-2016

**PRECAST CONCRETE PAD DETAIL FOR  
THREE-PHASE TRANSFORMERS  
45KVA TO 500KVA**

**136**

**CONSTRUCTION NOTES:**

1. A PRECAST CONCRETE PAD SHALL BE USED.
2. APPROVED MANUFACTURERS AND STRUCTURES.

50KV - 500KV TRANSFORMER PAD			
MANUFACTURER	PHONE No.	STRUCTURE No.	FRONT/SIDE/THICKNESS DIMENSIONS
SUPERIOR READY MIX	(760) 352-4341	3426 HLR	94"(F) X 73"(S) X 8"(T)
JENSEN PRECAST	1-775-352-2700	PD7296-T8-25	96"(F) X 72"(S) X 8"(T)
OLD CASTLE	1-800-626-3860	IID-7296-8-TP	96"(F) X 72"(S) X 8"(T)

(F) = FRONT                      (S) = SIDE                      (T) = THICKNESS

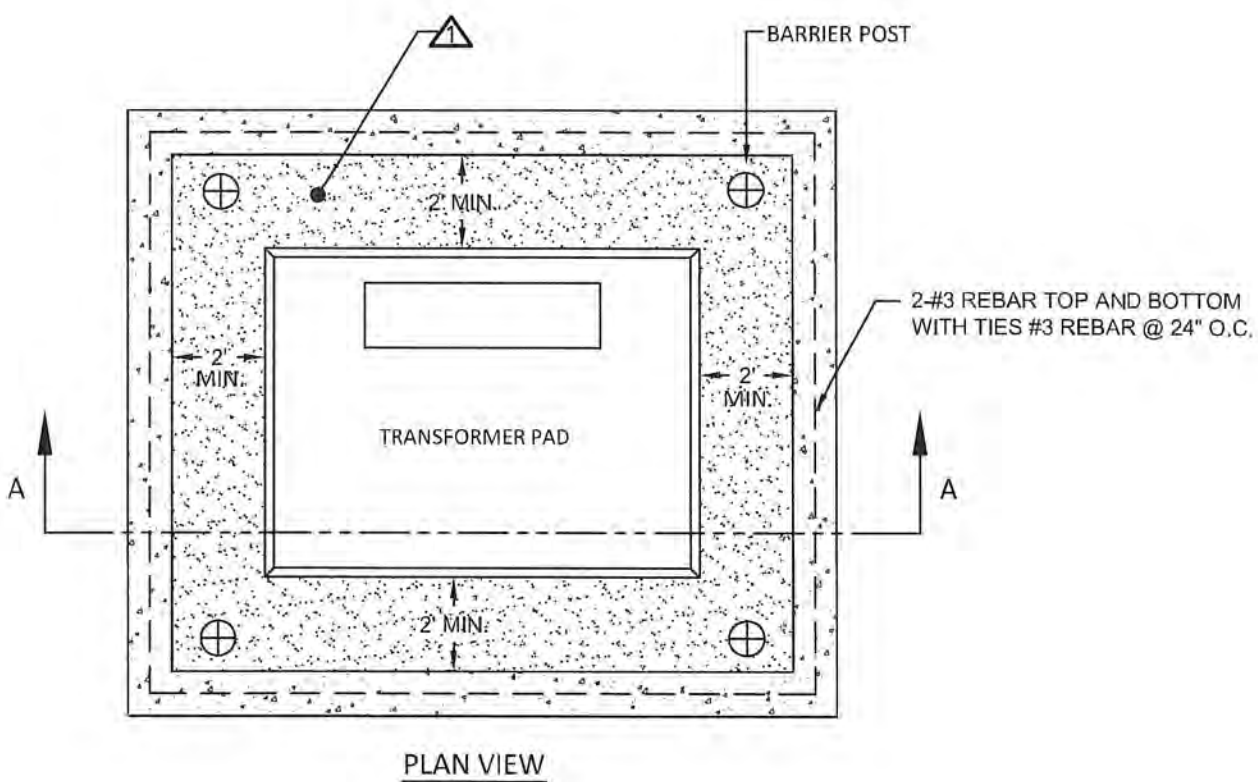
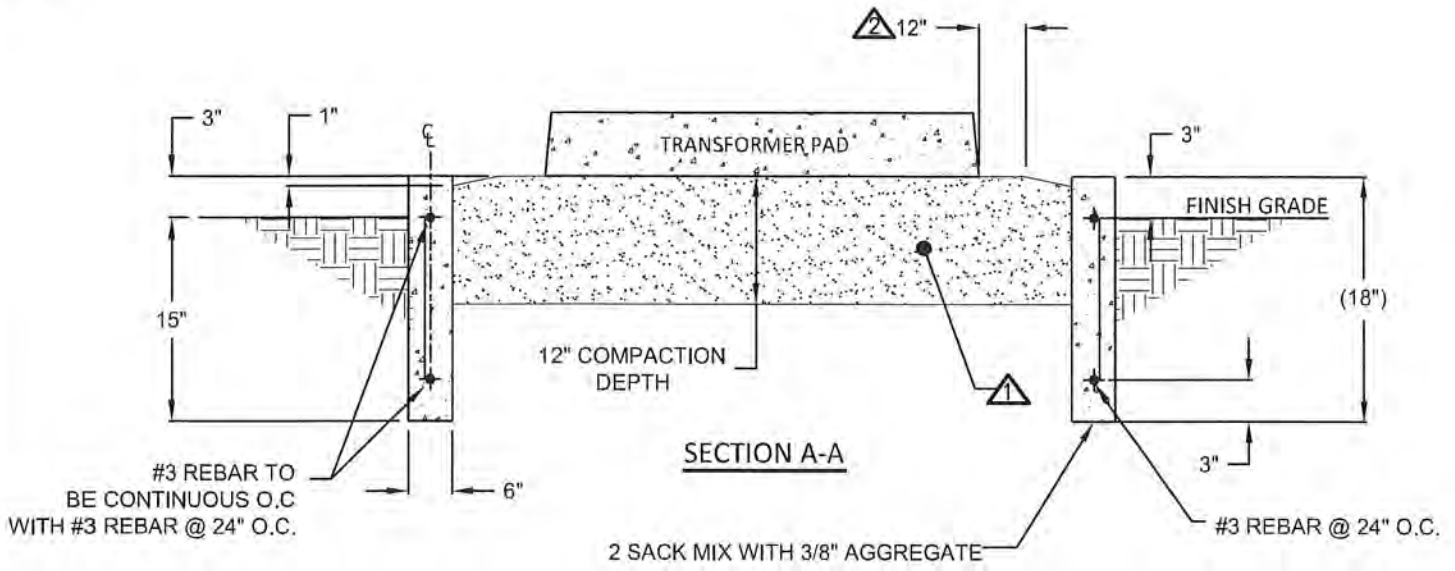
3. CONTRACTOR TO PROVIDE TWO 5/8"x10' COPPERWELD GROUND RODS PER PAD (INSTALLATION BY CONTRACTOR).
4. SIZE AND NUMBER OF CONDUITS IN EACH PAD TO BE AS SHOWN ON CONDUIT LAYOUT.
5. ANCHORAGE TO BE SET BY I.I.D. WHEN TRANSFORMER IS INSTALLED.
6. CONTRACTOR SHALL PROVIDE & INSTALL 12" OF CLASS 2 AGGREGATE ROAD BASE MATERIAL OR CRUSHER FINES WITH 3/8" ROCKS UNDERNEATH TRANSFORMER PAD, AND COMPACT ALL ROAD BASE UNDERNEATH TRANSFORMER PAD TO A MINIMUM COMPACTION OF 90%. SEE STANDARD 136. SECTION 3, 3.4.
7. CONDUITS TO TERMINATE 1" ABOVE TOP OF TRANSFORMER PAD.

IMPERIAL IRRIGATION DISTRICT	
DRAWN BY	<i>gr</i>
REVIEWED	<i>rs</i>
APPROVED	<i>ms</i>
REVISION	REV 7
DATE	9-27-2016



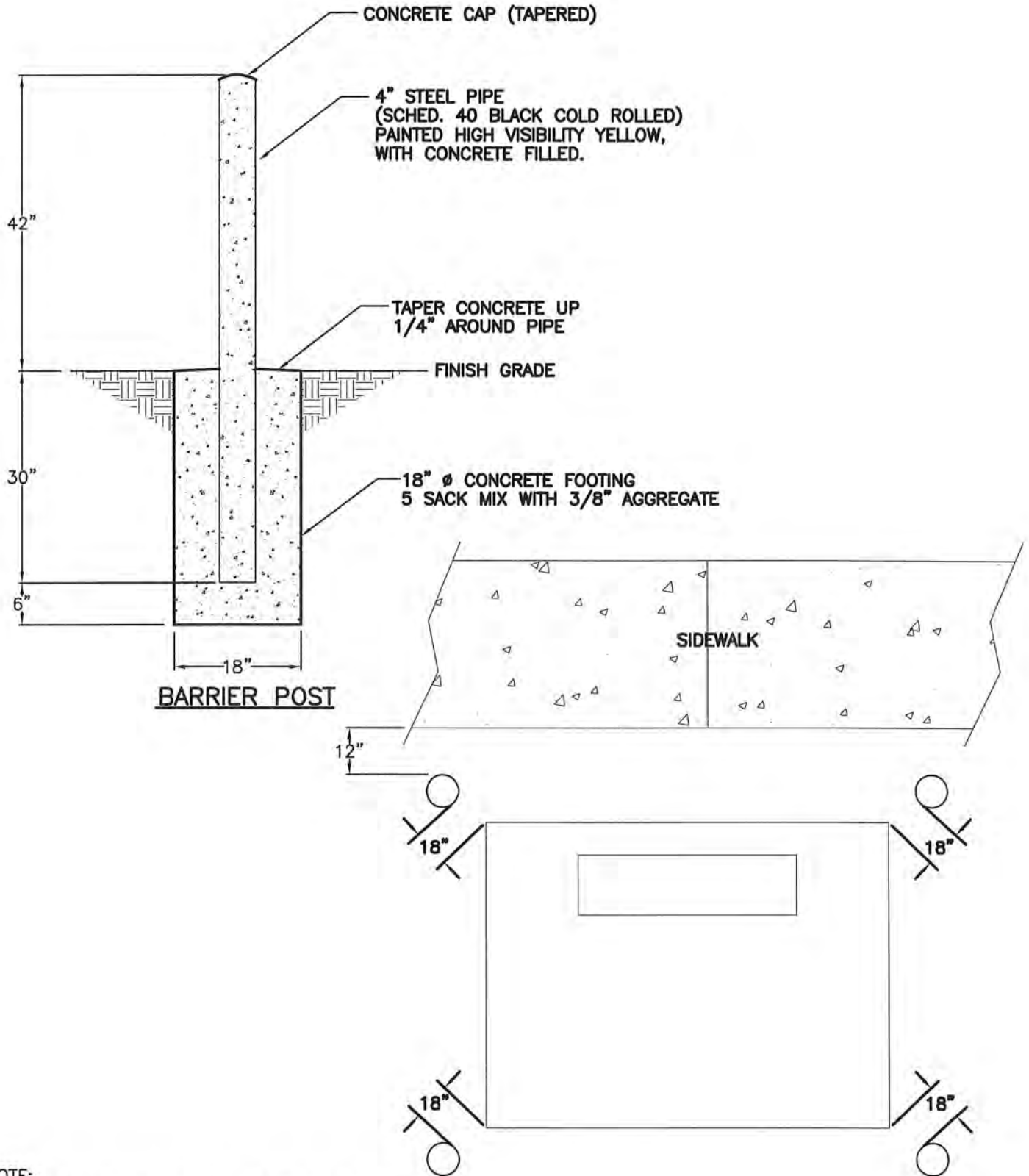
**PRECAST CONCRETE PAD DETAIL FOR  
THREE-PHASE TRANSFORMER  
45KVA TO 500KVA**

**136.1**



- NOTES:**
- ▲ COMPACTED AREA SHALL BE CALTRANS CLASS 2 AGGREGATE BASE OR CRUSHER FINES WITH 3/8" ROCKS.  
SECTION 5.5 COMPACTION PROCESS.
  - ▲ A MAXIMUM OF 1/2" OF SAND FILL WILL BE APPROVED FOR LEVELING OF COMPACTION AREA.  
SECTION 5.5 COMPACTION PROCESS.

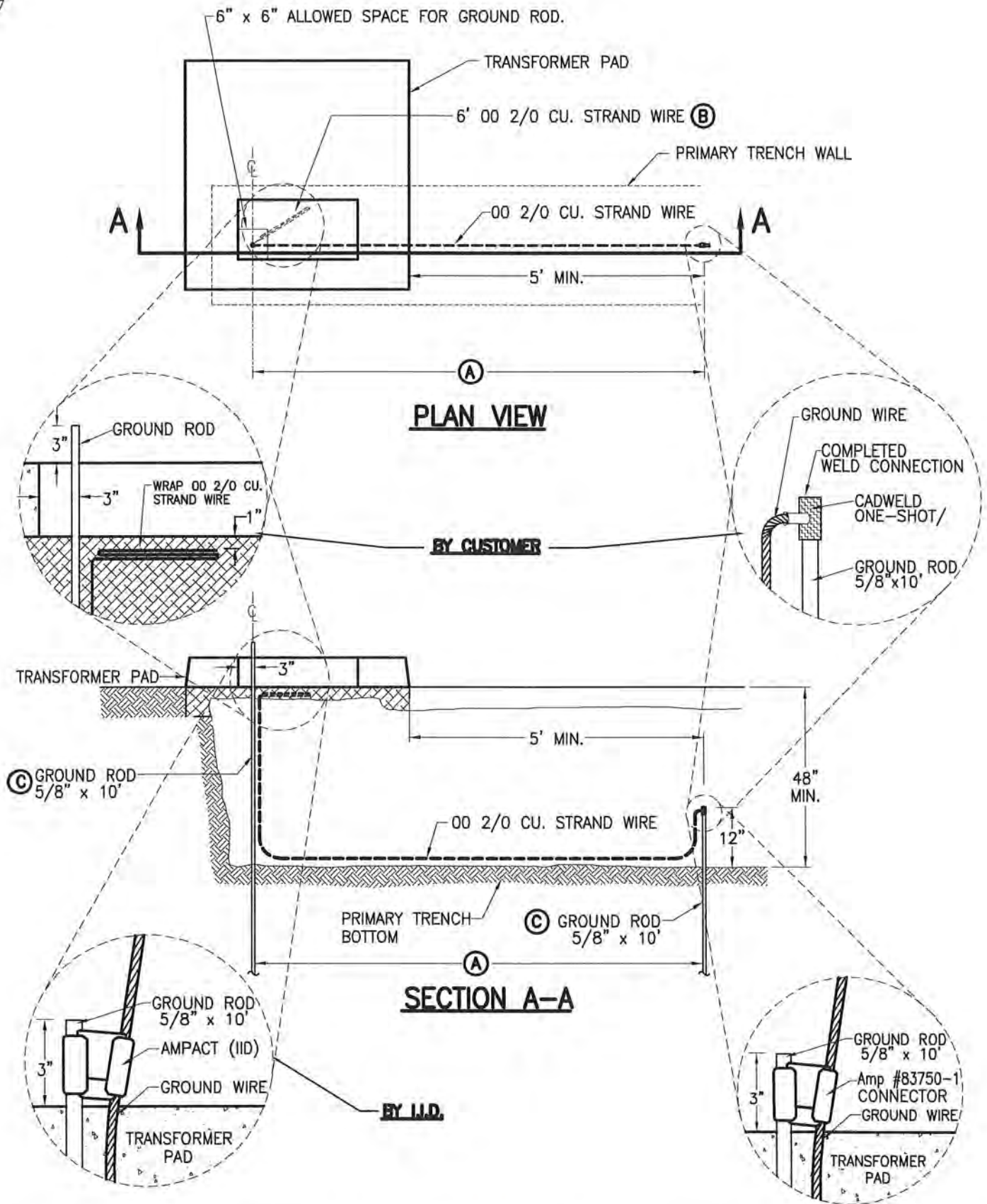
IMPERIAL IRRIGATION DISTRICT			<b>TRANSFORMER PAD CONCRETE RE-ENFORCEMENT CURB DETAIL</b>
DRAWN BY	<i>gr</i>		
REVIEWED	<i>rd</i>		
APPROVED	<i>ms</i>		
REVISION	REV 3		
DATE	9-27-2016	<b>100.9</b>	



**NOTE:**

1. REMOVABLE BARRIER POSTS ARE NOT ALLOWED.
2. IMPERIAL VALLEY TRANSFORMER PAD SHOWN.

IMPERIAL IRRIGATION DISTRICT			<b>TYPICAL BARRIER POST DETAIL</b>
DRAWN BY	<i>gr</i>		
REVIEWED	<i>pd</i>		
APPROVED	<i>ms</i>		
REVISION	REV 5		
DATE	9-27-2016	<b>181.6</b>	



IMPERIAL IRRIGATION DISTRICT	
DRAWN BY	<i>JK</i>
REVIEWED	<i>PO</i>
APPROVED	<i>MS</i>
REVISION	REV 8
DATE	11-21-2016



**TRENCH GROUND WIRE FOR  
THREE PHASE TRANSFORMER PADS  
TO BE INSTALLED BY CONTRACTOR**

**190.3**

**CONSTRUCTION NOTES:**

- (A) GROUND RODS TO HAVE A 6'-0" MINIMUM SEPARATION.
- (B) WRAP 6' OF WIRE (NOT EXPOSED) 1" UNDERGROUND NEXT TO GROUND ROD.
- (C) **LOCATE GROUND RODS SO THEY DO NOT TOUCH CONDUITS.** GENERAL ORDER 128 REQUIRES GROUND RODS TO BE DRIVEN.

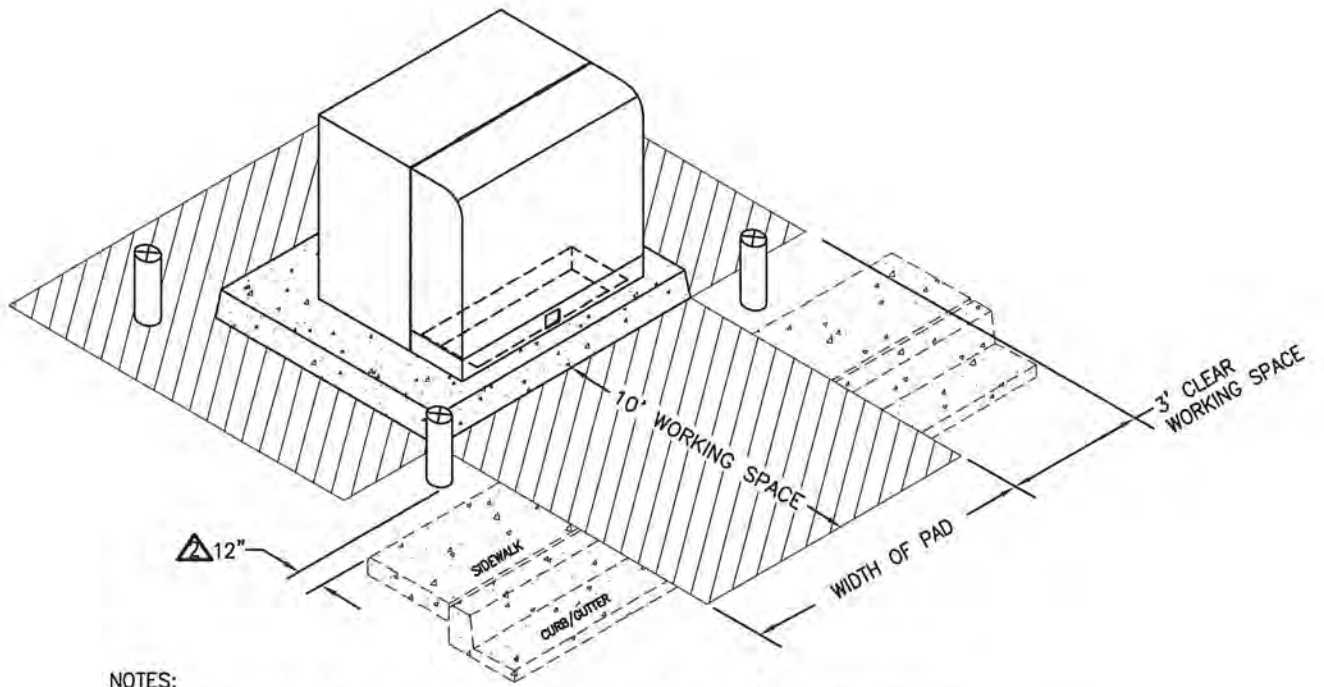
BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	STOCK No.	PAGE No.
1	1	CONCRETE PAD, SEE STANDARD 136 THRU 137		
2	1	CADWELD, ONE-SHOT/Amp CONNECTOR #83750-1	40003365	
3	20'	WIRE - COPPER 00 2/0 STRAND, SOFT DRAWN BARE	40004222	
4	2	GROUND ROD, 5/8" x 10', COPPERWELD	40003814	

**NOTES:**

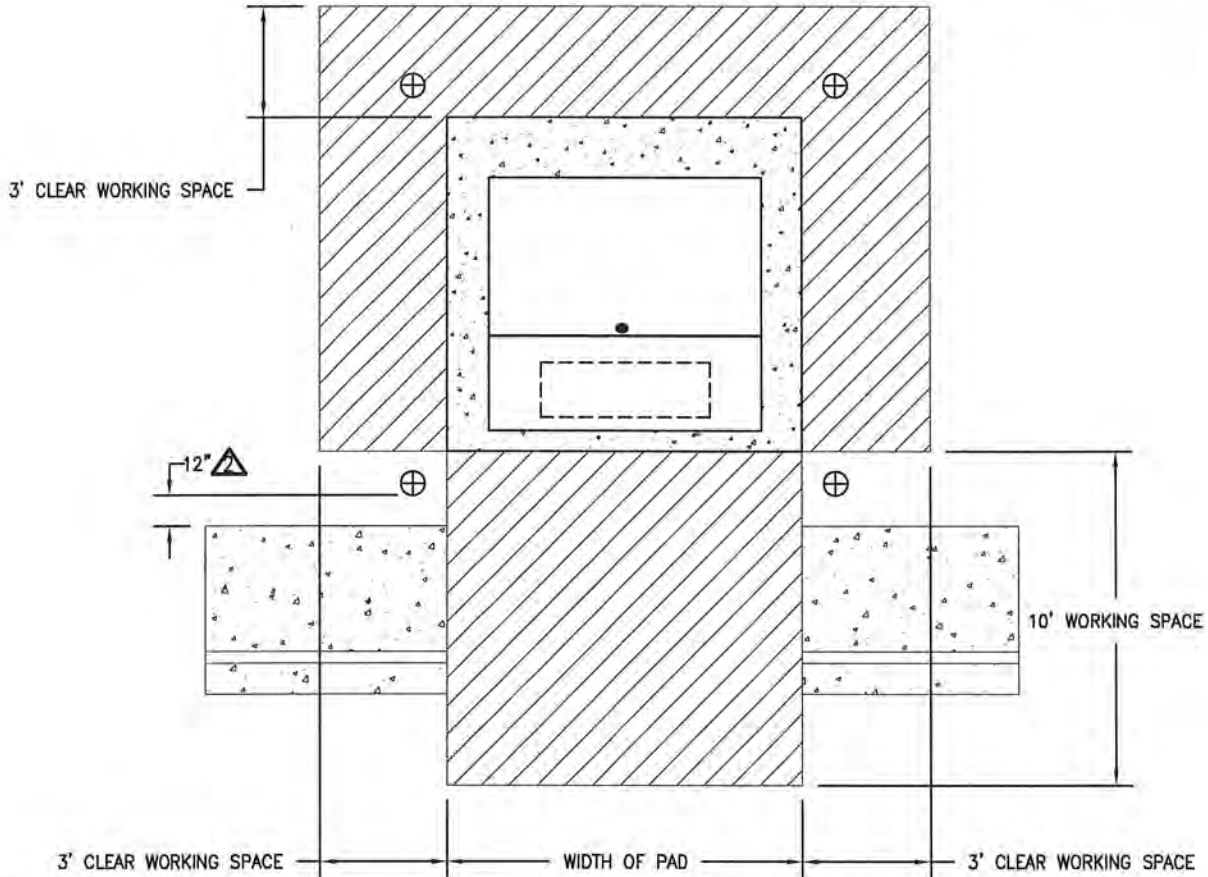
THE SERVICE TRENCH IS ON PRIVATE PROPERTY AND BELONGS TO THE CUSTOMER, THEREFORE, THE TRENCH GROUND WIRE SHOULD ALWAYS BE INSTALLED IN THE PRIMARY TRENCH.

DRAWN BY		IMPERIAL IRRIGATION DISTRICT	
REVIEWED	<i>[Signature]</i>		<b>TRENCH GROUND WIRE FOR THREE PHASE TRANSFORMERS PAD TO BE INSTALLED BY CUSTOMER</b>
APPROVED	<i>[Signature]</i>		
REVISION	REV 7		
DATE	11-21-2016		
		<b>190.31</b>	

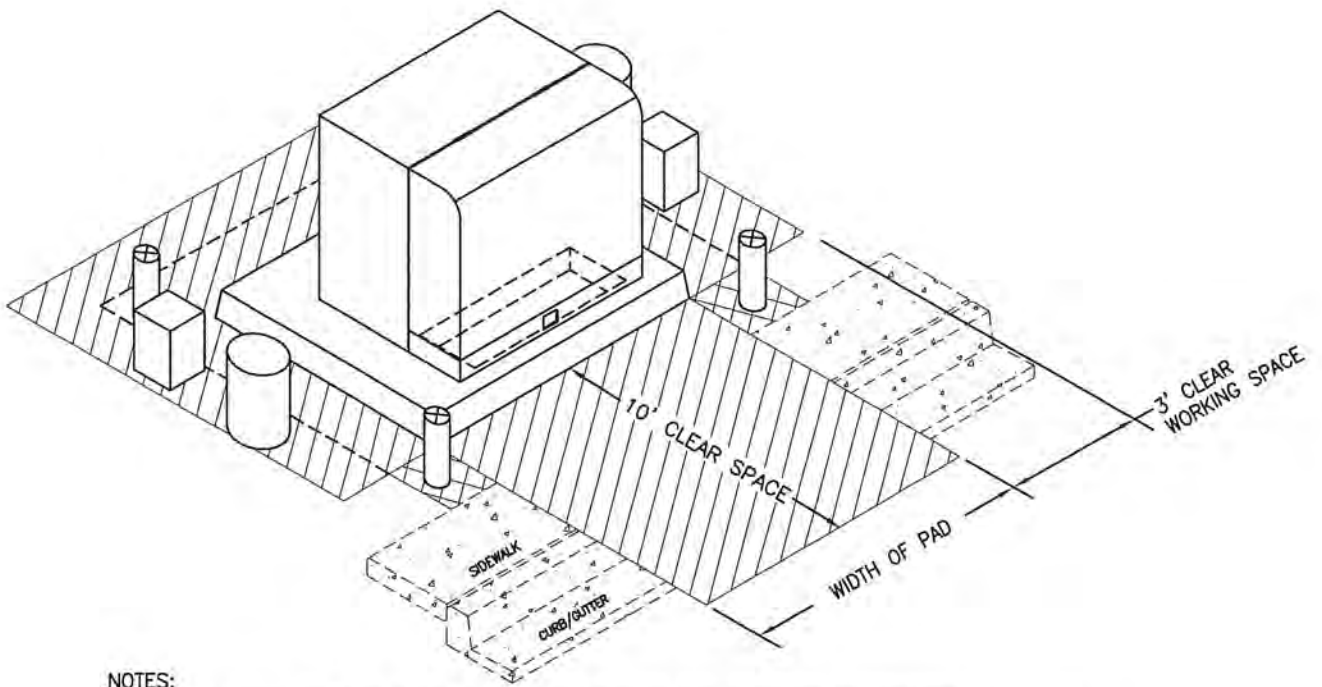


**NOTES:**

1. THE PURPOSE OF THIS DRAWING IS TO ILLUSTRATE THE REQUIRED CLEARANCES FROM AN I.I.D TRANSFORMER TO OTHER UTILITIES (18") AND MINIMUM HOT STICK CLEARANCE.
- ⚠ WHEN BARRIER POSTS ARE REQUIRED, REFER TO BARRIER POST DETAIL 181.6, SECTION 5.32. IF BARRIER POSTS ARE NOT REQUIRED, TRANSFORMER PRECAST PAD SHALL HAVE A 12" (1') OFFSET BEHIND SIDEWALK.

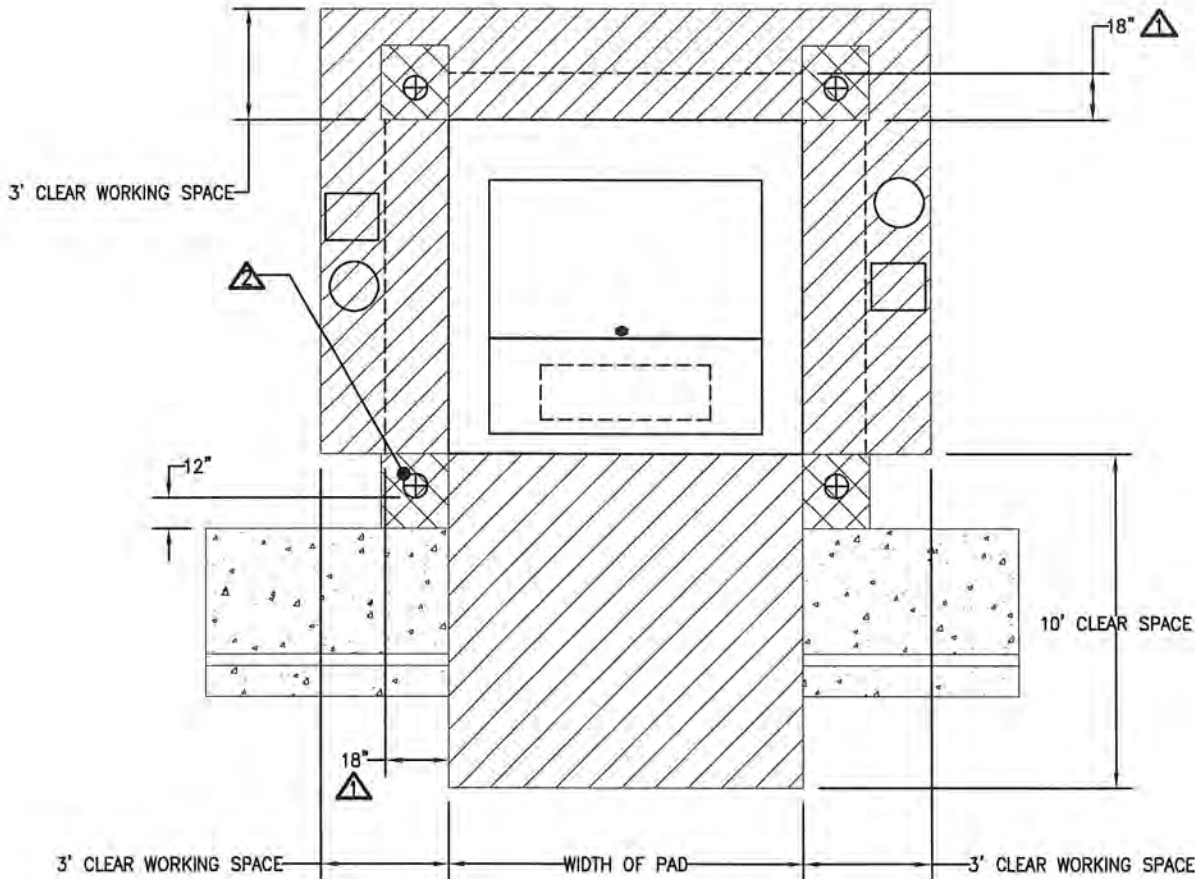


IMPERIAL IRRIGATION DISTRICT		 <b>PRECAST TRANSFORMER PAD SPATIAL CLEARANCES</b>
DRAWN BY	<i>gr</i>	
REVIEWED	<i>rs</i>	
APPROVED	<i>ms</i>	
REVISION	REV 2	
DATE	9-29-2016	<b>202.4</b>



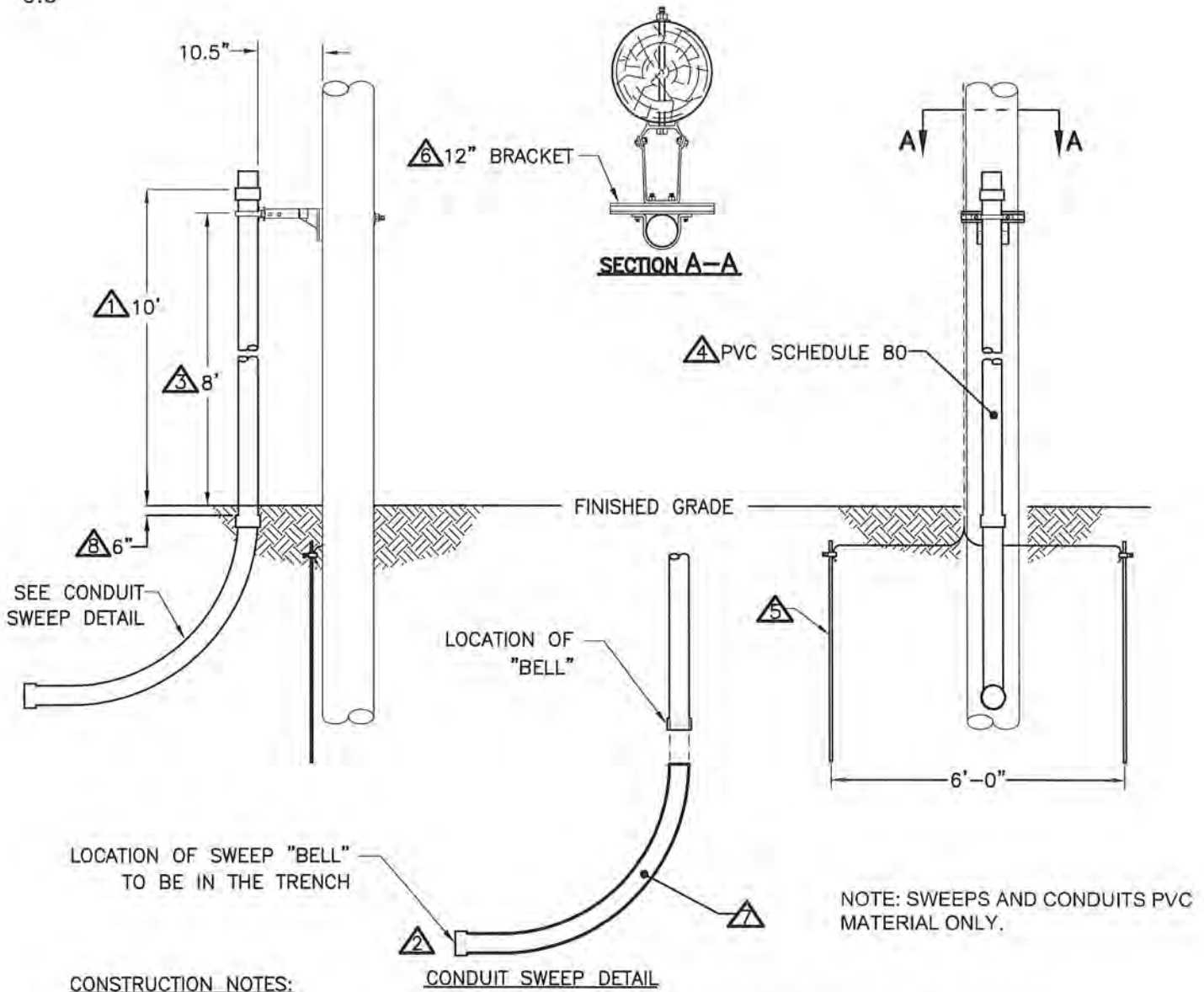
**NOTES:**

- ⚠ THE PURPOSE OF THIS DRAWING IS TO ILLUSTRATE THE REQUIRED CLEARANCES FROM AN I.I.D TRANSFORMER TO OTHER UTILITIES (18") AND MINIMUM HOT STICK CLEARANCE.
- ⚠ WHEN BARRIER POSTS ARE REQUIRED, ALL OTHER UTILITIES TO STAY CLEAR OF AREA. (REFER TO BARRIER POST DETAIL, 181.6, SECTION 5.32.)



IMPERIAL IRRIGATION DISTRICT			<b>PRECAST TRANSFORMER PAD SPATIAL CLEARANCES WITH COMMUNICATION</b>
DRAWN BY	<i>gr</i>		
REVIEWED	<i>rs</i>		
APPROVED	<i>ms</i>		
REVISION	REV 2		
DATE	9-29-2016	<b>202.5</b>	





**CONSTRUCTION NOTES:**

- △ 1 CONDUIT INSTALLATION TO BE COMPLETED BY THE CUSTOMER OR CONTRACTOR UP TO 10' ABOVE FINISHED GRADE AS SHOWN.
- △ 2 REFER TO CONTRACTORS NOTES DISTRIBUTION PLAN FOR DIRECTION OF THE SWEEP AND RISER POSITION.
- △ 3 FIRST CONDUIT BRACKET TO BE INSTALLED APPROXIMATELY 8 FEET ABOVE FINISHED GRADE.
- △ 4 REFER TO CONTRACTORS NOTES DISTRIBUTION PLAN FOR SIZE OF SCHEDULE 80 PVC ABOVE GROUND.
- △ 5 GROUND RODS TO BE INSTALLED BY IID.
- △ 6 BRACKETS TO BE SUPPLIED BY IID UNLESS OTHERWISE NOTED.
- △ 7 CONDUIT SWEEP TERMINATING AT RISER POLE SHALL BE SCHEDULE 80 WITH A MINIMUM 4' (48") RADIUS, SEE STANDARD 100.12. REFER TO CONTRACTORS NOTE 4H AND REFER TO TABLE 5 RISER SWEEP RADIUS.
- △ 8 **ALL RISER SWEEPS TO BE INSTALLED 6" BELOW FINISHED GRADE.**

IMPERIAL IRRIGATION DISTRICT	
DRAWN BY	<i>gr</i>
REVIEWED	<i>[Signature]</i>
APPROVED	<i>ms</i>
REVISION	REV 05
DATE	12-09-2013



**108.1**

**PRIMARY RISER POLE**

**6. SEELEY COUNTY WATER DISTRICT – WATER AND SANITARY SEWER SERVICES**

The Water and Sanitary Sewer Purveyor for the Townsite of Seeley and the Seeley Fire Station and Cooling Center is the Seeley County Water District. The Seeley County Water District will be providing a potable water supply for the 2 inch potable water service for the Seeley Fire Station and Cooling Center Building, 6 inch fire hydrant to be placed near the Seeley Fire Station and Cooling Center Building and 6 inch/8 inch fire line for the Seeley Fire Station and Cooling Center fire sprinkler system.

The Seeley County Water District will also be accepting wastewater flow from the Seeley Fire Station and Cooling Center Building 6 inch sanitary sewer lateral.

It will be necessary to extend a new 8 inch water main along the north side of Evan Hewes Highway from Mount Signal Drive to the project site. It will be necessary to extend a new 8 inch sanitary sewer pipeline along the south side of Evan Hewes Highway from Mount Signal Drive to the project site. Although both the 8 inch water main and 8 inch sanitary sewer line extensions are within Imperial County Right of Way, the 8 inch water main extension and 8 inch sanitary sewer main extension will be owned and operated by the Seeley County Water District.

The Civil Improvement plans illustrating the water and sanitary sewer pipeline improvements were reviewed and approved by the Seeley County Water District during the plan review process. The County of Imperial is responsible to pay for the water and sewer capacity and connection fees for the Seeley Fire Station and Cooling Center. The County of Imperial will be responsible to pay for any Seeley County Water District permit or inspection fees. The contractor will be responsible to contact the Seeley County Water District to coordinate water and sanitary sewer pipeline facility inspections and the testing of water and sanitary sewer pipelines including the disinfection of the water pipelines. The contractor shall not connect water services or the Building sanitary sewer system to the Seeley County Water District water distribution system and sanitary sewer collection system until approval is obtained from the Seeley County Water District.

**END SPECIAL CONDITION SECTION 6**

## 7. SOUTHERN CALIFORNIA GAS COMPANY

The County of Imperial forwarded a "Request for Non-Residential Gas Service" to Southern California Gas Company. Southern California Gas Company will be installing a new gas service pipeline from the existing north-south oriented existing gas pipeline adjacent to the project east property line to the Seeley Fire Station and Cooling Center gas point of connection located near the southeast building corner. Southern California Gas Company will also be installing the new gas meter. See Civil Plan Sheet C1.06 for the location of the existing Southern California Gas pipeline, new gas service pipeline, gas point of connection and gas meter at the southeast building corner.

The County of Imperial will be paying for the gas pipeline installation cost, gas meter, gas connection fee and all other related gas service expenses. The contractor shall excavate and backfill the new gas service pipeline trench from the existing gas pipeline to the point of connection/gas meter location at the southeast corner of the Seeley Fire Station and Cooling Center building. The contractor shall contact Joseph Campos at Southern California Gas Company at e-mail address: [jcampos3@socalgas.com](mailto:jcampos3@socalgas.com) ; telephone number (760) 219-6794 a minimum of ten (10) days prior to the excavation of the gas pipeline trench to review the trench excavation requirements and gas service installation coordination issues.

**END SPECIAL CONDITION SECTION 7**

## **8. AT&T FIBER OPTIC CABLES AND DIRECT BURIED CABLES ALONG EVAN HEWES HIGHWAY**

There is one (1) underground AT&T fiber optic cable and two (2) AT&T direct buried copper cables along the north side of Evan Hewes Highway at the Seeley Fire Station and Cooling Center project site. The exact location of the underground AT & T fiber optic cable and two (2) AT&T direct buried copper cables is not known. The existing AT&T fiber optic cable and two (2) AT&T direct buried copper cables may conflict with the installation of the Seeley Fire Station and Cooling Center new driveway entrance, new stormwater pipeline to be placed beneath the driveway entrance, new water pipeline to be placed beneath the driveway entrance and the new sanitary sewer lateral to cross the fiber optic cable and direct buried copper cables at a perpendicular angle at the driveway entrance. There are also two (2) new 8 inch diameter water pipelines and a new 2 inch water service pipeline which cross the existing AT&T fiber optic cable and two (2) AT&T direct buried copper cables at perpendicular angles at the project site north of Evan Hewes Highway. See Plan Sheets C1.05, C1.06 and C2.01. In addition, the existing AT & T fiber optic cable and two (2) AT&T direct buried copper cables may conflict with the grading of the stormwater swale along the north side of Evan Hewes Highway from Mount Signal Avenue to New River Boulevard as illustrated on Plan Sheet 2.02.

It will be required to pot-hole the existing underground utilities within the limits of construction within five (5) days from the issuance of the Notice to Proceed. See Pothole Notes on plan sheets C1.03 and C2.02. The limits of construction include the project site including the "area to be developed" and area "not to be developed". The limits of construction also includes the Evan Hewes Highway Right of Way from Mount Signal Avenue to New River Boulevard. It will be necessary to coordinate the "pot-holing" activities with the utility companies, construction manager and the Imperial County Public Works Department. The existing AT & T fiber optic cable and two (2) direct AT & T direct buried copper cables shall be potholed at even 100 foot stations from 1+00 to 12+00 along the north side of Evan Hewes Highway and at Stations 3+60, 4+10 and 4+60 at the new driveway entrance. The Contractor's Surveyor shall as-built the horizontal distance from the Evan Hewes Highway right of way centerline/survey baseline (not pavement edge) illustrated on plan sheet C2.02 to the location of the existing AT&T fiber optic cable and two (2) direct AT&T direct buried copper cables. The elevation of the existing AT&T fiber optic cable and two (2) direct AT&T direct buried copper cables shall be obtained at each station. The horizontal distances and elevations shall be placed on the As-Built plans maintained by the Contractor.

After the prior noted horizontal distances and vertical elevation field information is obtained the Construction Manager and Contractor shall evaluate whether there is a conflict between the existing AT & T fiber optic cable and two (2) direct buried copper cables and the new stormwater, water, sanitary sewer and driveway entrance facilities and also with the grading of the stormwater swale along the north side of Evan Hewes Highway between Mount Signal Avenue and New River Boulevard. If conflicts are identified the Imperial County Public Works Director and Imperial County Work Force and Economic

Development Director are to be notified. If conflicts are identified, the AT&T Manager, Mr. Daniel Garcia at e-mail address [DG7675@att.com](mailto:DG7675@att.com); office phone (760) 337-3358 or cell phone (760) 482-7428 is to be contacted regarding the conflict(s). It will be requested that AT&T determine the cost to relocate the AT&T fiber optic cable and/or two (2) direct buried copper cables to mitigate the conflict. *If it is required to relocate the AT & T fiber optic cable and/or two (2) direct buried copper cables the County of Imperial will pay for the cost for AT&T to relocate the AT&T fiber optic cable and/or two (2) direct buried copper cables.*

It is important that the potholing of the existing AT&T fiber optic cables and two (2) direct buried copper cables occur within 5 days of the issuance of the Notice to Proceed as it may take a considerable amount of time (possibly 100 days) for the potholing and field work to identify the horizontal and vertical elevations of the existing AT & T cables, for the evaluation as to whether conflicts exist and what segments of the existing AT&T cables require relocation, for AT & T to prepare an official quotation to relocate the AT & T cables, for the County of Imperial Staff to obtain payment for the AT&T relocation work and for AT&T forces to be assigned to relocate the AT&T fiber optic cables and/or two (2) direct buried copper cables after receiving payment from the County of Imperial.

**END SPECIAL CONDITION SECTION 8**

## 9. DEFERRED SUBMITTALS

Deferred Submittals to be prepared by the Contractor are listed on the Architectural Cover Sheet A0.00. The Contractor shall engage properly California Licensed Design Professionals, as required, to prepare submittal documents for the deferred submittal items. The deferred submittals shall be comprehensive and include all required shop drawings, details, specifications and callouts for the construction of the required deferred submittal item. The deferred submittals shall be prepared in conformance with California Building Code, 2019 and the other pertinent codes including but not limited to the California Fire Code, National Fire Protection Association 13, National Fire Alarm and Signalization Code of California and other codes as adopted by the County of Imperial Planning and Development Services – Building Division. Questions regarding the required and most current codes required for the deferred submittal preparation can be directed to Sergio Rubio, Building Division Manager, Imperial County Planning & Development Services at telephone number (442) 265-1736 or e-mail address: [sergiorubio@co.imperial.ca.us](mailto:sergiorubio@co.imperial.ca.us).



**END SPECIAL CONDITION SECTION 9**

## 10. PROJECT SIGN

The Contractor shall be required to furnish and install signs of the project. The sign layout shall be submitted to the Construction Manager as a submittal document for review and approval by the Engineer.

1. California requires a project identity sign for all construction projects in the State of California. At a minimum this sign must have the project name, the awarding agencies' information, the funding agencies' information. The project identity sign shall be installed at locations designated by the Construction Manager.
2. California requires a contractor's identity sign for all construction projects in the State of California. At a minimum this sign must have the Contractor's name, address, telephone number, State Contractor's License number and an after hour's emergency telephone number for safety, law enforcement, and fire emergencies. The Contractor's identity sign shall be installed at locations designated by the Construction Manager.
3. California and Federal labor laws require employee notices and posters be provided at all project sites that employ workers. Federal labor laws for Public Works projects require the current Federal Wage Decisions to be posted and maintained at the project site for the duration of a construction project. California labor laws for Public Works projects require the current State Wage Decisions to be posted and maintained at the project site for the duration of the construction project. In addition there are EEO, OSHA and other required postings to be posted and maintained at the project site for the duration of the construction project.
4. A clear Plexiglass plate is to be placed over the sign to protect the posters from the elements.
5. The Contractor is responsible for providing, installing and maintaining the project signs required by this section. The Project signs shall be submitted to the Construction Manager as a submittal document for review and approval by the Engineer. The Project signs are to be erected at the project site prior to commencement of any work activities. The Project signs are to remain posted for the entire duration of the construction project.

- Below is a typical project identity sign to include the project name, credit to the State and/or Federal grant agencies and the awarding agency and include the project cost and other items required by the grant agency.
- Below is a typical contractor identity sign.

<p><b>THIS PROJECT IS ADMINISTERED BY THE COUNTY OF IMPERIAL, WITH FUNDING FROM THE CALIFORNIA DEPARTMENT OF HOUSING &amp; COMMUNITY DEVELOPMENT'S (HCD) COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG) PROGRAM</b></p> <p>IMPERIAL COUNTY 2799 South 4th Street El Centro, CA 92243 (442) 265-1104</p>  	<p>CONTRACTOR'S NAME BUSINESS ADDRESS BUSINESS PHONE # STATE CONTRACTOR'S LICENSE # EMERGENCY AFTER HOURS #</p>
--	---

- Project identity sign to be placed on white background with black lettering.
- Provide and install logos.
- Sign to measure at a minimum 48" wide and 36" high.
- Both signs may be incorporated into one sign 8' x 4'.
- Provide art work as required by Grant Agency.
- Contractors Identity sign to be placed on white background with black lettering.
- Sign to measure a minimum 36" wide and 36" high

**END SPECIAL CONDITION SECTION 10**



## **11. CONTRACTORS APPLICATION FOR PAYMENT**

The Contractors Application for Payment Form on the following pages shall be used to process the Contractor's Payment Requests for this project.

**END OF SPECIAL CONDITION SECTION NUMBER 11**

**24. CONTRACTOR'S APPLICATION FOR PAYMENT NO. \_\_\_\_\_**

	Application Period:	Application Date:
To (Owner): <b>County of Imperial</b>	From (Contractor):	Via: <b>Imperial County Workforce &amp; Economic Development</b>
Project: <b>Niland Public Safety Facility</b>	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.: <b>821.029</b>

**APPLICATION FOR PAYMENT**

**Change Order Summary**

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE ORDERS		

<b>1. ORIGINAL CONTRACT PRICE</b> .....		\$ _____
<b>2. Net change by Change Orders</b> .....		\$ _____
<b>3. CURRENT CONTRACT PRICE (Line 1 ± 2)</b> .....		\$ _____
<b>4. TOTAL COMPLETED AND STORED TO DATE (Column F on Progress Estimate)</b> .....		\$ _____
<b>5. RETAINAGE:</b>		
<b>a. % x \$ Work Completed</b> .....		\$ _____
<b>b. % x \$ Stored Material</b> .....		\$ _____
<b>c. Total Retainage (Line 5a + Line 5b)</b> .....		\$ _____
<b>6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)</b> .....		\$ _____
<b>7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)</b>		\$ _____
<b>8. AMOUNT DUE THIS APPLICATION</b> .....		\$ _____
<b>9. BALANCE TO FINISH, PLUS RETAINAGE (Column G on Progress Estimate + Line 5 above)</b> .....		\$ _____

**CONTRACTOR'S CERTIFICATION**

The undersigned Contractor certifies that: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Payment of: \$ \_\_\_\_\_  
 \_\_\_\_\_  
 (Line 8 or other - attach explanation of other amount)  
 is recommended by: \_\_\_\_\_ (Date)  
 \_\_\_\_\_ (Engineer)

Payment of: \$ \_\_\_\_\_  
 \_\_\_\_\_  
 (Line 8 or other - attach explanation of other amount)

		is approved by: _____	
		(Owner)	(Date)
By:	Date:	Approved by: _____	
		Funding Agency (if applicable)	(Date)

**PROGRESS ESTIMATE**

**CONTRACTOR'S APPLICATION**

For (contract):						Application Number:		
Application Period:						Application Date:		
A		B	Work Completed		E	F		G
Item		Scheduled Value	C	D	Materials Presently Stored (not in C or D)	Total Completed and Stored to Date (C + D + E)	%	Balance to Finish (B - F)
Specification Section No.	Description		From Previous Application (C + D)	This Period		(E)	B	
<b>TOTALS</b>								

**PROGRESS ESTIMATE**

**CONTRACTOR'S APPLICATION**

For (contract):							Application Number:			
Application Period:							Application Date:			
A		B	C	D	E	F		G		
Bid Item No.	Description	Bid Quantity	Unit Price	Bid Value	Estimated Quantity Installed	Value	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	% (F) B	Balance to Finish (B - F)
	<b>TOTALS</b>									

**STORED MATERIAL SUMMARY**

**CONTRACTOR'S APPLICATION**

For (contract):					Application Number:				
Application Period:					Application Date:				
A	B	C	D		E		F		G
Invoice No.	Shop Drawing Transmittal No.	Materials Description	Stored Previously		Stored this Month		Incorporated in Work		Materials Remaining in Storage (\$) (D + E - F)
			Date (Month/Year)	Amount (\$)	Amount (\$)	Subtotal	Date (Month/Year)	Amount (\$)	
		<b>TOTALS</b>							

## 12. CHANGE ORDER INSTRUCTIONS AND FORM

### Change Order Instruction

#### A. *General Information*

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Time. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if the changes affect Price or Time.

Changes that affect Contract Price or Contract Time should be addressed by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Time, a Field Order should be used.

#### B. *Completing the Change Order Form*

The Engineer or Construction Manager normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by the Contractor, or requests from the Owner, or both.

Once the Engineer or Construction Manager has completed and signed the form, all copies should be sent to the Owner or the Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. The Engineer or Construction Manager should make distribution of executed copies after approval by both parties.

If a change only applies to price or to time, cross out the part of the tabulation that does not apply.

**Change Order Form**

No. \_\_\_\_\_

Date of Issuance: \_\_\_\_\_

Effective Date: \_\_\_\_\_

Project: <b>Niland Public Safety Facility</b>	Owner: <b>County of Imperial</b>	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:
		<b>821.029</b>

**The Contract Documents are modified as follows upon execution of this Change Order:**

Description: \_\_\_\_\_

Attachments: (List documents supporting change): \_\_\_\_\_

<b>CHANGE IN CONTRACT PRICE:</b>	<b>CHANGE IN CONTRACT TIMES:</b>
----------------------------------	----------------------------------

Original Contract Price:  \$ _____	Original Contract <input type="checkbox"/> Working days <input type="checkbox"/> Calendar days Substantial completion (days or date): _____ Ready for final payment (days or date): _____
--	---

[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____:  \$ _____	[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____:  Substantial completion (days): _____ Ready for final payment (days): _____
--	---

Contract Price prior to this Change Order:  \$ _____	Contract Times prior to this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
--	---

[Increase] [Decrease] of this Change Order:  \$ _____	[Increase] [Decrease] of this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
---	--

Contract Price incorporating this Change Order:  \$ _____	Contract Times with all approved Change Orders: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
---	--

<b>RECOMMENDED:</b>	<b>ACCEPTED:</b>	<b>ACCEPTED:</b>
By: _____ Engineer (Authorized Signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Date: _____	Date: _____	Date: _____
Approved by Funding Agency (if applicable):	Date: _____	Date: _____

**END SPECIAL CONDITION SECTION 12**

### **13. GEOTECHNICAL REPORT**

The Geotechnical Report for the design and construction of the Seeley Fire Station and Cooling Center, 1862 West Evan Hewes Highway, Seeley, California 92273 was prepared by Sierra Material Testing and Inspection; Project Number EC957, dated July 7, 2022. Technical Specification Document 00 31 32 contains a copy of the Geotechnical Report.

**END SPECIAL CONDITION SECTION 13**



## 14. GEOTECHNICAL TESTING AND CONCRETE CRITERIA

The contractor shall be responsible for the geotechnical testing and costs required for submittal preparation. The contractor shall also be responsible for geotechnical field testing and field testing costs during the construction period. The Civil Earthwork compaction field tests are listed by Earthwork Technical Specification 312300.3.10 on pages 312300-22 and 312300.23. The Civil Water and Sewer pipeline compaction field tests are listed by Trenching and Backfilling – Water and Sewer Pipelines Technical Specification 312350-3.06 on pages 312350-9 through 312350-11. Stormwater pipeline backfill compaction requirements are specified on Detail DD on plan sheet C2.03. Compaction tests shall be required along each 20 foot section of stormwater pipeline for each 9 inch lift of class 2 base placed. One compaction test shall be required for each 9 inch lift of backfill material placed around the stormwater manhole and stormwater catch basin illustrated on plan sheet C1.04. The Civil Asphalt Concrete paving field tests are listed by Asphalt Concrete Paving Specification 321200-3.01 on pages 321200-3 and 321200-4. As a minimum, a set of four (4) concrete cylinders and a slump test shall be completed each day concrete is placed at the project site. As a minimum one (1) set of concrete cylinders (4 cylinders per set) and a slump test shall be obtained for each 50 yards of concrete placed at the project site.

All pcc concrete used for this project shall contain 7 sacks of cement per cubic yard and attain a compressive strength of 5,000 psi after 28 days curing. Concrete slumps for all concrete placed at this project shall not exceed four (4) inches.

Architectural related material testing, as included in the Architectural Technical Specifications is to be completed and paid for by the contractor.

**END SPECIAL CONDITION SECTION 14**

## **15. AIR POLLUTION CONTROL DISTRICT REQUIREMENTS**

The Contractor shall be responsible for abiding with the latest edition of Regulation VIII set forth by Imperial County Air Pollution Control District. A copy of Regulation VIII is available from the Imperial County Air Pollution Control District.

The Contractor shall also be responsible for preparation and submission of a Construction Notification Form and Dust Control Plan to the County of Imperial Air Pollution Control District. The Construction Notification Form and Dust Control Plan shall also be posted at the Project Site. A copy of the Construction Notification Form and Dust Control Plan shall follow Regulation VIII.

The Imperial County Air Pollution Control District contact information is:

150 South Ninth Street  
El Centro, CA 92243  
Phone: 760-482-4606  
Fax: 760-353-9904  
[http://www.imperialcounty.net/AirPollution/  
Contacts:](http://www.imperialcounty.net/AirPollution/Contacts)  
Reyes Romero, Assistant Air Pollution Control Officer  
Monica Soucier, Division Manager Planning

The Contractor is to include the costs associated with the Air Pollution Control District requirements in the Bid.

**END SPECIAL CONDITION SECTION 15**

## 16. PROJECT CEQA AND NEPA DOCUMENTS AND REQUIREMENTS

An Environmental Assessment Determinations and Compliance Findings for U.S. Department of Housing and Urban Development assisted Projects was completed per 24 Code Federal Regulations (CFR) Part 58 for the Seeley Fire Station and Cooling Center. The NEPA Environmental Assessment was certified by the County of Imperial Executive Officer on 9/15/2020. A second Environmental Document, the CEQA Initial Study and Environmental Analysis – Mitigated Negative Declaration for the Seeley Fire Station and Cooling Center was adopted by the Imperial County Environmental Evaluation Committee (EEC) on November 19, 2020. The NEPA Environmental Assessment and CEQA Initial Study and Environmental Analysis are reviewed in greater Detail in Technical Specification Section 02 24 00, Project Environmental Controls. Technical Specification Section 02 24 00 attempts to highlight the mitigation requirements of the CEQA and NEPA documents; however, it is the responsibility of the Contractor to obtain the documents from the County of Imperial Work Force and Economic Development as listed in Technical Specification Section 02 24 00. It is the responsibility of the Contractor to comply with the CEQA and NEPA documents mitigation requirements during the project construction period.

The Contractor should note that Technical Specification Section 02 24 00 – 2, Mitigation Measures Biological Resources – MM – BIO 1 on page 02 24 00 – 2 states, “A pre-construction survey shall be conducted by a Biologist to identify any sensitive biological resources in the areas affected by construction.” The pre-construction survey is to occur shortly before construction activities are commenced. *The County of Imperial Work Force and Economic Development Agency will engage the services of a Biologist to conduct the pre-construction survey. The County of Imperial Work Force and Economic Development Agency will pay for the pre-construction survey. The contractor shall not start work at the project site until the pre-construction survey is complete and the Biologist and County of Imperial Work Force and Economic Development Agency Director approves the commencement of Construction Activities at the Project Site.*

**END SPECIAL CONDITION SECTION 16**

## 17. STORM WATER POLLUTION PREVENTION PLAN

The soil disturbance area resulted by the construction of the project will be more than 1 acre. A Stormwater Pollution Prevention Plan (SWPPP) was prepared during the project design period as required by the National Pollution Discharge Elimination System (NPDES) General Permit for construction activities. The SWPPP is included as a contract document item. Hard copy documents of the SWPPP are available by contacting the Holt Group, 1601 South Imperial Avenue, El Centro, California 92243 at phone number (760) 337-3883 or by email at [jack@theholtgroup.net](mailto:jack@theholtgroup.net). The contractor is responsible to implement the provisions of the SWPPP including the erosion control plans and best management practices (BMP's). The erosion control plans are included on improvement plan sheet C1.15. The contractor shall engage a Qualified SWPPP Practitioner (QSP) for site inspection and reporting services. The QSP shall assist the County of Imperial (Owner) in obtaining a Waste Discharge Identification Number (WDID). The QSP shall assist the County of Imperial in filing daily, quarterly, and annual reports, filing the Notice of Termination (NOT) at the project conclusion and all other required SWPPP documents through the Storm Water Multi Application and Report Tracking System (SMARTS). *The County of Imperial shall pay for all SWPPP and SMARTS filing fees. The contractor shall pay for all services of the QSP throughout the project duration.*

**END SPECIAL CONDITION SECTION 17**

## **18. FIRE TRUCK SIGN WITH SOLAR POWERED FLASHING BEACON AND REMOTE BEACON CONTROLLER**

A total of two (2) fire truck signs with flashing beacons and one (1) remote beacon controller are to be provided for this project. The fire truck signs with flashing beacons are “called out” by Signage and Striping Keynote 9 on improvement plan sheet C2.06.

The Carmanah R838, or an approved equal, remote beacon controller is to be mounted between the south roll up doors of the Apparatus Room. A 120 Volt, 1 phase, 60 hertz electrical receptacle has been illustrated on the Architectural and Electrical Improvement plans to provide an A.C. power source to the remote beacon controller. The contractor shall install A.C. circuitry to the remote beacon controller. The remote beacon controller shall be provided with a remote antenna. The remote antenna kit is to be used to locate the antenna above the south roll up Apparatus Bay Doors or Roof Facia area such that the Antenna has a direct signal to each of the two (2) fire truck sign solar operated flashing beacons. The remote antenna kit is supplied with a 35 foot coaxial extension cable to extend from the remote beacon controller to the antenna. The contractor shall install the antenna cable in an electrical conduit and provide junction boxes and other electrical items to accomplish the coaxial cable installation. The contractor shall provide any other miscellaneous support items or hardware to connect the antenna kit supplied bracket to the exterior of the building wall or facia.

The remote external controller located at least four (4) feet above the Apparatus Bay Floor shall be mounted to the interior building wall. The contractor shall provide a backboard with hardware for the mounting of the Remote Beacon Controller Unit. The remote beacon controller is supplied with a button on the exterior of the beacon controller. The flashing beacon lights mounted to the fire truck signs along Evan Hewes Highway will flash when activated by pressing the remote beacon controller button. The flashing beacon lights mounted to the fire truck signs will be de-activated when pressing the remote beacon controller button a second time.

It may be required for the County of Imperial to obtain a radio license to operate the solar powered flashing beacon and remote beacon controller. If it is necessary to obtain a radio license it will be applied for by the County of Imperial after the manufacturer of the solar powered flashing beacon and remote beacon controller is known and can be placed on the radio signal application forms. The Construction Manager will take the lead for the County of Imperial in applying for the radio license. The Construction Manager will monitor the processing and approval of the radio license. *The County of Imperial will pay for the application fee and other related fees for the radio license.*

The Contractor shall arrange for the manufacturer/supplier solar powered flashing beacon and remote beacon controller technician to be present for the start-up of the powered flashing beacon and remote beacon controller. The manufacturer/supplier technician shall review the system installation to ensure the system is properly constructed and connected prior to the start-up. The Contractor, Contractor's Electrical Subcontractor,

Construction Manager and designated County of Imperial Fire Department Personnel shall be present at the start-up of the solar powered flashing beacon and remote beacon controller. The Construction Manager shall confirm that any required radio signal license has been secured by the County of Imperial prior to the start-up of the solar powered flashing beacon and remote beacon controller system. After the initial start-up of the solar powered flashing beacon and remote beacon controller system the manufacturer/supplier technician shall review and establish the various remote beacon controller settings including but not limited to the solar flashing beacon time duration, nighttime dimming setting, ambient auto-adjust setting and radio channel synchronization setting. The settings shall be reviewed with the designated County of Imperial Fire Department Personnel, Contractor, Construction Manager and Contractor's Electrical Subcontractor. After the settings are initially established the manufacturer/supplier technician shall provide solar powered flashing beacon and remote beacon controller operation and maintenance training to the County of Imperial Fire Department Personnel.

The manufacturer/supplier technician shall be at the project site of an eight (8) hour period to complete the solar powered flashing beacon and remote beacon controller initial review, start-up and training. The manufacturer/supplier shall include all travel time, meals and lodging in the costs associated with the initial review, start-up and training. The contractor shall pay all costs for the manufacturer/supplier technician initial review, start-up and training and for all travel time, meals and lodging expenses.

**END SPECIAL CONDITION SECTION 18**



**Seeley Fire Station  
and  
Cooling Center**

**Project Manual**

**Technical  
Specifications**

**Volume 3 of 4**

**July 8, 2022**

**THG #542.088**

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## SECTION 00 11 50 PROJECT DESCRIPTION

The Seeley Fire Station and Cooling Center Project Site is in the unincorporated community of Seeley in Imperial County. Seeley is located 7.5 miles west of El Centro, California and is located near a Naval Air Facility (NAF El Centro). Seeley's 2010 population was 1,823. Seeley is primarily accessed from Drew Road which exits Interstate 8. Seeley is located approximately 1 ½ miles north of Interstate 8.

The County of Imperial has been awarded funds by the California Department of Housing and Community Development through its Community Development Block Grant (CDBG) Program for the Seeley Fire Station and Cooling Center Project under Grant 18-CDBG-12924. Per the conditions of the grant, the project is to be constructed and occupied by September 2023.

The Seeley Fire Station and Cooling Center is a one story 4,735 square foot pre-engineered metal building with stucco exterior panels. The Seeley Fire Station is comprised of an Apparatus Bay to accommodate two (2) fire trucks, a fire station with offices, lockers, washroom, restrooms, living quarters and server room and a Cooling Center. The 850 square foot Cooling Center shall be available to the public as a refuge for persons to access a cool space during the hot summer months. The Cooling Center Occupancy Capacity is 56 persons. The project will include an emergency power generator set to provide the facility emergency power in the event the normal power source fails.

The site improvements will include a pcc driveway entrance, asphalt concrete parking lots with a total of 23 parking spaces and two (2) handicap parking spaces and an asphalt concrete fire truck access roadway. The pcc driveway entrance, asphalt concrete parking lots and asphalt concrete fire truck access roadway shall be provided with lighting. There will be three (3) native earth retention basins to accept the stormwater generated by the project site. The project site improvements also include a Trash Enclosure and Project Entrance Sign.

The County of Imperial is the owner of the Seeley Fire Station and Cooling Center Project Site. The 2.47 acre project site is located along the north side of Evan Hewes Highway between Mount Signal Avenue and New River Boulevard. The existing project site is undeveloped and consists of native earth. It will be necessary to clear the entire site of brush and debris prior to commencing earthwork activities at the project site. The east portion of the project site (measuring approximately 234.24 feet x 270 feet = 63,245 square feet + or - or 1.45 Acres + or -) is to be developed for the construction of the Seeley Fire Station and Cooling Center Facility. The west portion of the project site (measuring approximately 190.35 feet x 233.15 feet = 44,380 square feet + or - or 1.02 Acres + or -) will not be developed; however, it is to be cleared and used as a borrow area or area to accept native earth from the developed project site. A portion of the undeveloped area is to be used as a staging area, contractor parking area and area to locate the construction project trailer. At the conclusion of the project the undeveloped site is to be cleared of construction related material and items. The existing native earth surface is to be leveled to an elevation across the undeveloped site within 0.10 feet. The undeveloped site native surface is to be compacted to 85 percent of maximum density per ASTM D1557 and bladed smooth.

The existing native earth developed area is approximately 2 feet below the A.C. pavement centerline of Evan Hewes Highway. The finish floor of the new Seeley Fire Station and Cooling Center is to be located approximately 1 foot higher than the centerline pavement of Evan Hewes Highway. The

Geotechnical Report for this project prepared by Sierra Material Testing and Inspections (Project No. EC957 dated July 7, 2022) notes that the upper 3 feet of the existing native soil consists of relatively loose fill and recommends this loose material be recompacted.

The Earthwork Technical Specifications requires the upper 3 feet of the entire developed area existing native surface be moisture conditioned and compacted in lifts as detailed within the specification. The existing upper 3 feet of native material will notice a high shrinkage percentage when compacted per the specifications. The undeveloped site can be used as a borrow area to obtain additional native material to compensate for the native earth shrinkage. Native earth obtained from the undeveloped site shall be obtained in even 1 foot lifts across the entire undeveloped area project site. The final native earth surface is to be brought to an elevation of 958.00 across the entire project site development area. Granular sand or class 2 base material is to be imported and compacted as required by the Earthwork Technical Specifications beneath the PCC building slab and foundation, pcc infrastructure and asphalt cement pavement infrastructure.

A Stormwater Pollution Prevention Plan (SWPPP) was prepared during the project design period as required by the National Pollution Discharge Elimination System (NPDES) General Permit for construction activities. The SWPPP is included as a contract document item. The contractor is responsible to implement the provisions of the SWPPP including the erosion control plans and best management practices (BMP's). The erosion control plans are included with the improvement plans. The contractor shall engage a Qualified SWPPP Practitioner (QSP) for site inspection and reporting services. The QSP shall assist the County of Imperial (Owner) in obtaining a Waste Discharge Identification Number (WDID). The QSP shall assist the County of Imperial in filing daily, quarterly, and annual reports, filing the Notice of Termination (NOT) at the project conclusion and all other required SWPPP documents through the Storm Water Multi Application and Report Tracking System (SMARTS). The County of Imperial shall pay for all SWPPP and SMARTS filing fees. The contractor shall pay for services of the QSP throughout the project duration.

The Seeley Fire Station and Cooling Center project will require electrical, gas, potable water and sanitary sewer services. Applications for the utility services were submitted to the utility agencies during the design period.

A Customer Service Proposal (CSP) was submitted to the Imperial Irrigation District Energy Department by the County of Imperial during the project design phase. The IID Energy Department completes Electrical Design Plans for providing primary and secondary electrical power to the project. The IID Energy Department personnel install the project primary and secondary electrical facilities during the project construction period. The completed CSP plans, and costs will be issued by the IID to the County of Imperial. The County of Imperial will forward the completed and approved IID CSP plans and costs to the Contractor. The contractor shall pay for the costs of the CSP construction related fees including the IID Electrical personal, electrical facilities, administrative fees and all other construction related items. The contractor shall include CSP construction related fees in the amount of \$20,000 in the Bid. If the actual IID CSP fees are greater than \$20,000 a positive change order will be processed compensating the contractor for the cost of the CSP fee more than \$20,000. If the actual IID CSP fee is less than \$20,000 a negative change order will be processed compensating the County of Imperial for the difference between the \$20,000 CSP bid amount and the actual CSP fee.

A Southern California Gas (SCG) Application was submitted for the Fire Station and Cooling Center gas related services during the design phase. The contractor shall pay for the costs of the SCG service installation and related fees. SCG personnel will install a new gas service from the existing gas pipeline along the east side of the project to the gas service point of connection (POC) near the southeast corner of the Seeley Fire Station and Cooling Center Building. The contractor shall include a SCG fee of \$15,000 for the construction of the gas service pipeline to the POC and for the payment

of any other SCG fees within the Bid amount. If the actual SCG fees are greater than \$15,000 a positive change order will be processed compensating the contractor for the cost of the SCG fee in excess of \$15,000. If the actual SCG fees are less than \$15,000 a negative change order will be processed compensating the County of Imperial for the difference between the \$15,000 SCG service installation and related fee bid amount and the actual SCG fee.

Water and sanitary sewer services for this project shall be supplied by the Seeley County Water District. An 8 inch water main pipeline extension and 8 inch sanitary sewer main pipeline extension will be required along Evan Hewes Highway from Mount Signal Drive to the project site to service the Seeley Fire Station and Cooling Center. See Civil plan and profile plan sheet 18. The water main and sanitary sewer main will be constructed in Imperial County Right of Way. A sanitary sewer lateral, domestic water service extension, fire hydrant water pipeline extension and fire sprinkler system water pipeline extension will also be located in Evan Hewes Highway Right of Way. The Improvement Plans were submitted to the County of Imperial Public Works Department (ICDPW) for review during the project design for the construction of the water and sanitary sewer pipelines within Imperial County Right of Way. The project driveway entrance improvements, stormwater pipeline improvement beneath the driveway entrance and native earth stormwater swale grading along the north and south sides of Evan Hewes Highway illustrated on the plans were also reviewed by ICDPW. An underground fiber optic cable is located along the north side of Evan Hewes Highway as illustrated on the plans. AT&T was contacted during the project design to discuss the possible conflict between the fiber optic cable and the new Stormwater Pipeline to be installed beneath the project pcc driveway entrance. AT&T researched the existing utilities along the north side of the Evan Hewes Highway and the Seeley Fire Station and Cooling Center site. There are two existing AT&T direct buried copper cables and an existing fiber optic cable located along the north side of Evan Hewes Highway which will likely require relocation by AT&T. The contractor shall complete potholing of the existing buried copper cables and fiber optic cable in conjunction with AT&T forces within 30 days after the issuance of the Notice to Proceed. The contractor shall include \$10,000 in the bid amount to pay AT&T for the relocation of the buried copper cables and fiber optic cable. If the actual AT&T fee to relocate the copper and fiber optic cables is greater than \$10,000 then a positive change order will be processed compensating the contractor for the additional cost greater than \$10,000 to relocate the cables. If the actual AT&T fee to relocate the cables is less than \$10,000 then a negative change order will be processed compensating the County of Imperial for the difference between the actual fee and \$10,000 which the contractor included in the bid. The contractor's bid amount shall include a County of Imperial Public Works Department Encroachment Permit Fee of \$5,000 for the issuance of the Encroachment Permit to the Contractor and associated construction inspection fees. The Contractor shall also be required to provide the County of Imperial Public Works Department required insurance. If the actual Encroachment Permit fees are greater than \$5,000 a positive change order will be processed compensating the contractor for the cost of the Encroachment Permit fee in excess of \$5,000. If the actual Encroachment Permit fee is less than \$5,000 a negative change order will be processed compensating the County of Imperial for the difference between the \$5,000 bid item amount and the actual Encroachment Permit fee.

The Contractor shall install the fire hydrant water pipeline service, sprinkler water pipeline and backflow preventer, domestic water meter service and backflow preventer and sanitary sewer lateral extension within the Seeley Fire Station and Cooling Center Project Site as illustrated on the approved improvement plans. The Seeley County Water District water and sewer fees for this project were paid by the County of Imperial during the project design phase. The contractor shall coordinate with the Seeley County Water District representatives and Construction Manager during the construction period for the inspection and approval of the project water and sewer services in accordance with the Technical Specifications.

**END OF SECTION**

**DOCUMENT 00 31 32**  
**GEOTECHNICAL REPORT**

**1.01 GEOTECHNICAL REPORT**

- A. A geotechnical investigation report has been prepared by the firm of Sierra Material Testing and Inspection. This report is identified as “Report of Geotechnical Investigation – County of Imperial Fire Station and Cooling Center, Seeley, California”, Project EC957, and is dated July 7, 2022.
  - 1. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. The Owner the Architect, and the Architect's consultants, are not responsible for interpretations or conclusions drawn from the data.
  - 2. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for the Contractor's convenience and are intended to supplement rather than serve in lieu of the Contractor's own investigations. They are made available for the Contractor's convenience and information. This Document and its attachments are not part of the Contract Documents.
- B. A copy of the report is attached and shall be referred to for a complete description of the conditions at the site.

**1.02 CONTRACTOR'S USE OF GEOTECHNICAL REPORT**

- A. This report was obtained only for use by the Owner, the Engineer, the Architect, the Architect's consultants, in designing building foundations and pavements and is not a part of the Contract Documents. The report and log of borings are made available for the Contractor's convenience and information, but are not a warranty of the subsurface conditions.
- B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Engineer, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.
- C. The Contractor shall review the applicable portions of the geotechnical investigation report, appropriate specification sections of this Project Manual, and the Drawings. The Engineer and Architect shall be notified of any discrepancies immediately. In the event of a conflict between the applicable portions of the geotechnical investigation report and the technical sections, the stricter requirement shall govern.
- D. The Contractor shall visit the site and acquaint himself with site conditions. Prior to bidding, The Contractor may make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.



- E. Make no deviations from the recommendations of the geotechnical investigation report and the requirements of the Contract Documents without specific and written approval of the Owner or Architect.

**END OF DOCUMENT**



**REPORT OF GEOTECHNICAL INVESTIGATION  
COUNTY OF IMPERIAL FIRE STATION AND COOLING CENTER  
SEELEY, CALIFORNIA**

Prepared for

Mr. Jack Holt, PE  
The Holt Group  
1601 N. Imperial Avenue  
El Centro, CA 92243

by

SIERRA MATERIAL TESTING AND INSPECTION  
Project No. EC957

July 7, 2022



July 7 2022

**SUBJECT: REPORT OF GEOTECHNICAL INVESTIGATION  
County of Imperial Fire Station and Cooling Center  
Seeley, CA**

Dear Mr. Jack Holt:

The following report presents the findings, conclusions, and recommendations of our geotechnical investigation for the proposed County of Imperial Fire Station and Cooling Center in Seeley, California. In general, our findings indicate that the site is underlain lacustrine deposits with no free groundwater encountered within approximately 20 feet below existing grades. There were no unusual or special conditions apparent in our investigation which would preclude the proposed improvements. Our findings and geotechnical recommendations are presented in the following report.

We appreciate this opportunity to provide our professional services. If you have any questions or require additional services, please do not hesitate to contact us.

**Sierra Material Testing & Inspection, Inc.**

A handwritten signature in blue ink, appearing to read "Alex Rojas".

Alex Rojas  
Area Manager

**REPORT OF GEOTECHNICAL INVESTIGATION  
County of Imperial Fire Station and Cooling Center  
Seeley, California**

**1 INTRODUCTION**

This report presents the results of our geotechnical investigation for the proposed New Fire Station and Cooling Center to be located at W. Evan Hewes Highway and Mt. Signal Avenue in Seeley, California. The purpose of this investigation was to characterize the pertinent geotechnical conditions at the site, and to provide recommendations for the geotechnical aspects of construction and foundation design. The conclusions presented in this report are based on field exploration, laboratory testing, engineering analysis, and our previous experience with similar soils and geologic conditions.

**2 SCOPE OF SERVICES**

To evaluate potential geotechnical impacts to the development and provide recommendations for grading and foundation design, the following services were provided.

- A reconnaissance of the surface characteristics of the site and a review of available maps and geologic reports relevant to the site.
- A subsurface exploration of the site including 4 exploratory trenches excavated using an excavator. The approximate locations of the explorations are shown on the Exploration Plan, Figure 1. Logs are presented in the figures of Appendix A.
- Laboratory testing of selected samples collected during the subsurface exploration. The laboratory test results are summarized in Appendix B.
- Assessment of general seismic conditions and geologic hazards affecting the site vicinity, and their likely impact on the project.
- Engineering analysis to make recommendations for the geotechnical aspects of site preparation, remedial earthwork, foundation design, retaining wall design, and slab design.

- Preparation of this report summarizing our findings, conclusions, and recommendations.

### **3 SITE DESCRIPTION**

The subject site is located at W Evan Hewes Highway and Mt. Signal Avenue in Seeley, California.

### **4 PROPOSED DEVELOPMENT**

The project is for a proposed new Fire Station and Cooling Center consisting of a building of approximately 4,200 square feet along with paved parking and access drives. The site configuration and proposed development are shown on the following Figure 1.

### **5 GEOLOGY AND SUBSURFACE CONDITIONS**

The site is situated in the Imperial Valley in southern California. The valley was formed by active rifting between the Pacific and North American Plates. As the plates pulled apart, the area filled with periods of marine and non-marine sedimentary influxes. The area has been dominated by non-marine lake deposits over the past 10,000 years. Currently, the site is underlain by local fills and Quaternary lacustrine (lake) deposits:

Based on experience in the area, and three exploration extended to approximately 10 feet below existing grade, the following conditions are expected to characterize the site:

#### **5.1 Fill**

Localized fill materials were encountered in the upper 3. The soil consisted of moderate brown, dry, loose, silty clay.

## **5.2 Lacustrine Deposits**

The entire site is underlain by Quaternary age lacustrine deposits. The sediments consist of moist, stiff, fat clay (United Soil Classifications CH). The clay is expansive.

## **5.3 Groundwater**

Free groundwater was not encountered in the exploration borings. However, shallow perched groundwater is a common occurrence in the project vicinity. It should be recognized that groundwater and perched elevations may fluctuate with time due to changes in flow within the waterways, or due to changes in irrigation practices or antecedent rainfall.

# **6 GEOLOGIC HAZARD**

The subject site is located within one of the most seismically active areas in California. In general, the Salton Trough is the zone of transition between the ocean floor spreading regime in the Gulf of California, and the right-lateral, strike-slip regime of the San Andreas Fault system. Geologic hazards at the site are generally associated with the potential for strong ground shaking, liquefaction, and the associated post-liquefaction settlement. Each of the geologic hazards is discussed below.

## **6.1 Ground Rupture**

Ground rupture is the result of movement on an active fault reaching the surface. The subject site is not located within an Alquist-Priolo Earthquake Fault Zone, nor do zones project toward the project site. No evidence of active or potentially active faulting was encountered during our subsurface investigation. Consequently, ground rupture is not considered to be a substantial geologic hazard at the site.

## **6.2 Seismicity**

The nearest active fault is the Imperial Fault, located about 4.3 km east of the site. The Imperial fault is one of the most active in California. The Imperial fault ruptured in 1940

with a moment magnitude ( $M_w$ ) of 6.4, and again in 1979 ( $M_w$  of 6.9). The California Geologic Survey estimates a slip rate of 20 mm per year, and a maximum magnitude of 7.0 for the Imperial fault. Seismic design parameters, based on the California Building Code, are provided in the Foundations section of this report.

### **6.3 Liquefaction**

Liquefaction is a process in which soil grains in a saturated sandy deposit lose contact due to earthquakes or other sources of ground shaking. The soil deposit temporarily behaves as a viscous fluid; pore pressures rise, and the strength of the deposit is greatly diminished. Liquefaction is often accompanied by sand boils, lateral spread, and post-liquefaction settlement as the pore pressures dissipate. Liquefiable soils typically consist of cohesionless sands and silts that are loose to medium dense, and saturated. Clayey soils do not liquefy because the soil skeleton is not supported by grain to grain contact, and is therefore not subject to densification by shaking.

The site is located within an area which has previously been shown as potentially susceptible to liquefaction. Liquefaction during earthquakes on the Imperial fault was widespread in Imperial County. The occurrences were typically located in river drainages or adjacent to canals. The liquefiable sites contained predominately loose sandy soils, or sequences of thick sandy layers within finer grained soils.

Previous analyses associated with projects in the Imperial Valley indicate that zones of sand and silt within the lacustrine deposits have the potential for liquefaction given the peak ground accelerations anticipated. For the purposes of this project, we are considering the site to have a liquefaction risk. The potentially liquefiable zones of soil are expected to consist of localized beds of sands with the clay and are located beyond the depth of foundation influence. Therefore, loss of bearing support is not considered to be a significant risk, but broad settlement associated with the liquefaction is assumed. Based on experience with past analyses, we are assuming that the proposed structure may experience post-liquefaction differential settlement of up to about 1½ inches in 40 feet.

#### **6.4 Landslides and Lateral Spreads**

Lateral spreading is the result of liquefaction or plastic deformation occurring on gently sloping ground during an earthquake. Typically, the event requires an unsupported, steep cut or scarp at the toe of the failure area that allows the initial lateral displacement. Evidence of ancient landslides or slope instabilities was not observed at the site during our investigation. In our opinion, the potential for landslides and lateral spreads to adversely affect the proposed development is negligible

#### **6.5 Tsunamis, Seiches, Flooding**

The subject site is situated roughly within a few feet of mean sea level. This suggests that the potential may exist for inundation in the event of a tsunami within the Gulf of California. There are no records which indicate that tsunamis have impacted the Imperial Valley in the last several hundred years. The distance between the subject site and the gulf most likely precludes damage due to seismically induced waves (tsunamis) or seiches. Furthermore, there are no large bodies of water in close proximity to the site. Consequently, the potential for earthquake induced flooding is also considered to be low.

### **7 CONCLUSIONS**

It is our opinion that there are no significant geotechnical constraints that would preclude the development as planned. Several geotechnical factors exist which should be addressed prior to construction.

- The prevailing soil at the site is expansive. Expansive soils increase in volume when going from a dryer to a wetter state. The force exerted is sufficient to heave and crack on-grade slabs and shallow foundations. Recommendations to help mitigate expansive heave are provided in ensuing sections of this report.



- The upper 3 feet of soil consists of fill that is relatively loose. It is recommended that this material be recompactd.
- The potential exists for earthquake induced liquefaction of the granular lacustrine deposits. We estimate that the proposed structures may experience post-liquefaction differential settlement of up to approximately 1½ inches in 40 feet.
- There are no known active faults underlying the project site. Likely seismic hazards that may occur at the site would generally be associated with strong ground shaking due to an earthquake on regional faults. Such hazards are typically mitigated by structural design in general accordance with the applicable building codes.

## **8 RECOMMENDATIONS**

The remainder of this report presents recommendations regarding earthwork construction and design of the proposed foundations and improvements. These recommendations are based on empirical and analytical methods typical of the standard of practice in southern California. If these recommendations do not cover a specific feature of the project, please contact our office for amendments.

### **8.1 Excavation and Grading Observation**

Foundation and grading excavations should be observed by Sierra Material Testing & Inspection, Inc. During grading, Sierra Material Testing & Inspection, Inc. should provide observation and testing services continuously. Such observations are considered essential to identify field conditions that differ from those anticipated by the preliminary investigation, to adjust designs to actual field conditions, and to determine that the grading is accomplished in general accordance with the recommendations of this report. Recommendations presented in this report are contingent upon Sierra Material Testing & Inspection, Inc. performing such services. Our personnel should perform sufficient testing of fill and backfill during grading and improvement operations to support our professional opinion as to compliance with the compaction recommendations.

## **8.2 Expansive Soil Considerations for On-Grade Slabs**

Alternatives for mitigating the effects of expansive on the proposed on-grade slabs heave include 1) removal and replacement of the expansive soil in the subgrade area with low expansion import, and 2) the construction of a thickened, reinforced slab on the existing subgrade with perimeter moisture control. Alternative 1 generally provides less risk of heave and cracking and this benefit would need to be weighed against the increased construction costs. Alternative 2 will result in some added risk that includes localized heave of the slab, even if no significant cracking occurs. This may cause an issue where the slab adjoins on entry way where an elevation differential would not be acceptable. In other areas where the slab is more isolated, this may not be an issue. Long-term heave of one inch is not unusual on expansive soil.

**8.2.1 Alternative A:** The subgrade soil within the building footprint should be removed to a depth of three feet below proposed subgrade. The resulting soil should be filled with imported soil having an expansion index of 20 or less. The excavation should be backfilled with uniform lifts, compacted to at least 90% relative compaction, based on ASTM D1557. The new slab should be at least 5 inches in actual thickness, reinforced with at least #3 bars, on 18-inch centers, each way.

**8.2.2 Alternative B:** The new slab on existing subgrade should be at least 6 inches in thickness and be reinforced with at least #4 bars on 12-inch centers, each way. A deepened footing along the perimeter edge of the slab is recommended to help maintain stable moisture conditions in the subgrade area. The footing should extend at least 30-inches below exterior subgrade. Prior to placing concrete, the subgrade soil should not be allowed to dry and desiccate. Periodic sprinkling should be performed as necessary to keep the soil moist.

## **8.3 Loose Surface Soil**

The upper 3 feet of soil consists or relatively loose fill. It is recommended that this material be re-compacted. If Alternative 1, above, is used, this will be accomplished in the process. If Alternative 2 is used, it is recommended that the upper two foot of subgrade be removed and stockpiled. The upper 12 inches in the resulting excavation

should be scarified, brought to optimum moisture, and uniformly compacted to at least 90% relative compaction based on ASTM D1557. This recommendation should apply to the area within a perimeter of 5 feet outside the building perimeter.

#### **8.4 Fill Compaction**

The minimum relative compaction recommended for fill is 90 percent of the maximum dry density based on ASTM D1557. Sierra Material Testing & Inspection Incorporated should perform sufficient observation and testing of fill so that an opinion can be rendered as to the compaction achieved. All fill and backfill to be placed in association with site development should be accomplished within 2 percentage points of optimum moisture content using equipment that is capable of producing a uniformly compacted product. Fill materials at less than optimum moisture should be uniformly mixed with water to achieve moisture conditions above optimum. Fill materials that are too wet should be aerated or mixed with drier material to achieve uniformly moisture-conditioned soil.

#### **8.5 Surface Drainage**

Foundation and slab performance depends greatly on how well surface runoff drains from the site. This is true both during construction and over the entire life of the structure. The ground surface around structures should be graded so that water flows rapidly away from the structures without ponding. The surface gradient needed to achieve this may depend on the prevailing landscape. The project engineer should consider these aspects in design. Planters should be built so that water from them will not seep into the foundation, slab, or pavement areas. If roof drains are used, their drainage should be channeled by pipe to storm drains, or discharge at least 10 feet from buildings. Irrigation should be limited to the minimum necessary to sustain landscaping plants.

#### **8.6 Foundations**

In general, the design of the foundations for the proposed structures should be performed by the project structural engineer, incorporating the following geotechnical parameters. The following foundation recommendations should be considered preliminary, and subject to revision based on the conditions observed during grading.

8.6.1 Foundations Using Alternative 'A' Site Preparation:

Allowable Bearing:	2,000 lbs/ft <sup>2</sup> ( $\frac{1}{3}$ increase for wind or seismic)
Minimum Footing Width:	12 inches
Minimum Footing Depth:	18 inches below lowest adjacent soil grade
Minimum Reinforcement:	Two No. 5 bars at both top and bottom in continuous footings.

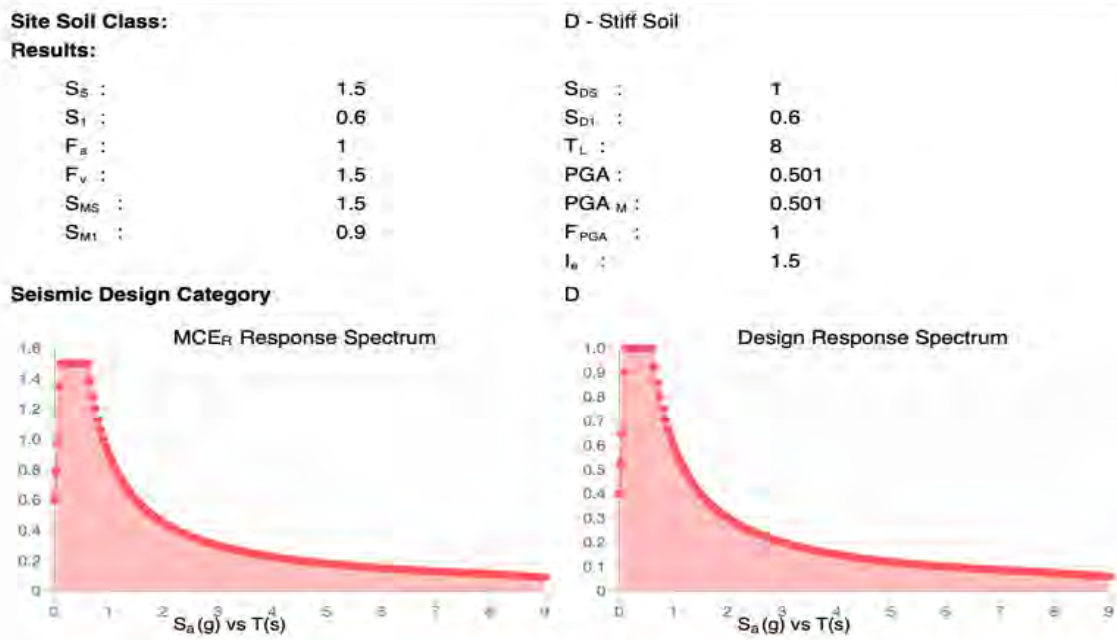
8.6.2 Foundations Using Alternative 'B' Site Preparation:

Allowable Bearing:	1,500 lbs/ft <sup>2</sup> ( $\frac{1}{3}$ increase for wind or seismic)
Minimum Footing Width:	12 inches
Minimum Footing Depth:	30 inches below lowest adjacent soil grade
Minimum Reinforcement:	Two No. 5 bars at both top and bottom in continuous footings.

8.6.3 Lateral Resistance: Lateral loads may be resisted by friction between the bottoms of footings and slabs and the supporting soil, as well as passive pressure from the portion of vertical foundation members embedded into compacted fill. A coefficient of friction of 0.25 and a passive pressure of 300 psf per foot of depth are.

8.6.4 Settlement: Total and differential settlements of the proposed additions from the allowable bearing loads are not expected to exceed  $\frac{3}{4}$  inch, and  $\frac{1}{2}$  inch in 40 feet, respectively. In addition, the foundations may experience post-liquefaction differential settlements of up to 1 $\frac{1}{2}$  inches in 40 feet, as described in Section 6.3.

8.6.5 Seismic Design: Based on our experience, it is our opinion that a California Building Code (CBC) Site Class D would be most applicable to the general site conditions. Shear wave velocity measurements taken at many CPT soundings conducted in the Valley indicate an average shear wave velocity of 740 ft/s. Although liquefaction may occur at depth, it is our opinion that the site will generally behave as a deep soil site with respect to the seismic response of proposed structure. Design should comply with the latest edition of the CBC for site Class D for a Risk Category IV.



### **8.7 Interior On-Grade Slabs**

On-grade slabs should be designed by the project design engineer. A modulus of subgrade reaction of 150 lb/in<sup>3</sup> may be assumed for elastic design.

Slabs on non-expansive soil cap:	5 inches thick (actual), reinforced with at least No. 3 bars on 18-inch centers, each way.
Slabs on native expansive soil:	6 inches thick (actual), reinforced with at least No. 3 bars on 12-inch centers, each way

**8.7.1 Moisture Protection for Interior Slab:** Concrete slabs constructed on grade ultimately cause the moisture content to rise in the underlying soil. This results from continued capillary rise and the termination of normal evapotranspiration. Because normal concrete is permeable, the moisture will eventually penetrate the slab. Excessive moisture may cause mildewed carpets, lifting or discoloration of floor tiles, or similar problems. To decrease the likelihood of problems related to damp slabs, suitable moisture protection measures should be used where moisture sensitive floor coverings, moisture sensitive equipment, or other factors warrant.

The most commonly moisture barrier previously used in southern California consists of two to four inches of clean sand or pea gravel covered by 'visqueen' plastic sheeting. Two inches of sand are placed over the plastic to decrease concrete curing problems. It has been our experience that such systems will transmit approximately 6 to 12 pounds of moisture per 1000 square feet per day. The architect should review the estimated moisture transmission rates, since these values may be excessive for some applications, such as sheet vinyl, wood flooring, vinyl tiles, or carpeting with impermeable backings that use water soluble adhesives. Sheet vinyl may develop discoloration or adhesive degradation due to excessive moisture. Wood flooring may swell and dome if exposed to excessive moisture. The architect should specify an appropriate

moisture barrier based on the allowable moisture transmission rate for the flooring. This may require a “vapor barrier” rather than a “vapor retarder”.

### **8.8 Exterior Flatwork**

Exterior slabs and sidewalks should be at least 5 inches thick. Crack control joints should be placed on a maximum spacing of 10 foot centers, each way, for slabs, and 5 feet for sidewalks. The potential for differential movement across the joints may be reduced by using reinforcement. We recommend at least 6x6 W2.9/W2.9 welded wire fabric, or No. 3 rebars on 18-inch centers, each way, placed securely at mid-height of the slab section

### **8.9 Reactive Soils**

A sample of the on-site clay was evaluated for water-soluble sulfate content to assess the general degree of sulfate exposure of concrete in contact with the site soils. The test results (presented in Appendix B) indicate a negligible degree of reactivity (Exposure Class S0) due to sulfate exposure, based on ACI 318, Table 4.3.1.

### **8.10 Earth-Retaining Structures**

Backfilling retaining walls with expansive soil can increase lateral pressures well beyond normal active or at-rest pressures. We recommend that retaining walls be backfilled with soil which has an expansion index of 50 or less. The onsite clays do not meet this criterion. Retaining wall backfill should be compacted to at least 90 percent relative compaction, based on ASTM D1557. Backfill should not be placed until walls have achieved adequate structural strength. Heavy compaction equipment which could cause distress to the walls should not be used. All retaining walls should contain subdrains to reduce the potential for hydrostatic pressure. Typical retaining wall drain details are provided in Figure 2.

Cantilever retaining walls backfilled with imported granular soil may be designed for an active earth pressure approximated by an equivalent fluid pressure of 35 lbs/ft<sup>3</sup>. The active pressure should be used for walls free to yield at the top at least 1 percent of the

wall height. For cantilever walls with 2:1 sloping backfill, or walls with level backfill that are restrained, an equivalent fluid pressure of 55 lbs/ft<sup>3</sup> should be used for design. The

above pressures do not consider surcharge loads. Walls adjacent to vehicular traffic should be designed to resist a uniform lateral pressure of 100 lbs/ft<sup>2</sup>, acting as a result of an assumed 300 lbs/ft<sup>2</sup> surcharge behind the wall. If the traffic is kept back from the walls a distance of 1.2 times the height of the wall, the traffic surcharge may be neglected.

### **8.11 PAVEMENTS**

8.11.1 Design Parameters: Based on the site explorations and previous experience in the area, the prevailing subgrade soil in the project area is highly plastic clay having an estimated R-Value of 8. The Traffic Index used for parking areas intended for passenger car and light truck traffic is 4.5. The Traffic Index for parking areas and drives intended for heavy truck traffic (semi-tractor trailers and trash trucks) is 6.0.

8.11.12 Pavement Design: Based on the CALTRANS design method, the following pavement sections represent the minimum pavement sections recommended for passenger car and light truck traffic parking.

Asphalt-Concrete	Aggregate Base
3 inches	8 inches

For drives and heavy truck traffic lanes, the following sections represent the minimum design sections.

Asphalt-Concrete	Aggregate Base
3 inches	13 inches
4 inches	11 inches



Pavements should be constructed using the sections recommended above. Aggregate base should conform to Class 2 aggregate base as defined in Section 26-1.02A of the Caltrans Standard Specifications; to Class 2 aggregate base as defined in Section 400-2.4 of the Regional Supplement Amendments to the "Greenbook;" or to crushed aggregate base, crushed miscellaneous base, or processed miscellaneous base as defined in Section 200-2 of the "Greenbook." Aggregate Base should be compacted to at least 95% relative compaction based on ASTM D1557. Asphalt concrete should conform to "Greenbook" specifications and should be compacted to at least 95 percent of the Hveem unit weight.

**8.11.3 Portland Cement Concrete:** Concrete pavement design was conducted in general accordance with the simplified design procedure of the Portland Cement Association. This methodology is based on a 20 year design life. For design, it was assumed that aggregate interlock would be used for load transfer across control joints. The subgrade materials were assumed to provide "low" subgrade support based on the results of the R-Value testing. Based on these assumptions, we recommend that the PCC pavement sections at the site consist of at least 6 inches of concrete placed directly over compacted soil. Heavy truck traffic areas should consist of at least 7 inches of concrete placed over 6 inches of aggregate base.

Crack control joints should be constructed for all PCC pavements on a maximum spacing of 10 feet, each way. Concentrated truck traffic areas, such as trash truck aprons, should be reinforced with number 4 bars on 18-inch centers, each way.

## **8.12 SLOPE GRADIENTS FOR STORM DRAIN RETENTION BASIN**

The upper soils encounter at the storm drain retention are susceptible to erosion. To reduce the potential for erosion, shallow soil movements and related maintenance requirements for the basins side slopes, a maximum repose of 3 Horizontal (H) to 1 Vertical (V) is recommended for the basins slopes. In order to reduce the potential for erosion of the side slopes, positive rooting vegetation could be established on the slopes. However, vegetation cover would reduce the infiltration capacity of the soils. As an alternative to vegetation, the side slopes could be left un-vegetated and more aggressive maintenance measures could be scheduled to repair erosion and shallow soil movements.

## 9 LIMITATIONS OF INVESTIGATION

This investigation was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No warranty, express or implied, is made as to the conclusions and professional opinions included in this report. This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the recommendations contained herein are brought to the attention of the necessary design consultants for the project and incorporated into the plans, and the necessary steps are taken to see that the contractors carry out such recommendations in the field.

The findings of this report are valid as of the present date. However, changes in the condition of a property can occur with the passage of time, whether due to natural processes or the work of man on this or adjacent properties. In addition, changes in applicable or appropriate standards of practice may occur from legislation or the broadening of knowledge.

Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

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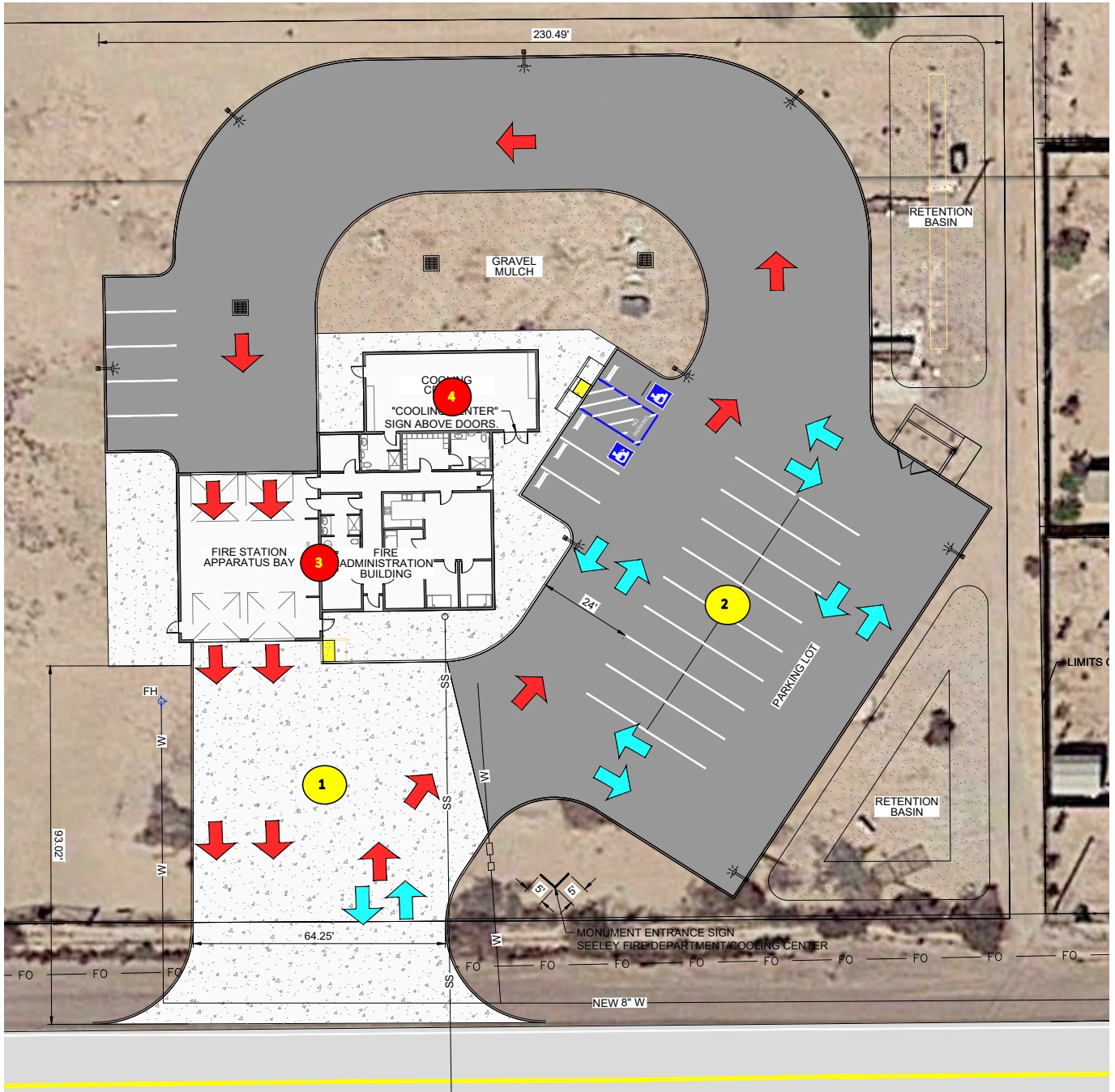
## Sierra Material Testing & Inspection




Roberto Martinez, PE  
Senior Engineer

A handwritten signature in blue ink, appearing to read "Alex Rojas".

Alex Rojas  
Project Manager



EXPLANATION	
● Trenches @ 20 feet	Trenches
● @ 5 feet	

SIERRA MATERIAL TESTING & INSPECTION		PROJECT NO. EC957
	PROJECT NAME: County of Imperial Fire Station and Cooling Center	Figure 1
	<b>EXPLORATION MAP</b>	

## ROCK AND FABRIC ALTERNATIVE

MINUS 3/4-INCH CRUSHED ROCK ENVELOPED IN FILTER FABRIC (MIRAFI 140NL, SUPAC 4NP, OR APPROVED SIMILAR)

4-INCH DIAM. PVC PERFORATED PIPE

DAMP-PROOFING OR WATER-PROOFING AS REQUIRED

12"

COMPACTED BACKFILL

12-INCH MINIMUM

WEEP-HOLE ALTERNATIVE

DAMP-PROOFING OR WATER-PROOFING AS REQUIRED

GEOCOMPOSITE PANEL DRAIN

1 CU. FT. PER LINEAR FOOT OF MINUS 3/4-INCH CRUSHED ROCK ENVELOPED IN FILTER FABRIC

4-INCH DIAM. PVC PERFORATED PIPE

12"

COMPACTED BACKFILL

## PANEL DRAIN ALTERNATIVE

WEEP-HOLE ALTERNATIVE

### NOTES

- 1) Perforated pipe should outlet through a solid pipe to a free gravity outfall. Perforated pipe and outlet pipe should have a fall of at least 1%.
- 2) As an alternative to the perforated pipe and outlet, weep-holes may be constructed. Weep-holes should be at least 2 inches in diameter, spaced no greater than 8 feet, and be located just above grade at the bottom of wall.
- 3) Filter fabric should consist of Mirafi 140N, Supac 5NP, Amoco 4599, or similar approved fabric. Filter fabric should be overlapped at least 6-inches.
- 4) Geocomposite panel drain should consist of Miradrain 6000, J-DRain 400, Supac DS-15, or approved similar product.
- 5) Drain installation should be observed by the geotechnical consultant prior to backfilling.

## **APPENDIX A**

### **SUBSURFACE EXPLORATION**

Field exploration consisted of a visual and geologic reconnaissance of the site and the excavation of four borings using an excavator on January 7, 2022. Bulk soil samples were collected for laboratory testing. The maximum depth of exploration was 20 feet. The approximate locations of the borings are shown on the Exploration Plan, Figure 1. Logs describing the subsurface conditions encountered in the borings are presented in the following Figures A-1 through A-4.

The exploration locations were determined by visually estimating, pacing and wheel rolling distances from landmarks shown on the Exploration Plan, Figure 1. The locations shown should not be considered more accurate than is implied by the method of measurement used and the scale of the map. The lines designating the interface between differing soil materials on the logs may be abrupt or gradational. Further, soil conditions at locations between the excavations may be substantially different from those at the specific locations explored. It should be noted that the passage of time can result in changes in the soil conditions reported in our logs.

## LOG OF EXPLORATION TRENCH NO. 1

**Logged by:** PG  
**Method of Drilling:** Excavator  
**Hammer Weight:**

**Fire Station and Cooling Center**

**Date Excavated:** 1/7/22  
**Elevation:** 5 feet

DEPTH (FT)	BLOWS PER FT	DRIVE SAMPLE	BULK SAMPLE	DESCRIPTION	LAB TESTS
1				Light brown, silty clay med plasticity, CL, 2 % moisture	
2			BAG		
3					
4				CL, 6.0% moisture	
5					
6				<div style="border: 1px solid black; display: inline-block; padding: 2px;">Total Depth: 5 Feet</div> No ground water	
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
<b>PROJECT NO. EC957</b>				<b>SIERRA material testing &amp; inspection</b>	<b>A-1</b>

## LOG OF EXPLORATION TRENCH NO. 2

**Logged by:** PG  
**Method of Drilling:** Excavator  
**Hammer Weight:**

**Fire Station and Cooling Center**

**Date Excavated:** 1/7/22  
**Elevation:** 5 feet

DEPTH (FT)	BLOWS PER FT	DRIVE SAMPLE	BULK SAMPLE	DESCRIPTION	LAB TESTS
1				Light brown, silty clay med plasticity, CL, 2 % moisture	
2			BAG		
3					
4				CL, 6.0% moisture	
5					
6				<div style="border: 1px solid black; display: inline-block; padding: 2px;">Total Depth: 5 Feet</div> No ground water	
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
<b>PROJECT NO. EC957</b>				<b>SIERRA material testing &amp; inspection</b>	<b>A-2</b>

## LOG OF EXPLORATION BORING NO. 3

**Logged by:** PG  
**Method of Drilling:** 8" Augar  
**Hammer Weight:**

**Fire Station and Cooling Center**

**Date Drilled:** 1/7/22  
**Elevation:** 20 feet

DEPTH (FT)	BLOWS PER FT	DRIVE SAMPLE	BULK SAMPLE	DESCRIPTION	LAB TESTS
1				Light brown, silty clay med plasticity, CL, 4 % moisture	Sieve Analysis Atterberg Limits Sulfate Content Expansion Index
2					
3			BAG	CL, 4.0% moisture	
4			BAG		
5				Moderate brown, lean clay, high plasticity CL, 8% moisture	
6					
7					
8					
9					Sieve Analysis Atterberg Limits Sulfate Content Expansion Index
10					
11			BAG	Moderate brown, lean clay, high plasticity CH, 18.0 % moisture	
12					
13					
14					
15			BAG	CH, 24.0 % moisture	
16					
17					
18			BAG	CH, 24.0 % moisture	
19					
20					
				Total Depth: 20 Feet	No groundwater
<b>PROJECT NO. EC957</b>				<b>SIERRA material testing &amp; inspection</b>	
				<b>A-3</b>	



## LOG OF EXPLORATION BORING NO. 4

**Logged by:** PG  
**Method of Drilling:** 8" Augar  
**Hammer Weight:**

**Fire Station and Cooling Center**

**Date Drilled:** 1/7/22  
**Elevation:** 20 feet

DEPTH (FT)	BLOWS PER FT	DRIVE SAMPLE	BULK SAMPLE	DESCRIPTION	LAB TESTS
1			BAG	Light brown, silty clay med plasticity, CL, 2 % moisture	
2					
3			BAG	CL, 2.0% moisture	
4					
5			BAG	Moderate brown, lean clay, high plasticity CL, 4% moisture	
6					
7					
8					
9			BAG		Sieve Analysis Atterberg Limits Sulfate Content Expansion Index
10					
11				Moderate brown, lean clay, high plasticity CH, 16.0 % moisture	
12					
13					
14					
15			BAG	CH, 21.0 % moisture	
16					
17					
18			BAG	CH, 24.0 % moisture	
19					
20					
				Total Depth: 20 Feet	No groundwater
<b>PROJECT NO. EC957</b>				<b>SIERRA material testing &amp; inspection</b>	
				<b>A-4</b>	

## APPENDIX B

### LABORATORY TESTING

Laboratory testing was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions and in the same locality. No warranty, express or implied, is made as to the correctness or serviceability of the test results, or the conclusions derived from these tests. Where a specific laboratory test method has been referenced, such as ASTM, Caltrans, or AASHTO, the reference applies only to the specified laboratory test method and not to associated referenced test method(s) or practices, and the test method referenced has been used only as a guidance document for the general performance of the test and not as a "Test Standard". A brief description of the tests performed follows.

**Classification:** Soils were classified visually according to the Unified Soil Classification System as established by the American Society of Civil Engineers. Visual classification was supplemented by laboratory testing of selected soil samples and classification in general accordance with the laboratory soil classification tests outlined in ASTM test method D2487. The resultant soil classifications are shown on the boring logs in Appendix A.

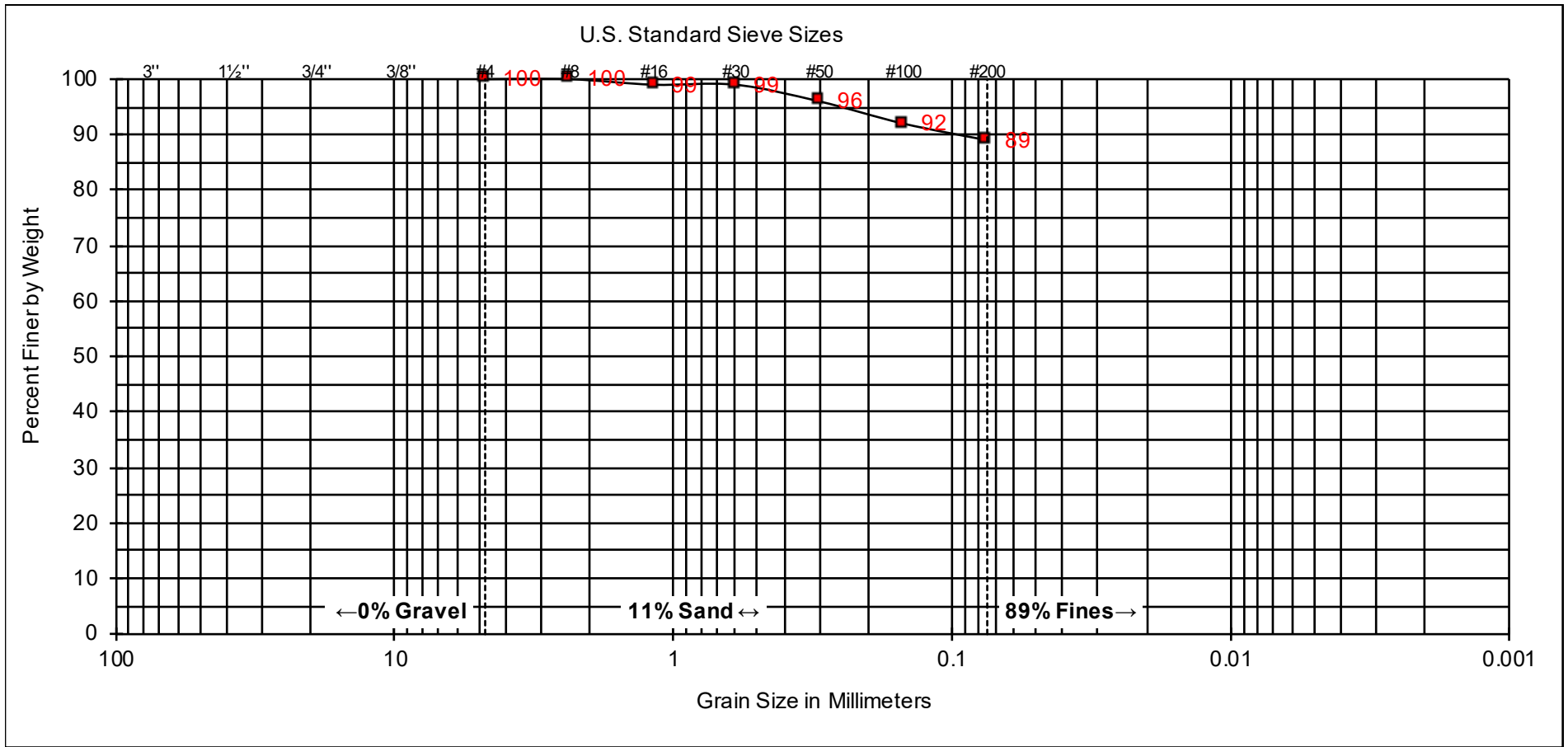
**Expansion Index:** The expansion potentials of selected soil samples were estimated in general accordance with the laboratory procedures outlined in ASTM test method D4829. The test results are summarized on Figure B-3. Figure B-3 also presents common criteria for evaluating the expansion potential based on the expansion index.

**Sulfate Content:** To assess the potential for reactivity with concrete, selected soil samples were tested for water soluble sulfate. The sulfate was extracted from the soil under vacuum using a 10:1 (water to dry soil) dilution ratio. The extracted solution was tested for water soluble sulfate in general accordance with ASTM D516. The test results are presented in Figure B-3. Figure B-3 also presents common criteria for evaluating soluble sulfate content.

**In-Situ Moisture:** Selected samples were tested for in-situ moisture content in general accordance with ASTM D4643. The results are provided on the exploration logs in Appendix A.

**Atterberg Limits:** ASTM D4318 was used to determine the liquid limit and plasticity index of selected soil samples. The Atterberg Limits were used to refine the soil classifications as shown in Figure B-1 and B-2.

**Particle Size Analysis:** Particle size analyses were performed in general accordance with ASTM D422, and were used to supplement visual soil classifications. The test results are summarized in Figures B-1 and B-2.



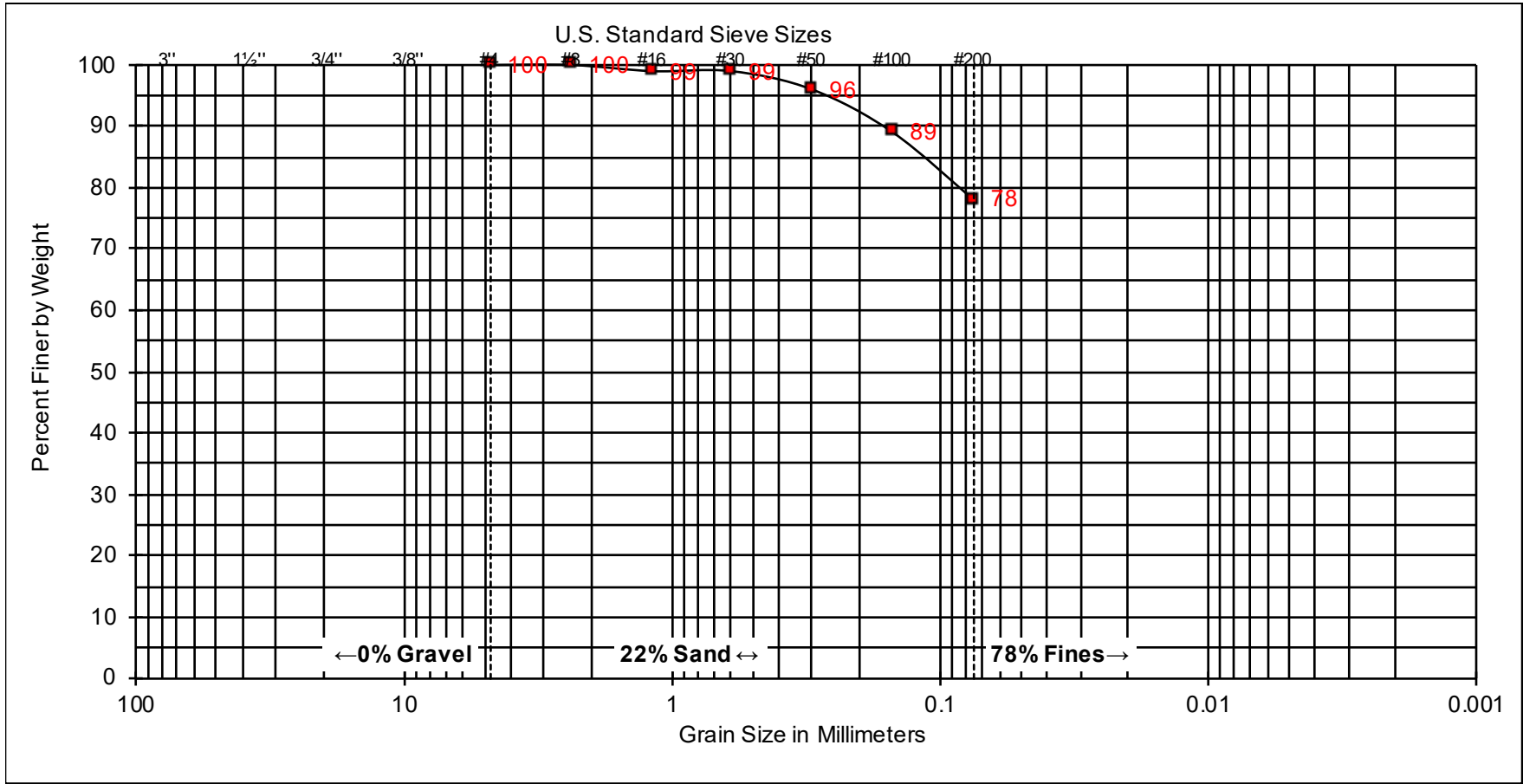
COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

<b>SAMPLE</b>
SAMPLE NUMBER: B-3
SAMPLE DEPTH: 3.0'-5.0'

<b>UNIFIED SOIL CLASSIFICATION:</b> CL
<b>DESCRIPTION</b> Silty Clay

<b>ATTERBERG LIMITS</b>
Liquid Limit: 30
Plastic Limit: 14
Plasticity Index: 16

<b>EXPANSION INDEX</b>
48
<b>SULFATES</b>
0.00%



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

<b>SAMPLE</b>
SAMPLE NUMBER: B-4
SAMPLE DEPTH: 8.0' 8'-10'

<b>UNIFIED SOIL CLASSIFICATION: CH</b>
<b>DESCRIPTION CLAY</b>

<b>ATTERBERG LIMITS</b>
Liquid Limit: 55
Plastic Limit: 20
Plasticity Index: 35

<b>EXPANSION</b>
93
<b>CORROSIVITY</b>
0.00%

## EXPANSION TEST RESULTS

(ASTM D4829)

SAMPLE	DESCRIPTION	EXPANSION INDEX
B-3 3.0' - 5.0'	SILTY CLAY	48
B-4 8.0' - 10.0'	CLAY	93
EXPANSION INDEX		POTENTIAL EXPANSION
0 TO 20		Very Low
21 TO 50		Low
51 TO 90		Medium
91 TO 130		High
Above 130		Very High

## CHEMISTRY TEST RESULTS

(ASTM D516, CTM 643)

SAMPLE	pH	RESISTIVITY (OHM-CM)	SULFATE CONTENT (%)	CHLORIDE CONTENT (%)
B-3 5.0' - 10.0'			0.00	
B-8 0.0' - 4.0'			0.00	

SULFATE CONTENT (%)	SULFATE EXPOSURE	SERVERTY ACI 318
0.00 To 0.10	Negligible	S0
0.10 To 0.20	Moderate	S1
0.20 To 2.00	Severe	S2
Above 2.0	Very Severe	S3



**LABORATORY TEST RESULTS**

Project No. EC957  
Figure B-3

**SECTION 01 31 50**  
**PROJECT MEETINGS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

A. WORK INCLUDED:

1. Project meetings are required to enable an orderly and periodic review of the progress of work, submittal status, review request for information forms, review change orders, review material or equipment delays, review project status, review schedule modifications, review safety issues, review utility connections, review scheduling of monthly progress payments and similar issues. The Construction Manager will be responsible for the project meeting agenda, chair the project meetings and prepare the project meeting memorandums.

**1.02 RELATED WORK SPECIFIED ELSEWHERE**

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Division 1 – General Requirements.

**1.03 MEETING GUIDELINES**

A. MEETING AGENDAS

1. The Construction Manager shall be responsible for preparing the meeting agendas. The Contractor, Owner and other pertinent parties shall provide meeting agenda items to the Construction Manager for inclusion in the meeting agenda a minimum of 48 hours prior to meetings.

B. MEETING SCHEDULES

1. The Construction Manager, Contractor and Owner shall establish a regularly scheduled meeting time and date for project meetings.
2. Weekly Project Meetings shall be required for this project.
3. A Pre-Construction Meeting shall be required for this project.

C. MEETING LOCATION

1. The Pre-Construction Meeting will be conducted at a County of Imperial Facility Location. The location of the Pre-Construction Meeting will be determined after the Contract Award is issued to the successful contractor.
2. Regularly Scheduled Construction Meetings shall be conducted at the Project Construction Trailer located at the Project Site.

D. MEETING ATTENDANCE

1. The designated and approved Construction Superintendent shall attend all Meetings. In the event the Construction Superintendent is not able to attend a particular meeting an alternate Construction Representative knowledgeable with the project with the authority to act on behalf of the Contractor, shall attend the meeting. The Construction Manager shall attend the meetings. The Owner or designated Owners Representative is encouraged to attend all meetings. The Contractor can approve meeting participation by subcontractors or material suppliers. Utility Representatives are welcome to attend the meetings.
2. Regularly scheduled meetings may be cancelled if mutually agreed to by the Construction Manager, Owner and Contractor.

E. MINIMUM REGULARLY SCHEDULED MEETING AGENDAS

1. At a minimum, regularly scheduled meeting agendas shall include the following.
  - 1.1 Review work progress since the previous meeting. Review completion of significant items.
  - 1.2 Review submittal status. Review submittals which have not been approved and have the potential of delaying the project completion.
  - 1.3 Review new and past problems. Review any progress in addressing problems. Review which party or parties will take action to address the problem. Mutually arrive at an agreed solution, schedule, action item or items and responsible party or parties to address the problems.
  - 1.4 Review the project schedule. Note any significant items which have been completed since the last meeting, items anticipated to be completed by the next meeting and any items for which a scheduling alteration or delay has become evident. Review whether the schedule requires review at the next regularly scheduled meeting.
  - 1.5 Prepare action items to be completed by the Construction Manager, Contractor, Owner or other parties prior to the next meeting.
  - 1.6. Review Project RFI status. Review the schedule for responding to outstanding RFI's. Review action items to be completed by the Construction Manager, Engineer, Architect, Contractor or Owner to respond to a particular RFI.



1.7. Review the status of Change Orders. Review the schedule for responding to Change Orders. Review action items to be completed by the Construction Manager, Engineer, Architect, Contractor, Owner or Grant Agency to respond to a particular Change Order.

1.8 Review monthly payment request scheduling. Review the calculation of quantities or other items necessary to complete the monthly payment requests. Review any action items to be completed by the Construction Manager, Architect, Engineer, Contractor or owner for the preparation of the monthly payment request.

1.9 Review Safety Issues.

1.10 Review work items, equipment deliveries, equipment start-ups, material deliveries and similar project items anticipated to be completed prior to the next scheduled meeting.

1.11 Review any critical action items to be completed by the Contractor, Owner, Architect, Engineer or Construction Manager to realize the completion of work items.

1.12 Review any other significant items concerning the project.

F. MEETING MEMORANDUMS

1. The Construction Manager is responsible to prepare Meeting Memorandums summarizing the items discussed at meetings. The Meeting Memorandums are to be completed and distributed to the contractor, owner and all other pertinent parties. The Contractor shall determine and authorize the Construction Manager *to distribute or not distribute* Meeting Memorandums to subcontractors, suppliers, and other parties to which the Contractor has signed agreements. The Contractor shall also have the option to send the Meeting Memorandums to those parties to which the Contractor has signed agreements, as determined by the Contractor.

2. The Construction Manager is to forward the Meeting Memorandum for a particular Meeting to all pertinent parties within 48 hours after the meeting concludes.

**1.04 PRE-CONSTRUCTION MEETING**

A. A Pre-Construction Meeting is to be scheduled for the project prior to the commencement of construction activities at the project site. The County of Imperial shall determine the Pre-Construction Conference Scheduling.

1. The Contractor and designated Project Superintendent shall attend the Pre-Construction Meeting. The Contractor shall invite major sub-contractors and material suppliers to attend the Pre-Construction Conference.

2. The Construction Manager shall contact and invite all pertinent, County of Imperial Representative. The Construction Manager shall contact and invite the Architect, Engineer, Utility Purveyors and all other parties critical to the completion of the project.

3. The Pre-Construction Conference Minimum Agenda shall include the following:

- 3.1 Circulation of Pre-Construction Conference Attendance List to those present at the Pre-Construction Conference.
- 3.2 Introduction of those present at the Pre-Construction Conference.
- 3.3 Project Description per Project Design Documents.
- 3.4 Project Schedule Provided by Contractor.
- 3.5 Project Submittal List Required.
- 3.6 Contractors Organizational Structure
- 3.7 Construction Manager and Owners Organizational Structure
- 3.8 Processing of RFI's.
- 3.9 Processing of Monthly Payment Requests
- 3.10 Processing of Change Orders
- 3.11 Construction Manager's Responsibilities
- 3.12 Channels and procedures for communication
- 3.13 Building Permit and Requirements
- 3.14 Building Inspections
- 3.15 County of Imperial Encroachment Permit
- 3.16 County I.T. Participation and Scope of Work
- 3.17 Imperial Irrigation District Energy Department Customer Service Proposal & Electrical Service
- 3.18 Southern California Gas Company Service & Permit Requirements
- 3.19 Seeley County Water District Water and Sanitary Sewer Services Permits and Requirements
- 3.20 Project Safety
- 3.21 Distribution of Contract Documents (plans, specifications and addenda).
- 3.22 Staging area, security of staging area site, materials and equipment security, construction phase parking, night lighting, fencing and similar issues.
- 3.23 Project Sign.

3.24 Emergency Information: The name, addresses, telephone and e-mails of Contractor, Subcontractors, Owner Representatives, Construction Manager and other critical project participants.

3.25 Labor Compliance

3.26 Items to be reviewed at the Pre-Construction Conference required by the Grant Agency.

## **1.05 SPECIAL MEETINGS**

- A. Special meetings can be conducted if emergency events or other unforeseen events occur which require immediate attention. The Owner and Construction Manager will determine if Special Meeting are required.

**END OF SECTION**

## SECTION 01 31 75

### MOBILIZATION

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. Mobilization shall consist of preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to the project site for all other work and operations that must be performed or costs incurred before beginning work on the various contract items at the project site. Mobilization also includes administrative items, supervisory items, support items and miscellaneous items required during the project construction period.
- B. Mobilization shall include, but not be limited to the following items required for the proper performance and completion of the work:
1. Obtaining all permits, licenses, insurance and bonds. Providing original and copy documents of these items to the Construction Manager.
  2. Moving the Contractor's materials, equipment, personnel and all other items necessary for the construction of the project onto the jobsite. This includes all freight and trucking charges associated with moving materials and equipment to the project site.
  3. Payment of all taxes for materials, equipment and all other items.
  4. Providing a designated Contractor's representative at the project site on a full-time basis throughout the project construction period.
  5. Providing and maintaining restroom facilities for construction personnel at the project site.
  6. Providing potable water facilities as specified. This includes a means by which all on-site contractor, sub-contractor, supplier, testing and construction management and inspection personnel can wash their hands with soap and water.
  7. Posting all CAL/OSHA required notices and establishment of safety programs at the project site.
  8. Participating in pre-construction conference, project progress meetings, pre-final inspection meeting, final inspection meeting and other project relating meetings, per Civil Technical Specification 01 31 50.
  9. Preparation of Request for Information (RFI) Forms and Change Order Forms and the administrative work associated with the RFI and Change Order Forms.

10. Contacting Underground Service Alert and Utility Companies to address utility issues concerning this project.
11. Preparation, submission and revisions associated with project submittals per Submittal Civil Technical Specification 01 33 00 including the preparation and updating of construction schedules and preparing the contract price breakdown (schedule of value) document.
12. Complying with the Air Pollution Control District Permit requirements and paying all associated costs.
13. Providing temporary electrical power and fuel required for the project construction. Providing all circuitry for temporary electrical power. Providing temporary lighting facilities.
14. Providing all communication facilities, computers, phones (including cell phones), modems and any other communication facilities necessary for the project construction.
15. Maintain the staging area to store materials, equipment and all other items required for the construction of the project secure. Provide 6-inch-deep class 2 base access roads, 6-inch-deep class 2 base material storage areas and parking areas to access the staging area site. Provide fencing, night guards and security systems, as required.
16. Providing Project Sign(s) and posted information.
17. Providing all lodging and subsistence fees for construction personnel.
18. Providing fencing and barricades as required for public safety and to protect work in place. Provide fencing around project staging area.
19. Provide a parking area for all contractor and subcontractor personnel, equipment suppliers, utility personnel, construction manager, owners representatives, geotechnical personnel and all others associated with the project. The parking areas is to be located within the area which is designated "not to be developed." Install 6 inches of class 2 base in the parking area.
20. Demobilization of equipment, personnel and all other items from the project site at the conclusion of the construction project.
21. Completion of all project close out items, per Civil Technical Specification 01 77 00.
22. Providing Operation and Maintenance Manuals, per Civil Technical Specification 01 75 50.
23. Spare parts for equipment as required.
24. Maintenance and preparation of As-Built Drawings, per Civil Technical Specification 01 77 50.
24. A construction office trailer shall be provided per the Temporary Facilities Section 01 51 00 of the Site Civil Technical Specifications. The contractor shall obtain and pay

all expenses relative to the permit for the construction trailer as determined by the County of Imperial Planning and Development Services Department. The Contractor shall obtain and pay for the electrical power service and associated IID Customer Service Proposal permit for the construction trailer. The contractor shall pay for all costs for the monthly electrical power service fees. The contractor shall pay for all costs regarding security considerations for the construction office trailer.

25. Preparation and revisions to monthly construction payment requests including all associated work with obtaining backup information necessary to substantiate the monthly construction payment requests.

26. Maintain project site clean, including staging area and parking lot, free from rubbish and waste material. A dumpster shall be maintained at the site throughout the construction period and the contractor shall insure the rubbish and waste material is removed from the site on a weekly basis.

27. Providing Construction Water for the project.

28. Provide Project Environmental Controls per Civil Technical Specification Section 02 24 00.

## **1.02 PAYMENT FOR MOBILIZATION**

- A. Payment for Mobilization shall be included in the Bid Amount. The Mobilization Schedule of Values monthly payment shall be released to the contractor based upon the percentage of each mobilization task which has been completed during a given payment period.

**END OF SECTION**

## SECTION 01 33 00

### SUBMITTALS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. All submittals by the Contractor shall be forwarded to the Construction Manager at the Site. The Construction Manager will forward the submittals to the Design Engineer or Architect. The Architect and Design Engineer will forward reviewed submittals to the Construction Manager. The Construction Manager will in turn forward the approved submittals to the Contractor and Owner.
- B. Within three (3) calendar days after the date of the Notice to Proceed, the Contractor shall submit the following items to the Construction Manager:
  - 1. A Construction Schedule providing the starting and completion dates of the various stages of the Work. The Contractor shall be prepared to discuss its construction schedule at the pre-construction conference.
  - 2. Schedule of Values or lump sum price breakdown for progress payment purposes.
  - 3. Letter designating Project Construction Superintendent.

##### 1.02 SUBMITTAL REQUIREMENTS AND PROCESS

- A. The Contractor shall prepare a detailed list of required submittals required for the Seeley Fire Station and Cooling Center within five (5) calendar days of receiving the Notice to Proceed. The Construction Manager will review and forward comments regarding the submittal list to the contractor within three (3) days after receiving the list. The Architect, Design Engineer, Owner and County of Imperial Building Department shall also review and offer comments regarding the submittal list. The Construction Manager shall insure the submittal list for the Seeley Fire Station and Cooling Center is approved within 10 days after the issuance of the Notice to Proceed.
- B. The Contractor shall furnish two (2) hard copies and an electronic PDF of each submittal to the Construction Manager for review.
- C. All submittals shall be accompanied by a submittal transmittal form. This form may be obtained from the Construction Manager. A separate transmittal form shall be used for each specific item for which a submittal is required. Each submittal should be referenced to the specification section requiring the submittal. All Contractor submittals shall be carefully reviewed by an authorized representative of the Contractor, prior to submission to the Construction Manager. Each submittal shall be dated, signed and certified by the Contractor as being correct and in strict conformance with the Contract

Documents. In the case of shop drawings, each sheet shall be so dated, signed and certified. No consideration for review by the Construction Manager of any Contractor

submittals will be made for any items which have not been so certified by the Contractor. All non-certified submittals will be returned to the Contractor without action taken by the Engineer and any delays caused thereby shall be the sole responsibility of the Contractor.

- D. Multiple-page submittals shall be collated into sets with each set stapled or bound.
- E. The Construction Manager will return copies of each submittal to the Contractor with review comments within five (5) calendar days following their receipt by the Construction Manager. There will be one (1) hard copy and an electronic PDF submittal returned to the Contractor when marked either "NO EXCEPTIONS TAKEN" or "APPROVED AS NOTED", and no formal revision and re-submission of said submittal will be required. However, if one or more copies of the submittal are returned to the Contractor marked "REVISE AND RESUBMIT" or "REJECTED", the Contractor shall revise said submittal and shall resubmit the required revised submittal copies to the Construction Manager.
- F. Fabrication of an item shall commence only after the Architect or Engineer has reviewed the submittal and returned copies to the Contractor marked either "NO EXCEPTIONS TAKEN" or "APPROVED AS NOTED". Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis of claims for extra work.
- G. The Architect's or Engineer's review of Contractor's submittals shall not relieve the Contractor of the entire responsibility for the correctness of details and dimensions. The Contractor shall assume all responsibility and risk for any misfits due to any errors in the Contractor submittals. The Contractor shall be responsible for the dimensions and the design of adequate connections and details.

### **1.03 CONTRACTOR'S SCHEDULE SUBMITTAL**

- A. The Contractor shall submit to the Construction Manager a construction schedule for the Work showing a general plan for orderly progression of the Work including mobilization of plant and equipment and timing of procurement of major materials and equipment.
- B. The Construction Manager may request that the Contractor provide a revised or updated Construction Schedule if, at any time, the Construction Manager considers the completion date to be in jeopardy because of any portion of the Work falling behind schedule or the sequence of operations becomes different from the previous schedule.

### **1.04 PROPOSED SUBSTITUTES OR "OR EQUAL" ITEM SUBMITTAL**

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance and quality required. Other items of material or equipment, or material or equipment of other Suppliers may be submitted to the Architect or Engineer for review under the



circumstances described below subject to the *Instruction to Bidders* (Section 2, Article 11), *Standard General Conditions* (Article 6.05), and the following requirements:

1. The Contractor shall be responsible for resultant changes and all additional costs or credit to the Owner which the accepted substitution requires in the Contractor's work, the work of its subcontractors and of other contractors and shall effect such changes without cost to the Owner.
- B. The procedure for review by the Architect or Engineer will include the following:
  1. If proposed substitute material or equipment has been judged to be unacceptable by the Architect or Engineer, the Contractor shall provide the material or equipment named in the Contract Documents.

#### **1.05 SAMPLES SUBMITTAL**

- A. The Contractor shall submit not less than two (2) samples, unless noted otherwise in a material or equipment specification, to the Architect or Engineer for acceptance at no additional cost to the Owner. Samples shall be submitted for acceptance a minimum of ten (10) days prior to ordering such material for delivery to the job site. If accepted by the Architect or Engineer, one (1) set of samples will be returned to the Contractor and one (1) set of samples shall remain at the job site until completion of the Work.

#### **1.06 OPERATION, MAINTENANCE AND TECHNICAL MANUAL SUBMITTAL**

- A. The Contractor shall furnish operation, maintenance and technical manuals in accordance with Section 01 75 50 – Operation and Maintenance Manuals.

#### **1.07 AS-BUILT SUBMITTAL**

- A. The Contractor shall maintain, during the progress of the Work, one (1) set of As-Built Drawings and shall neatly mark on them all project changes from the details shown on the original Contract Drawings. Special attention shall be given to recording on the drawings the horizontal and vertical location of all buried utilities that differ from the locations indicated or which were revealed during the construction.
- B. As-Built drawings shall be accessible to the Construction Manager at all times during the construction period and shall be delivered to the Construction Manager and the Design Engineer and Architect upon completion of the Work.
- C. Upon substantial completion of the Work and prior to final acceptance the Contractor shall deliver a complete set of As-Built drawings to the Architect and Engineer.

#### **1.08 SUPERINTENDENT SUBMITTAL**

- A. A letter designating the Project Superintendent shall be forwarded to the Construction Manager within three (3) days of the issuance of the Notice to Proceed for his review. The letter shall also include emergency contact information for the Project Superintendent and other Contractor Representative.

**END OF SECTION**

**SECTION 01 43 05**  
**PROTECTION OF EXISTING FACILITIES**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. The Contractor shall protect all existing utilities, piping and improvements not designated for removal and shall restore damaged or temporarily relocated utilities, piping and improvements to a condition equal to or better than they were prior to such damage or temporary relocation.
- B. The Contractor shall verify the exact locations and depths of all underground piping and utilities shown and not shown and shall make exploratory excavations of all piping and utilities that may interfere with the Work. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities, piping and other improvements that will be encountered during construction operations and verify that such utilities or other improvements are adequately protected from damage due to such operations.
- C. Maintaining in Service: All pipelines, electrical, power, telephone communication cables, gas and water mains shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Construction Manager are made with the Owner. Where the proper completion of the Work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement the Contractor, after necessary scheduling and approval, shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the Construction Manager and the Owner of the facility. In all cases of such temporary removal or relocation, the Work shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement to a new condition meeting the specification requirements.
- D. All repairs to a damaged utility or improvement are subject to inspection and approval by the Construction Manager and Utility Purveyor Representative before being concealed by backfill or other work.

**1.02 RIGHTS-OF-WAY**

- A. The Contractor shall refrain from commencing work or entering upon the rights-of-way of any oil, gas, sewer or water pipeline; any telephone or electric transmission line; any fence; or any other structure, until notified by the Construction Manager that the Owner has secured authority to do so. After authority has been obtained, the Contractor shall give the governing utility proper advanced notice of its intention to begin work.

**1.03 RESTORATION OF PAVEMENT AND SIDEWALKS**

- A. All paved areas and sidewalks not designated for replacement, cut or damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas unless otherwise noted. All sidewalks, curbs and gutters and pavements which are subject to partial removal shall be neatly saw-cut in straight lines. The sidewalk, curb and gutter and pavement shall be constructed in accordance with the Standard Details and Plans of the governing agency.

**1.04 UNDERGROUND UTILITIES NOT SHOWN OR INDICATED**

- A. If the Contractor damages existing utilities, piping or improvements that are not illustrated or the location of which was not made known to the Contractor prior to excavation and the damage was not due to failure of the Contractor to exercise reasonable care the Contractor shall immediately notify the Construction Manager. If directed by the Construction Manager repairs shall be made by the Contractor under the provisions for changes and extra work contained in Standard General Conditions.

**1.05 NOTIFICATION BY THE CONTRACTOR**

- A. Prior to any excavation in the vicinity of any existing underground facilities, including water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications or telecommunication cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, the Contractor shall notify the respective utility purveyors or agencies or owners responsible for such facilities not less than three (3) working days prior to excavation so that a representative is afforded the opportunity to be present during the excavation work.

**END OF SECTION**

**SECTION 01 43 75**  
**MATERIALS AND EQUIPMENT**

**PART 1 - GENERAL**

**1.01 QUALITY ASSURANCE**

- A. To the greatest extent possible for each unit of work, the Contractor shall provide products, materials or equipment from a single source.
- B. Where more than one choice is available as options for Contractor's selection of a product, material or equipment, the Contractor shall select an option which is compatible with other products, materials or equipment already selected.

**1.02 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. The Contractor shall transport, deliver, handle and store products in accordance with supplier's written recommendations and by methods and means which will prevent damage, deterioration and loss including theft. Delivery schedules shall be coordinated to minimize long-term storage of products at the Site and overcrowding of construction spaces. The Contractor shall provide installation coordination to ensure minimum storage times for products recognized to be flammable, hazardous or easily damaged.
- B. Products shall be delivered in a dry, undamaged condition in the supplier's unopened packaging. The Engineer and Owner reserve the right to reject all damaged products, materials and equipment. Rejected products shall be immediately removed from the Site.
- C. Products, materials and equipment shall be stored in accordance with the manufacturer's written instructions, with seals and labels intact and legible. Motors, electrical gear, mechanical equipment with open bearings or moving parts or any product sensitive to the environment shall be stored in weather-tight enclosures with necessary temperature and humidity ranges maintained within the manufacturer's instructions.
- D. Fabricated structural components shall be stored on supports above ground and in a manner to prevent accumulation of water and warping. Products subject to deterioration from atmospheric conditions shall be covered in a manner that will provide adequate ventilation to avoid condensation.
- E. Products, materials and equipment not stored in a manner that will insure the maintaining of a new condition will be rejected by the Engineer. Such rejected products, materials and equipment shall be immediately removed from the Site.

**END OF SECTION**

**SECTION 01 51 00**  
**TEMPORARY FACILITIES**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

The Owner shall bear no costs of temporary facilities, unless noted otherwise.

It shall be the Contractor's responsibility to provide equipment that is adequate for the performance of the Work under this Contract within the time specified. All equipment shall be kept in satisfactory operating condition, shall be capable of safely and efficiently performing the required Work and shall be subject to inspection and approval by the Owner's representative at any time within the duration of the Contract. All work hereunder shall conform to the applicable requirements of the OSHA Standards for Construction.

**1.02 POWER AND LIGHTING**

The Contractor shall provide temporary electric power as necessary for the execution of the Work, including that required by all Subcontractors. Contractor shall make the necessary arrangements with utility purveyor to include all permits, applications and fees, and shall bear all costs for these temporary services and shall furnish and install all necessary transformers, metering facilities and distribution centers from branch circuits as may be required.

The Contractor shall provide lighting and outlets in temporary structures throughout the Project as may be required for safety, proper performance and inspection of the Work. If operations are performed during hours of darkness, or if natural lighting is deemed insufficient by Construction Manager, the Contractor shall provide adequate floodlights, clusters and spot illumination. The use of permanently installed lighting fixtures, lamps and tubes for work shall not be permitted except by special permission of Construction Manager. The Contractor shall make arrangements with Subcontractors for electrical services and lighting as may be necessary in the performance of their work.

**1.03 WATER SUPPLY**

- A. Construction Water: The Contractor shall provide construction water for this project. The local water purveyor in Seeley is the Seeley County Water District. The Seeley County Water District address is 1898 West Main Street, Seeley, CA 92273. The telephone number of the Seeley County Water District is (760) 352-6612. An email contact for the Seeley County Water District is [info@seeleywaterdistrict.com](mailto:info@seeleywaterdistrict.com).
- B. Drinking Water: All drinking water on the site during construction shall be furnished by the Contractor and shall be bottled water or water furnished in approved dispensers. Notices shall be posted conspicuously throughout the site warning the Contractor's personnel that piped water for construction purposes may be contaminated and is not for human consumption.

- C. Water Connections: The Contractor shall not make connection to, or draw water from, any fire hydrant or pipeline without first obtaining permission, in writing, of the authority having jurisdiction over the use of said fire hydrant or pipeline and from the agency owning the water system. For each such connection made the Contractor shall first attach to the fire hydrant or pipeline a valve, backflow preventer and a meter, if required by the said authority, of a size and type acceptable to said authority and agency.
- D. Removal of Water Connections: Before final acceptance of the Work all temporary water connections and piping installed by the Contractor shall be entirely removed, and all affected improvements shall be restored to their original condition, or better, to the satisfaction of the Engineer and to the agency owning the affected utility.
- E. Fire Protection: The Contractor shall provide fire extinguishers and other fire protection equipment to adequately protect new and existing facilities and temporary facilities against damage by fire. Hose connections and hose, water casks, chemical equipment or other sufficient means shall be provided for fighting fires in the new, existing and temporary structures and other portions of the Work and responsible persons shall be designated and instructed in the operation of such fire apparatus so as to prevent or minimize the hazard of fire. The Contractor's fire protection program shall conform to the requirements of the OSHA Standards for Construction. The Contractor shall employ every reasonable means to prevent the hazard of fire.

#### 1.04 CONSTRUCTION OFFICE TRAILER

The Contractor shall provide and maintain a Construction Office Trailer at the Project Site. The Trailer shall have a floor area of at least 500 square feet with a minimum of 150 square feet designated for the sole use of the Construction Manager. The Trailer shall be provided with lighting, hot/cold water dispenser, heating, air conditioning, two (2) file cabinets, three (3) desks, six (6) chairs and connections for internet and computers. The Contractor shall provide a power service, wiring, conduit and electrical service pole in accordance with the standards of the power division of the Imperial Irrigation District. All costs related to the Construction Office Trailer shall be borne by the Contractor. The Contractor shall obtain and pay for all required trailer permits through the County of Imperial Planning and Development Services Department and Customer Service Proposal permits for electrical power from the Imperial Irrigation District Power Division. The Construction Trailer shall be moved to an area secured and paid for by the contractor near the project site within **ten (10) days** of the Notice to Proceed. Drinking water at the office trailer shall be supplied by the Contractor.

#### 1.05 SANITATION

- A. Toilet Facilities: Portable chemical toilet facilities shall be provided wherever needed for the use of employees. Toilets at Site(s) shall conform to the requirements of Subpart "D", Section 1926.51 of the OSHA Standards for Construction. The Owner's toilet facilities shall not be used by the Contractor. Two (2) toilet facilities shall be positioned at the project site. One (1) toilet facility shall be for men. The other toilet facility shall be for women. Toilet facilities shall be relocated as required and be maintained close to daily work activities. The toilet facilities shall be cleaned and serviced on a weekly basis.

- B. Sanitary and Other Organic Wastes: The Contractor shall establish adequate and regular collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of in a manner satisfactory to the Owner and in accordance with all laws and regulations pertaining thereto.

#### 1.06 COMMUNICATIONS

- A. Internet Services: The Contractor shall provide and maintain internet services to the construction trailer for the contractor's personnel and Construction Manager.

#### 1.07 FENCE AND BARRICADES

The Contractor shall provide such protective fences and barricades as deemed necessary for public safety and to protect storage areas and the Work in place. The location and appearance of all fences shall be subject to the approval of the Engineer.

#### 1.08 CONTRACTOR PARKING

The Contractor shall construct a parking area on the project site "not to be developed." The parking area shall be available to the contractor and subcontractor's personnel, equipment suppliers, utility personnel, construction manager, owners representatives, geotechnical personnel and all others associated with this project. A minimum of 6 inches of Class 2 Base shall be placed over the parking area to allow access to the parking area during wet weather conditions.

#### 1.09 TEMPORARY LIVING QUARTERS

Temporary living quarters shall not be allowed on the Site or on publicly owned properties. In addition, all local zoning codes for the area in question shall be strictly adhered to.

#### 1.10 REMOVAL OF TEMPORARY CONSTRUCTION FACILITIES

The Contractor shall remove temporary toilets, storage sheds, material, and other temporary construction facilities from the site as soon as, in Engineer's opinion, the progress of Work permits. The Contractor shall recondition and restore those portions of the site occupied by the Contractor to a condition equal to or better than it was prior to construction.

**END OF SECTION**



**SECTION 01 55 00**  
**SITE ACCESS AND STORAGE**

**PART 1 - GENERAL**

**1.01 HIGHWAY AND STREET LIMITATIONS**

- A. The Contractor shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits and other limitations affecting transportation and ingress and egress to the Site. It shall be the Contractor's responsibility to construct and maintain any haul roads required for its construction operations or define any alternate routes to the Site due to roadway or bridge restrictions.
- B. Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street, utility right-of-way or the Site during the performance of the Work hereunder. The Contractor shall conduct its operations so as not to interfere unnecessarily with the authorized work of utility companies, other agencies, or the Owner's plant personnel. No street or access shall be closed without first obtaining permission of the Engineer or proper governmental authority. Where excavation is being performed in primary streets or highways one (1) lane in each direction shall be kept open to traffic at all times unless otherwise provided or shown by the Contract Documents. Fire hydrants on or adjacent to the Work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the Contractor to assure the use of sidewalks, access routes and the proper functioning of all gutters, sewer inlets and other drainage facilities.
- C. Traffic Control: For the protection of traffic in public streets and construction workers at the Site, the Contractor shall provide, place and maintain all necessary barricades, traffic cones, warning signs, lights and other approved safety devices. All barricades, traffic cones, warning signs, lights and other approved safety devices shall be placed according to the agency requirements maintaining jurisdiction, as applicable. The Contractor shall take all necessary precautions for the protection of the Work and the safety of the Owner's personnel and the public. All barricades and obstructions shall be illuminated at night.

**1.02 CONTRACTOR'S WORK AND STAGING AREA**

- A. Materials and equipment shall be stored, handled and placed in such a manner to insure the preservation of their quality and fitness for the project.
- B. The Contractor shall be allowed to use the portion of the project site "not to be developed" as a staging area, material storage area and construction parking area.
  - a. ~~If private property is utilized, the Contractor shall supply a Letter of Permission signed by the owner to the County representative at the Pre-construction Meeting.~~

~~The letter of Permission shall provide for restoration of the site to the satisfaction of the owner subject to County of Imperial requirements.~~

- ~~b. If Public Property is utilized, the site shall be maintained by the contractor as directed by the County representative. Unused material, if any, shall be removed from the site at the end of the project by the Contractor and the site shall be restored by the Contractor to the satisfaction of the County representative.~~
- C. Contractor shall provide its own security for its equipment and materials at its own expense. The Contractor shall erect fencing around the area "not to be developed" as illustrated on the plans.

**END OF SECTION**

**SECTION 01 75 50**  
**OPERATION AND MAINTENANCE MANUALS**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

The Contractor shall furnish to the Construction Manager three (3) identical sets of operation, maintenance and technical manuals. The Contractor shall include in the manuals for each item of mechanical, electrical and instrumentation equipment the following:

1. Complete operating instructions, including recommended troubleshooting and start-up procedures; tabulation of proper settings for all pressure relief valves, pressure switches and other related equipment protection devices; detailed test procedures to determine performance efficiency of equipment; list of all electrical relay settings including alarm and contact settings.
2. Preventive maintenance procedures and schedules, including required lubricants, filters, adjustments and special tools.
3. Parts lists, by generic title and identification number, complete with exploded views of each assembly. Spare parts information shall be included for each mechanical, electrical and instrumentation equipment. The spare parts list shall include the current list price of each spare part. The spare parts list shall be limited to those spare parts which each manufacturer recommends be maintained by the Owner in inventory at the plant site. Each manufacturer or supplier shall indicate the name, address and telephone number of its nearest outlet for spare parts to facilitate the Owner in ordering.
4. Disassembly and reassembly instructions, including required special tools.
5. Record drawings including diagrams and schematics as required under the electrical and instrumentation portions of these specifications.

**1.02 OPERATIONS AND MAINTENANCE MANUALS**

A. General:

1. The "Operating and Maintenance Manual" is a bound compilation of drawings and data required for each project. These manuals, complete with drawings and data, shall be furnished to the Owner.
2. The Contractor has overall responsibility to obtain the necessary data from and compile the data as set forth in this specification, including items or equipment purchased by the Owner and delivered to the Contractor for installation.

3. The number of binders (or "volumes") required for each individual project will depend on the amount of information to be catalogued.
  4. All information included shall be legible and sufficiently marked to indicate the exact size, model, type, etc., of equipment furnished and installed.
- B. Purpose: The Operating and Maintenance Manual is prepared to provide a ready reference to all important mechanical, electrical and instrumental equipment components installed at the project. It is also to provide the necessary operating and maintenance data for use by service personnel. It is also to provide information required for checking equipment performance or for planning of plant expansion or redesign.
- C. Quantity and Preparation:
1. Operation and Maintenance Manuals shall be prepared for the project.
    - A. Three (3) sets
  2. The quantities of drawings, manufacturer's literature, or other data required for these manuals are in addition to those otherwise required for normal distribution for approval during the construction period.

## PART 2 - MATERIALS AND METHODS

### 2.01 PAGE SIZE

- A. All pages shall be standard 8-½ x 11 inches size or approximate multiples (preferably 11 x 17 inches) folded to 8-½ x 11-inch manila pockets, which shall have standard three-ring side punching for insertion in the binders. The equipment name, drawing description and number shall be written on the face of each manila pocket.

### 2.02 DRAWINGS

- A. All drawings larger than 8-½ x 11" shall be folded and inserted in individual 8-½" x 11" manila pockets, which shall have standard three-ring side punching for insertion in the binders. The equipment name, drawing description and number shall be written on the face of each manila pocket.

### 2.03 BINDERS

- A. Binders shall be Buckram binders with block lettering for sheet size 8-½ x 11 inches with 2" to 3-½" expandable metal capacity as required for the project. The number of binders, however, shall be based on not filling them beyond 4".
- B. The following information shall appear on the front cover and backbone:
  1. "Operation and Maintenance Manual"

2. Project Name (Imperial County Community and Economic Development Niland Public Safety Facility) and volume number if more than one volume
3. Owner's name
4. Engineer's name
5. General Contractor's name

Item 5 need not be printed on the backbone.

#### 2.04 CONTENTS AND INDEXING

- A. Manuals shall contain descriptions of the plant systems in sufficient detail to adequately indicate the type of systems installed and the basic details of their operation.
- B. All purchased equipment data shall be used to designate the sections. Within each section additional indexing of component parts may be required.
- C. Operation and Maintenance Manuals shall contain to the fullest extent all possible information pertinent to the equipment. The arrangement and type of information to be filed shall be as follows:
  1. Copy of purchase order change (if any).
  2. Outline drawings, special construction details, "as built" electrical wiring and control diagrams for all major and supplementary systems.
  3. Manufacturer's test or calculated performance data and certified test curves.
  4. Installation, operating and maintenance instructions, including a complete parts list and sectional drawing with parts identification numbers. Mark with model, size and plan number.
  5. Manufacturer's brochure marked to indicate exact equipment purchased. Brochures on component parts supplied by a manufacturer with his equipment, but not manufactured directly by him, shall also be included.
  6. The serial numbers of each item of equipment installed are to be listed with the model numbers and plan symbols.
  7. Written warranties.
  8. Include a Table of Contents. The contents shall be divided with tabbed index dividers into the following suggested parts:

Part I	Building and System Descriptions
Part II	Purchased Equipment Data
Part III	Test Reports and Utility Charts

Part IV Start-Up and Operation

Part V Preventative Maintenance Recommendations

9. A copy of the approved submittals for each piece of equipment.
10. A copy of all testing, adjusting and balancing reports.
11. Wiring diagrams marked with model and size and plan symbol.
12. Operating and Maintenance Manuals data for Part I shall be obtained directly from the mechanical and electrical consultants. (All consultant preparation cost.)
13. The index shall contain the name and address of the manufacturer and, if different, where replacement and repair parts may be obtained.

## **2.05 EQUIPMENT SUMMARY DATA FORMS INFORMATION SHEET**

Equipment Summary Data Forms are intended to provide the Maintenance Department with sufficient information to catalogue newly purchased equipment items installed at the project site. This information is used for inventory purposes as well as for equipment performance tracking purposes. Each item of equipment installed at the facility must be documented on Equipment Summary Data Form. Examples of the form is attached. Additional requirements regarding submittal format, quantities, etc, are found elsewhere in this Specification.

1. Equipment item (included industry-accepted nomenclature).
2. Manufacturer address, phone/fax numbers
3. Supplier address (if different than above), phone/fax numbers
4. Equipment serial and model numbers
5. Size
6. Capacity
7. Rated output
8. Drive motor data (as appropriate).

In addition, information specific to the item described shall be provided as indicated on the following form.

**EQUIPMENT SUMMARY  
DATA FORM**

**EQUIPMENT ITEM:** \_\_\_\_\_

**EQUIPMENT COST:** \_\_\_\_\_

**EQUIPMENT SUPPLIER:** \_\_\_\_\_

<b>COMPONENT INFORMATION:</b>	
<b>NAMEPLATE DATE:</b>	<b>MANUFACTURER:</b>
<b>EQUIPMENT MODEL NO.:</b>	<b>EQUIPMENT SERIAL NO.:</b>
<b>EQUIPMENT MODEL DESIGNATION:</b>	<b>TYPE:</b>
<b>SIZE:</b>	<b>RATED OUTPUT:</b>
<b>CAPACITY:</b>	<b>SERVICE:</b>
<b>COMPONENT INFORMATION: DRIVE MOTOR DATA</b>	
<b>MANUFACTURER:</b>	
<b>SERIAL NO.:</b>	<b>HORSEPOWER:</b>
<b>MODEL:</b>	<b>FRAME:</b>
<b>TYPE:</b>	<b>VOLTAGE:</b>
<b>ENCLOSURE:</b>	<b>AMPERAGE:</b>
<b>PHASE:</b>	<b>SERVICE FACTOR:</b>
<b>HERTZ:</b>	
<b>LUBRICATION REQUIREMENTS: MOTOR</b>	
<b>COMMENTS:</b>	

## 2.06 INFORMATION SHEET FOR EQUIPMENT MAINTENANCE SUMMARY FORMS

Equipment Maintenance Summary forms are intended to provide the Maintenance Division with information sufficient to properly diagnose (troubleshoot, repair, check-out, and return an item of equipment to service. Standard information contained in each Form shall be as follows:

In addition, Maintenance information required to troubleshoot, repair, and return electrical/electronic equipment to service (including set point, derivatives, etc.) shall be included as required. The Maintenance Summary Form attached is intended to serve as a (minimum) guide to the information required per item of equipment. Additional requirements regarding submittal format, quantities, etc. are found elsewhere in this Specification.

1. Equipment item (include industry-accepted nomenclature)
2. Manufacturer address, phone/fax numbers
3. Equipment serial number(s)
4. Weight of individual components (over 100 pounds)
5. Nameplate data (including voltage, horsepower, lubrication requirements, speed, etc.)
6. Manufacturer's local representative address, phone/fax numbers
7. Maintenance operation(s) required. Listing shall include (1) Maintenance Operation to be performed. (2) frequency of said Maintenance Operation based on actual service conditions of installed equipment (i.e., type of duty, environmental factors). Reference shall be made to the appropriate section of the manufacturer's technical literature.
8. Lubricant list. List shall include a primary and two secondary manufacturer-approved lubricants.
9. Spare parts required for a minimum of one (1) year of equipment operation based on anticipated actual service conditions. Also the name, address, and phone number of the recommended source of spare parts shall be included if different than manufacturer's representative.



**TYPICAL MAINTENANCE SUMMARY FORM**

**NOTE:** SUPPLEMENTARY INFORMATION SHALL BE INCLUDED AS APPROPRIATE

1. EQUIPMENT ITEM: \_\_\_\_\_
2. MANUFACTURER: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_  
TELEPHONE NO.: \_\_\_\_\_ FAX NO.: \_\_\_\_\_
3. EQUIPMENT SERIAL/IDENTIFICATION NUMBERS: \_\_\_\_\_
4. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS): \_\_\_\_\_
5. NAMEPLATE DATA: \_\_\_\_\_
6. MANUFACTURER'S LOCAL REPRESENTATIVE: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_  
TELEPHONE NO.: \_\_\_\_\_  
FAX NO.: \_\_\_\_\_
7. MAINTENANCE OPERATION(S) REQUIRED: (attach separate sheet if required).

<u>OPERATION</u>	<u>FREQUENCY</u>	<u>COMMENTS</u>

8. LUBRICANT LIST. Provide Reference symbol used in items recommended.

SHELL	STANDARD OIL	GULF	ARCO	EQUAL

9. RECOMMENDED SPARE PARTS LISTS FOR MINIMUM OF ONE (1) YEAR UNINTERRUPTED SERVICE. (Attach separate sheet if required).

ITEM	PART NO.	QUANTITY REQUIRED (per unit)	UNIT COST	COMMENTS

**END OF SECTION**

**SECTION 01 77 00**  
**PROJECT CLOSEOUT**

**PART 1 - GENERAL**

**1.01 FINAL CLEANUP**

- A. The Contractor shall promptly remove from the vicinity of the completed work, all rubbish, unused materials, concrete forms, construction equipment and temporary structures and facilities used during construction. Final acceptance of the Work by the Owner will be withheld until the Contractor has satisfactorily complied with the requirements for final cleanup of the site.
- B. A portion of the undeveloped area is to be used as a staging area, contractor parking area and area to locate the construction project trailer. At the conclusion of the project, the undeveloped site is to be cleared of construction related material and items. The existing native earth surface is to be leveled to an elevation across the undeveloped site within 0.10 feet. The undeveloped site native surface is to be compacted to 85 percent of maximum density per ASTM D1557 and bladed smooth.

**1.02 FINAL SUBMITTALS**

- A. The Contractor, prior to requesting final payment shall obtain and submit the following items to the Construction Manager for transmittal to the Owner:
  - 1. Written guarantees, where required.
  - 2. Manufacturers' representative's installation, testing and startup report.
  - 3. Keying.
  - 4. Maintenance stock items, spare parts and special tools.
  - 5. Completed As-Builts.
  - 6. Certificates of inspection and acceptance by local governing agencies having jurisdiction.
  - 7. Releases from all parties who are entitled to claims against the subject project, property or improvement pursuant to the provisions of law.
  - 8. Extension of Performance Bond in accordance with Article 5.01A of the Standard General Conditions, if applicable.
  - 9. Submission of a "Proof of Environmental Mitigation" per Site Civil Technical Specification Section 02 24 00 and the Special Conditions, if required.

**1.03 MAINTENANCE AND GUARANTEE**

- A. The Contractor shall provide a bond to comply with the guarantee requirements contained in Article 5.01A of the Standard General Conditions.
- B. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the Owner. If the Contractor fails to make such repairs or replacements promptly the Owner reserves the right to do the Work and the Contractor and his surety shall be liable to the Owner for the cost thereof. Replacement of native material or aggregate fill, backfill or resurfacing where it has settled below the required finish elevations shall be considered as part of such required repair work.

**END OF SECTION**

## SECTION 01 77 50

### AS-BUILTS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. As-Builts are full size drawings (Plans) and Record Project Manual which are marked up during construction to delineate the actual in-place constructed conditions. As-Builts shall be provided by the Contractor for this Project. Requirements for As-Builts, as specified elsewhere, shall supplement the requirements specified herein.
- B. As-Builts shall include all changes in the Plans including those issued as Change Orders, Plan Clarifications, Addenda, Notice to Bidders, responses to Request for Information, Project Site Memos, and any additional details needed for the construction of the Project but not shown on the Plans. Any substructures encountered while excavating that are left in place shall be located by survey, to the satisfaction of the Engineer, shown, and identified on the As-Builts. All substructures including, but not limited to, concrete structures, electrical conduit and duct banks, drains and sanitary sewer pipelines, process piping, water lines, etc, whose installed location differs from that shown on the original Plans shall be precisely located by survey to the satisfaction of the Engineer and recorded on the As-Builts before backfilling.
- C. As-Builts shall be marked with red ink or chemical fluid on one (1) set of full size prints to produce a record of the complete installation. Any additional drawings that may be required to indicate record conditions shall be prepared on 24" x 36" paper. All additions to the plans shall employ and use drafting standards which are consistent with the drafting standards used in the Contract.
- D. The As-Builts, including those of all Subcontractors, shall be kept by the Contractor in the Contractor's Project Site Office, shall be updated during construction, and shall be available for the Construction Manager's inspection and copying at all times. The Construction Manager will review the As-Builts prior to submittal of all Monthly Payment Requests. If, in the opinion of the Construction Manager, the As-Builts are not current, approval of the Monthly Payment may be withheld until the drawings are made current.
- E. Where the Plans are diagrammatic or lacking precise details, the Contractor shall produce dimensioned full size sheets as the As-Builts. For installations outside of the structures, the locations shall be given by coordinates and elevations. Where substructures are encased in concrete, the outside dimensions of the encasement shall also be given.
- F. In the case of those Drawings which depict the detail requirements for equipment to be assembled and wired in the factory, the As-Builts shall be updated by indicating those portions which are superseded by final Shop Drawings and by including appropriate

reference information describing the Shop Drawings by manufacturer, drawing and revision numbers.

- G. At the Completion of the Work and after Final Inspection, the Contractor shall copy As-Built data, using red ink, onto a new set of Plans provided by the Owner. The Contractor shall certify to the completeness and accuracy of the "as installed" information indicated on the new set of Plans with its signature. The Contractor shall then deliver as a submittal to the Construction Manager, for review and approval, both the field developed As-Built Plans and the final signed As-Built Plans as a condition precedent to the Owner's release of any retained funds.

**END OF SECTION**

## SECTION 02 21 00

### SURVEYING

#### PART 1 - GENERAL

**The Contractor is responsible to employ and pay for a surveyor to complete the survey work and construction staking for this project.**

#### 1.01 DESCRIPTION

##### A. Project Boundary Survey Monuments

1. The Contractor shall be responsible for the preservation of survey monuments and benchmarks for this project. There are survey monuments located around the perimeter of the project boundary as illustrated on the plans. The contractor shall be responsible to protect the property survey monuments from disturbance or destruction during the construction project. As a precautionary measure, a registered California Licensed Land Surveyor or Registered Civil Engineer authorized to practice land surveying is to be engaged and compensated by the contractor. The California Licensed Land Surveyor or Registered Civil Engineer authorized to practice land surveying shall locate the monuments prior to the commencement of construction and place painted lath with flagging around the survey monuments. At least two (2) working days before the start of construction, the registered Land Surveyor or Registered Civil Engineer authorized to practice land surveying shall submit monument survey ties to the Contractor, Construction Manager and Design Engineer. There shall be a minimum of four (4) survey ties to each monument. The Contractor is responsible to ensure the survey monuments are not disturbed or destroyed during the project construction period.

Destroyed or disturbed monuments shall be replaced at the Contractor's expense by the California Licensed Land Surveyor or Registered Civil Engineer authorized to practice land surveying. Post-construction survey monument ties shall be submitted to the Construction Manager and Design Engineer at the completion of the Construction Work. If it is determined from a review of the post construction survey ties the survey monuments have been disturbed or if the monuments have been destroyed; the California Licensed Land Surveyor or Registered Civil Engineer shall re-establish and re-set the survey monuments in conformance with the Section 8771 of the Land Surveyors Act, Division 3, Chapter 15 of the State of California Business and Professions Code. The California Licensed Land Surveyor or Registered Civil Engineer shall coordinate the re-establishment of the property monuments with the County of Imperial Land Surveyor. The re-establishment of the property corner monuments shall be at the expense of the contractor.

B. Benchmarks:

1. The Contractor shall use Temporary Benchmark (TBM) number 2 illustrated on the Plans as the primary benchmark to complete survey work on this project. Temporary Benchmark (TBM) number 1 was used during the Project Design Phase; however, TBM number 1 will be destroyed during initial construction demolition procedures. The surveyor shall complete a level loop prior to the start of construction activities between TBM #1 and TBM #3. The surveyor's level loop survey notes shall confirm that TBM #1 and #3 elevations are within 0.02 feet per the TBM elevations illustrated on the plans.

**1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 31 23 00 – Earthwork
- B. Section 31 23 50 – Trenching and Backfilling – Water and Sewer Pipelines
- C. Section 32 12 00 – Asphalt Concrete Paving

**PART 2 – EXECUTION**

**2.01 PROJECT SURVEY TASKS**

- 2.01.1 Place painted lath and flagging (Christmas Trees) around the property monuments located around the perimeter of the project site boundary prior to the commencement of construction activities. Complete Survey Tie Cards with four (4) ties to each monument. The tie cards are to be dated and forwarded to the Contractor, Construction Manager and Design Engineer prior to the commencement of construction activities.
- 2.01.2 The Surveyor shall complete a level loop between TBM #1 and TBM #3 prior to the commencement of construction activities. The Surveyor's level loop survey notes shall confirm that TBM #1 and #3 elevations are within 0.02 feet per the TBM elevations illustrated on the plans.
- 2.01.3 4 foot painted lath with flagging and hubs shall be placed along the perimeter of the project site to be 1 developed and the perimeter of the project site which is not to be developed as illustrated on the plans. The lath and hubs shall be placed at the corners of the areas to be developed and not to be developed and along the perimeter boundaries at 50 feet on center.
- 2.01.4 Establish demolition lines on A.C. pavement with traffic marking paint.

- 2.01.5 Establish bluetop stakes (stakes established to a design grade, design subgrade or design subbase grade) across the project area to be developed on a 50 foot x 50 foot grid to elevation 955.75 after the initial native soil has been removed from the developed area and the scarification and compaction of the native earth has been successfully completed per Earthwork Specification 31 23 00 3.05B on page 16.
- 2.01.6 Establish bluetop stakes on a 50 foot x 50 foot grid to elevation 958.00 across the entire project site developed area after the native soil moisture conditioning and compaction has been completed per Earthwork Specification 31 23 00 3.05B on page 16.
- 2.01.7 Install 10 foot x 10 foot diagonal offset stakes from the fire station and cooling center building corners to construct the granular sand building pad including the 5 foot "blowup" area beyond the building wall lines. See the project Geotechnical Report regarding the pad blowup area.
- 2.01.8 Install 5 foot x 5 foot bluetop stakes across the granular building pad surface prior to the design engineer certifying the building pad surface elevation as approved.
- 2.01.9 Install in-line stakes at each building corner and at each architectural building line at an offset determined by the contractor.
- 2.01.10 Install 15 foot x 15 foot bluetop stakes across the A.C. pavement and PCC pavement subgrade class 2 base surfaces. These areas include the driveway entrances and A.C. parking lots.
- 2.01.11 Install in line offset stakes from the corners of the trash enclosure structure at an offset determined by the contractor. Install two (2) stakes at each trash enclosure structure corner.
- 2.01.12 Install toe of slope offset stakes at 25 feet on center, at angle points and along curves around the perimeter of the project site developed area. The offset distance is to be determined by the contractor. Provide slope information to the top of slope embankment.
- 2.01.13 Install top of slope offset stakes at 25 on center, angle points, beginning and end of curves and along curve radii for the retention basins. The offset distances are to be determined by the contractor. Provide slope information to the toe of slope
- 2.01.14 Install 10 foot x 10 foot bluetop stakes across the bottoms of the retention basins, along the toe of slopes of the retention basins and the corners of the retention basin bottoms.
- 2.01.15 Install offset stakes along curb and gutter and barrier curb at 15 feet on center along straight lines and curves, at angle points, at B.C.'s, E.C.s, beginning and termination points and other critical points. The offset distance shall be determined by the contractor. Cut and fill vertical distances shall be given to flowline or top of curb as determined by the contractor.



- 2.01.16 Install two (2) inline offset stakes at the corner of each pcc slab at the project site including the trash enclosure slab, generator set slab, electrical transformer slab, large exterior slab west and adjacent to the apparatus bays, fire backflow preventer slab, post indicator valve slab, entrance sign slab and similar slabs. Offset stakes will also be required to be placed at the B.C.'s and E.C.s and 10 foot on center along the curved portion of the large exterior slab west of the apparatus bay. The offset distances shall be determined by the contractor. Cut and fill vertical distances shall be given to the top of the pcc slabs.
- 2.01.17 Install offset stakes at 90 degree angles equal distance and inline with the center of the light pole pcc bases. A total of four offset stakes shall be installed. The offset distances shall be determined by the contractor. Cut and fill vertical distances shall be given to the top of the pcc light pedestals.
- 2.01.18 Install offset stakes along the sanitary sewer main along Evan Hewes Highway and the sanitary sewer lateral extending from the Sanitary Sewer Main along Evan Hewes Highway to the Fire Station and Cooling Center Building. The offset stakes shall be installed at 20 feet on center, cleanout locations, points of connection and pipeline beginning and termination points entering or exiting manholes. The offset stake distance shall be determined by the contractor. Cut and fill distances shall be given to the pipeline invert (flowline).
- 2.01.19 Manhole offset stakes shall be provided in line with the manhole center point. Stakes shall be established along lines at 90 degree angles. A total of four (4) offset stakes shall be established. This includes sanitary sewer and stormwater manholes. The offset distance shall be determined by the contractor. Cut and fill vertical distances shall be given to the manhole pipeline flowline elevation at the center of the manhole.
- 2.01.20 Install offset stakes along the water pipeline along Evan Hewes Highway at 20 feet on center, at valves, fittings, angle points and termination points. The offset distance shall be determined by the contractor. Cuts and fill vertical distances to the top of water pipeline shall be given.
- 2.01.21 Install offset stakes along the 2 inch domestic water service pipeline at 15 feet on center, at angle points, the location of the water meter, the location of the backflow preventor and the point of connection at the Fire Station and Cooling Center building. The offset distance shall be determined by the contractor. Cuts and fill vertical distances to the top of the 2 inch domestic water service pipeline shall be given.
- 2.01.22 Install offset stakes along the fire sprinkler pipeline at 20 feet on center, at angle points, the post indicator valve, fittings, the fire backflow preventer and the building point of connection. The offset distance shall be determined by the contractor. Cuts and fill vertical distances to the top of the fire sprinkler pipeline shall be given.
- 2.01.23 Install offset stakes along the fire hydrant 8 inch diameter pipeline at 20 feet on center, at angle points, fittings, valves and the fire hydrant. The offset distance shall be determined by the contractor. Cuts and fill distances to the top of the pipeline shall be given.

- 2.01.24 Install offset stakes for the stormwater pipelines between the retention basins and for the stormwater pipeline beneath the Fire Station and Cooling Center driveway entrance. The offset stakes shall be established 15 feet on center and at angle points and end points. The offset distance shall be determined by the contractor. Cut and fill distances to the pipeline invert (flowline) shall be given.
- 2.01.25 Offset top of swale slope stakes shall be established at 25 feet on center, angle points, beginning points and end points along the native earth stormwater swales located along both the north and south sides of Evan Hewes Highway. The top of swale, slope information and swale flowline cut and fill vertical distance shall be provided. The offset distance to the top of swale and swale flowline shall be provided by the contractor. After the swale is excavated place blue top stakes along the swale flowline grade at 25 feet on center, angle points and end points along the swale. Fine grade the swale flowline as required using the bluetop stakes.

**END OF SECTION**

**SECTION 02 24 00**  
**PROJECT ENVIRONMENTAL CONTROLS**

**PART 1 - GENERAL**

**1.01 ENVIRONMENTAL REPORTS AND REQUIRED MITIGATION MEASURES**

An Environmental Assessment Determinations and Compliance Findings for U.S. Department of Housing and Urban Development assisted Projects was completed per 24 Code of Federal Regulations (CFR) Part 58 for the Seeley Fire Station and Cooling Center; **hereafter referred to as NEPA Environmental Assessment**. The NEPA Environmental Assessment was certified by the County of Imperial Executive Officer on 9/15/2020.

The NEPA Environmental Assessment “*Summary of Findings and Conclusions*” on page 31 of the NEPA Environmental Assessment states,

*“The proposed Project would result in an overall beneficial impact for Imperial County Fire Department (ICFD) staff as well as the residents of the Colonia of Seeley. The Project will provide a new fire station and cooling center to allow the safe and efficient operation of the ICFD to serve the Colonia of Seeley. The Project will also include space for a cooling center/emergency shelter. Short-term construction impacts can be addressed through implementation of the mitigation measures identified below. No adverse effects would result from implementation of the proposed Seeley Fire Station and Cooling Center.”*

The NEPA Environmental Assessment “Mitigation Measures and Conditions [40 CFR 1505.2(c)] on page 31 of the NEPA Environmental Assessment noted that no mitigation measures were required for this project. The NEPA Environmental Assessment determination was a finding of no significant impact as listed on page 32 of the NEPA Environmental Assessment.

The NEPA Environmental Assessment did contain compliance and conformance determinations for existing statutes, executive orders and regulations listed at 24 CFR 50.4 and 58.6. The compliance and conformance determinations are listed on pages 13 through 21 of the NEPA Environmental Assessment. A portion of the compliance and conformance determinations are also contained in an *additional environmental document* prepared for the Seeley Fire Station and Cooling Center Project. The additional environmental document, *The CEQA Initial Study and Environmental Analysis – Mitigated Negative Declaration (Lot Merger #00147 & Initial Study #20-0018)* for the Seeley Fire Station and Cooling Center was adopted by the Imperial County Environmental Evaluation Committee (EEC) on November 19, 2020.

***The Contractor is responsible to review the NEPA Environmental Assessment and implement all compliance and conformance determinations.*** The NEPA Environmental Assessment can be obtained by contacting the Imperial County Workforce & Economic Development Department, 2799 South Fourth Street, El Centro, California 92243 – Telephone Number (442) 265-1104. The NEPA Environmental Assessment compliance and conformance determinations which do not appear to also be included in the CEQA Initial Study and Environmental Analysis Mitigation Measures are as follows:

**1.01.1 Clean Air** – The second paragraph of Clean Air on pages 14 and 15 states, “Although the project is expected to be well below emission thresholds and no significant air quality impacts are anticipated, the project contractor will use standard dust suppression measures to further minimize dust generation during construction. These would include controlling fugitive dust using the following techniques:

- Prepare a high wind dust control plan and implement plan elements and terminate soil disturbance when winds exceed 25 mph.
- Limit the simultaneous disturbance area to as small an area as practical when winds exceed 25 mph.
- Stabilize previously disturbed areas if subsequent construction is delayed.
- Water exposed surfaces 3 times per day.
- Cover all stock piles with tarps.
- Replace ground cover in disturbed areas quickly.
- Reduce speeds in unpaved roads to less than 15 mph.”

**1.01.2 Endangered Species** – The Endangered Species compliance determination on page 17 states, “Based on a search of the California Endangered Species Database, two California Endangered Species were identified within a one-half mile radius of the site. Chaparral sand-verbena and mud nama, both plants, are within 1/8 mile of the site. (Refer to Attachment A, EDR NEPA Check, p.3 “Natural Areas Map”, and Natural Areas Map Findings, pp. 55-57). No endangered species were identified on the Project parcel. The parcel and surrounding area are highly disturbed and include development to the east and to the north across Main Street. While there are no endangered species on the site, a pre-construction survey should be undertaken to identify any biological resources that could be present on the site that could be impacted by construction. If warranted by the results of the pre-construction survey, a Biological Monitor shall be present during construction to ensure that resources are avoided and protected. The Project is not anticipated to have a negative effect on endangered species based on existing conditions.”

**1.01.3 Historic Preservation** – The ninth sentence of the Historic Preservation compliance factors on page 19 states, “Construction workers, vehicles and staged materials will be monitored to ensure that project boundaries are maintained and that no areas outside the parcel are disturbed.”

The CEQA Initial Study and Environmental Analysis mitigation measures as adopted by the Imperial County Environmental Evaluation Committee (EEC) on November 19, 2020 for the Seeley Fire Station and Cooling Center Project are as follows:

**MITIGATION MEASURE BIOLOGICAL RESOURCES (MM BIO)**

MM – BIO 1:

A pre-construction survey shall be conducted by a Biologist to identify any sensitive biological resources in the areas affect by construction.

[Monitoring Responsibility: Imperial County Planning & Development Services (ICPDS), Biological Monitor; Timing: prior to construction]

MM – BIO 2:

If warranted by the results of the pre-construction survey, a Biological Monitor shall be present during construction to ensure that resources are avoided and protected.

[Monitoring Responsibility: Imperial County Planning & Development Services (ICPDS), Biological Monitor; Timing: during construction]

MM – BIO3:

A third-party compliance monitor shall be present during pre-construction activities/final design and construction to ensure that activities remain within designated boundaries and that no biological resources are unduly disturbed or harmed.

[Monitoring Responsibility: Imperial County Planning & Development Services (ICPDS), Biological Monitor and Third-Party Compliance Monitor, Timing: Prior to and during construction]

**MITIGATION MEASURE CULTURAL RESOURCES (MM CUL)**

MM – CUL 1:

Should archaeological resources be encountered during construction of the project, all work in that area shall be halted and a qualified archaeologist shall be summoned and shall have the authority to halt and redirect construction until the significance of the find can be determined. If the resource is determined to be significant, a recovery and catalog program shall be implemented.

[Monitoring Responsibility: Imperial County Planning & Development Services (ICPDS), Archaeologist; Timing: during construction]

MM – CUL-2:

Should artifacts or items of potential paleontological significance be discovered during the project construction activities, all work in that area shall be halted and a qualified paleontologist shall be summoned to the site to evaluate the find. If the resource is determined to be significant, a recovery and catalog program shall be implemented.

[Monitoring Responsibility: Imperial County Planning & Development Services (ICPDS), Qualified paleontologist; Timing: during construction]

MM – CUL-3:

If human remains are uncovered during project construction, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur in the immediate area until the County Coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code Section 5097.98. If the coroner recognizes the human remains to be those of a Native American, or has reason to believe that they are those of a Native American, he or she shall contact, by telephone within 24 hours, the State Native American Heritage Commission (NAHC) who will then contact the appropriate tribal representative.

[Monitoring Responsibility: Imperial County Planning & Development Services (ICPDS), County Coroner, Timing: during construction]

### MITIGATION MEASURE NOISE – 1 (MM NOI)

#### MM – NOI 1:

During construction, the project shall be subject to noise control via implementation of the County of Imperial Noise Ordinance.

[Monitoring Responsibility: Imperial County Planning & Development Services (ICPDS),  
Timing: during construction]

#### MM – NOI 2:

Construction equipment operation shall be limited to the hours of 7 a.m. to 7 p.m., Monday through Friday, and 9 a.m. to 5 p.m. Saturday. No commercial construction operations are permitted on Sunday or holidays.

[Monitoring Responsibility: Imperial County Planning & Development Services (ICPDS),  
Timing: during construction]

#### MM – NOI 3:

No construction equipment, or combination of equipment regardless of age or date of acquisition, shall be operated so as to cause noise at a level in excess of seventy-five (75) decibels for more than eight (8) hours during any twenty-four (24) hour period when measured at or within the property lines of any property which is developed and used either in part or in whole for residential purposes.

[Monitoring Responsibility: Imperial County Planning & Development Services (ICPDS),  
Timing: during construction]

A copy of the CEQA Initial Study and Environmental Analysis – Mitigated Negative Declaration (Lot Merger #00147 & Initial Study #20-0018) for the Seeley Fire Station and Cooling Center adopted by the EEC on November 19, 2020 can be obtained by contacting the Imperial County Workforce & Economic Development Department, 2799 South Fourth Street, El Centro, California 92243 – Telephone Number (442) 265-1104.

## 1.02 DUST ABATEMENT AND RUBBISH CONTROL

- A. The Contractor shall provide under the Contract all necessary measures to prevent its operation from producing dust in amounts damaging to property or causing a nuisance to Owner's plant personnel and operations or to persons living in or occupying buildings in the vicinity. The Contractor shall be responsible for damage resulting from any dust originating from its operations. The dust abatement measures shall be continued throughout the length of the Contract.
- B. During the progress of the Work the Contractor shall keep the Site and other areas used by it in a neat and clean condition and free from any accumulation of rubbish and waste materials. The Contractor shall maintain a dumpster at the project site and dispose of all rubbish and waste materials of any nature occurring at the Site, and shall establish collection and disposal of such materials and waste on a weekly basis. The maintenance of the site in a clean condition free of rubbish and waste materials,

maintenance of a dumpster at the project site and disposal of rubbish and waste materials shall be provided at the contractor's expense. The Contractor shall also keep its haul roads free from dirt, rubbish and unnecessary obstructions resulting from its operations. Disposal of all rubbish and surplus materials shall be off the site of construction in accordance with local codes and ordinances governing locations and methods of disposal and in conformance with all applicable Safety Laws and Health Standards for Construction. The Owner's dumpster shall not be used by the Contractor.

- C. Contractor shall implement regulations set by CAL EPA and the Imperial County Air Pollution Control District for all work activities related to this Project.

### **1.03 CHEMICALS**

- A. All chemicals used during project construction or furnished for project operation, whether soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall show approval for use by either the U.S. Environmental Protection Agency, the U.S. Department of Agriculture or the local jurisdictional agency. Use of all such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer.

### **1.04 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)**

- A. The soil disturbance area resulted by the construction of the project will be more than 1 acre. A Stormwater Pollution Prevention Plan (SWPPP) was prepared during the project design period as required by the National Pollution Discharge Elimination System (NPDES) General Permit for construction activities. The SWPPP is included as a contract document item. The contractor is responsible to implement the provisions of the SWPPP including the erosion control plans and best management practices (BMP's). The erosion control plans are included with the improvement plans. The contractor shall engage a Qualified SWPPP Practitioner (QSP) for site inspection and reporting services. The QSP shall assist the County of Imperial (Owner) in obtaining a Waste Discharge Identification Number (WDID). The QSP shall assist the County of Imperial in filing daily, quarterly, and annual reports, filing the Notice of Termination (NOT) at the project conclusion and all other required SWPPP documents through the Storm Water Multi Application and Report Tracking System (SMARTS). The County of Imperial shall pay for all SWPPP and SMARTS filing fees. The contractor shall pay for all services of the QSP throughout the project duration.

### **1.05 AIR POLLUTION CONTROL DISTRICT REQUIREMENTS**

The Contractor shall be responsible for abiding with the latest edition of Regulation VIII set forth by Imperial County Air Pollution Control District. The Contractor shall also be responsible for preparation and submission of a Construction Notification Form and Dust Control Plan to the County of Imperial Air Pollution Control District. The Construction Notification Form and Dust Control Plan shall also be posted at the Project Site. A copy of the Construction Notification Form and Regulation VIII documents follow the end of this specification section.

The Imperial County Air Pollution Control District contact information is:

150 South Ninth Street  
El Centro, CA 92243  
Phone: 760-482-4606  
Fax: 760-353-9904

<http://www.imperialcounty.net/AirPollution/>

Contacts:

Reyes Romero, Assistant Air Pollution Control Officer  
Monica Soucier, Division Manager Planning

The contractor is to include the costs associated with the Air Pollution Control District requirements in the Proposal.

**END OF SECTION**



### Imperial County Air Pollution Control District Construction Notification Form

Project Information	
Project Name:	_____
Project Address:	_____
Major X-Streets:	_____
City:	County: _____
Expected Construction Start Date:	Total project site area: _____ Acres
End Date:	Total disturbed surface area: _____ Acres
The project is: <input type="checkbox"/> Residential <input type="checkbox"/> Non-residential (commercial, industrial, institutional, public, etc.)	
Construction activities on any site will include ten acres or more of disturbed surface area for residential developments, or five acres or more for non-residential developments, are required to submit a Dust Control Plan to the District prior to the start of any construction activity. The Construction Notification Form may not be used to circumvent any Dust Control Plan requirement.	

Contacts	
Property Owner:	_____
Address:	_____
City / State / Zip:	_____
Phone:	Fax: _____ Cell: _____
Developer:	_____
Address:	_____
City / State / Zip:	_____
Contact Person:	_____
Phone:	Fax: _____ Cell: _____
General Contractor:	_____
Address:	_____
City / State / Zip:	_____
Contact Person:	_____
Phone:	Fax: _____ Cell: _____
Other Contact:	_____
Company:	_____
Address:	_____
City / State / Zip:	_____
Phone:	Fax: _____ Cell: _____

**Mailing Address: 150 South 9th Street  
El Centro, CA 92243  
Office: (760) 482-4606  
Fax: (760) 353-9904**



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SAMPLE FORMAT  
CONSTRUCTION  
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**REGULATION VIII - Rules 800-805**

**PROJECT IDENTIFICATION**

Project Name \_\_\_\_\_ Project CUP # \_\_\_\_\_  
Legal Name/Company \_\_\_\_\_ City \_\_\_\_\_  
Contact name \_\_\_\_\_ Contact Phone \_\_\_\_\_

Description of the location of the project; such as Address and major cross roads

**PROJECT CONTACTS**

In order to comply with the requirements of Regulation VIII all contacts responsible for the submittal and implementation of the Dust Control Plan shall be identified below with an explanation of the responsibility of each contact. If additional space is needed please attach a sheet. (Rule 801, subsection F.2.c.1)

NAME \_\_\_\_\_ TITLE \_\_\_\_\_  
PHONE NUMBER \_\_\_\_\_ E-MAIL ADDRESS \_\_\_\_\_

Describe the association the named person above has to the identified project. What are that person's duties, responsibilities. Does the person named above have the primary responsibility for implementing the Dust Control Plan? Is this person responsible for the project site?

NAME \_\_\_\_\_ TITLE \_\_\_\_\_  
PHONE NUMBER \_\_\_\_\_ E-MAIL ADDRESS \_\_\_\_\_

Describe the association the named person above has to the identified project. What are that person's duties, responsibilities. Does the person named above have the primary responsibility for implementing the Dust Control Plan? Is this person responsible for the project site?

Please identify any known contractors, names, phone contact person etc., hired to work on the project site on separate cover.



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Project Name \_\_\_\_\_

Project CUP # \_\_\_\_\_

**PROJECT CONSTRUCTION OPERATIONS**

Provide pertinent information concerning the projects construction operations - include a plot plan (which may be a tract map, site map or topographic map) which identifies the boundaries of the project, existing roads (including but not limited to paved, unpaved road ways, highways and freeways), where new proposed roads will be constructed, where the staging areas will be located, easements, entry and exit points (include whether these entry points will be permanent or temporary), whether or not sensitive receptors are adjacent to the project (including but not limited to residential areas, schools, day cares, churches, hospitals, nursing facilities, commercial and/or retail), include the distance between the project and the sensitive receptors and any other information as to allow for the proper evaluation of dust generating point sources and their impact. (Rule 801, subsection F.2.c.2&5)

The following checklist is provided solely as a guide and is not meant to be all inclusive. During the Plot Plan review process the Air District may identify additional dust generating point sources. For those instances where additional sources, not listed, have been identified please list under other. (Rule 801 subsection F.2.c.2&5)

**List all identified actual and potential sources of fugitive dust emissions**

- Bulk material handling and storage areas.
- Paved and unpaved access roads, haul roads, traffic areas, and equipment storage yards.
- Exit points where carryout and trackout onto paved public roads may occur.
- Water supply locations if water application will be used for controlling visible dust emissions.
- Other list below.

**Check or list the relative locations of sensitive receptors within ¼ mile of the project.** (Rule 407, Nuisance)

- No sensitive receptors within ¼ mile of the project.
- Residential areas, schools, day care, churches, hospitals, nursing facilities, commercial, retail, etc.
- Freeways, roads, or traffic areas that may be affected by the dust generating activities.
- Other list below.



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Project Name \_\_\_\_\_ Project CUP # \_\_\_\_\_

**DISTURBED SURFACE AREA**

Report the total area of land surface to be disturbed, the daily throughput volume of earthmovement in cubic yards and the total area in acres of the entire project site. (Rule 801, subsection F.2.c.3&4)

Total area of project site \_\_\_\_\_ Acres Total surface area to be disturbed \_\_\_\_\_ Acres  
Total disturbed areas left inactive for more than seven days  
\_\_\_\_\_ Acres

Daily average throughput volume of earthmoving \_\_\_\_\_ Cubic Yards Daily maximum throughput volume of earthmoving  
\_\_\_\_\_ Cubic Yards

**OTHER SITES**

Identify whether any other locations should be included with this plan that are involved with this project. An example may include listing any site where materials will be imported from or exported to.

No other locations are included with this project

**Location 1:** \_\_\_\_\_

No Dust Control Plan Required  Included with this plan  Included with another plan

**Location 2:** \_\_\_\_\_

No Dust Control Plan Required  Included with this plan  Included with another plan

**Location 3:** \_\_\_\_\_

No Dust Control Plan Required  Included with this plan  Included with another plan

**DUST GENERATING ACTIVITY DATES**

**EXPECTED CONSTRUCTION START AND END DATES**

IF CONSTRUCTION IS NOT PHASED SIMPLY INCLUDE THE START AND END DATES UNDER THE PHASE 1 OPTION

Phase 1 Start Date _____	Phase 3 Start Date _____
Phase 1 End Date _____	Phase 3 End Date _____
Phase 2 Start Date _____	Phase 4 Start Date _____
Phase 2 End Date _____	Phase 4 Start Date _____



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Project Name \_\_\_\_\_ Project CUP # \_\_\_\_\_

**MINIMUM REQUIREMENTS**

This section describes the minimum requirements for limiting visible dust emissions from activities that cause fugitive dust emissions. Each category must have one requirement check marked.

(Rule 801 section F) For Enhanced Measures check all that apply.

**Structural Demolition**

No demolitions are planned for this project explain below.

Asbestos NESHAP notification has been submitted to the ARB and copy to the District.

Date notification submitted \_\_\_\_\_

**Pre-Activity** (Rule 801 subsection F.1.a)

Not applicable for this project explain below.

The site will be pre-watered and work will be phased to reduce the amount of disturbed surface area at any one time. (Complete section M-1 beginning with page 7)

**Active Operations** (Rule 801, subsection F.1.b)

Application of water or Chemical Stabilizers to earthmoving activities. (Complete sections M-1 and/or M-2)

Construct & maintain wind barriers to limit visible dust emissions to 20%. (Complete section M-3)

**Temporary stabilization: areas unused for seven or more days** (Rule 801 subsection F.1.c)

Not applicable for this project explain below.

Vehicular access will be restricted and water or dust suppressants will be applied and maintained at all unvegetated areas. (Complete sections M-2 and/or section M-3)



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Project Name \_\_\_\_\_ Project CUP # \_\_\_\_\_

**MINIMUM REQUIREMENTS CONTINUED**

This section describes the minimum requirements for limiting visible dust emissions from activities that cause fugitive dust emissions. Each category must have one requirement check marked.

(Rule 801 section F) For Enhanced Measures check all that apply.

**Unpaved Access, Haul Roads, Traffic & Equipment Storage Areas** (Rule 805)

Not applicable for this project explain below.

Apply water or dust suppressants to unpaved haul and access roads. (Complete sections M-1 and/or M-2)

Method of restricting unauthorized vehicle access. (Complete section M-3)

Water or dust suppressants will be applied to vehicle traffic and equipment storage areas. (Complete sec M-1 and/or M-2)

Establish vegetation on all previously disturbed areas. (Complete section M-3)

**Outdoor Handling of Bulk Materials** (Rule 802)

No bulk materials will be handled during this project explain below.

Water or dust suppressants will be applied when handling bulk materials. (Complete sections M-1 and/or M-2)

Protection from wind erosion by sheltering or enclosing the operation and transfer line. (Complete section M-3)

**Outdoor Storage of Bulk Materials** (Rule 802)

No bulk materials will be stored during this project explain below.

Water or dust suppressants will be applied to storage piles. (Complete sections M-1 and/or M-2)

Storage piles will be covered with tarps, plastic or other suitable material and anchored in such a manner that prevents the cover from being removed by wind action. (Complete section M-3)



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Project Name \_\_\_\_\_

Project CUP # \_\_\_\_\_

**MINIMUM REQUIREMENTS CONTINUED**

This section describes the minimum requirements for limiting visible dust emissions from activities that cause fugitive dust emissions. Each category must have one requirement check marked.  
(Rule 801 section F) For Enhanced Measures check all that apply.

**On-Site/Off Site Transporting of Bulk Materials**

No bulk materials will be transported on the project site explain below

- Haul trucks will be covered with a tarp or other suitable cover. *(Complete section M-5)*
- All haul trucks will be loaded such that the freeboard is not less than six inches when transported across any paved public access road. *(Complete section M-5)*
- Cargo compartments are maintained so that **no** spillage and loss of bulk material will occur from holes or other openings in the floor, side and/or tailgate. *(Complete section M-5)*
- Cargo compartment is to be cleaned and/or washed at delivery site after removal of Bulk Material. *(Complete section M-5)*

**Enhanced Measures:** *According to Regulation VIII stabilization must be met at all times. See Rule 801 subsection D.2*

- Cease dust generating activities when wind speeds exceed 25mph. *(Records of wind speeds and wind gusts must be maintained and provided to the APCD upon request.)*
- Application of water or dust suppressants once per hour when wind speeds exceed 15mph. *(Records of wind speeds and wind gusts must be maintained and provided to the APCD upon request.)*
- Apply water to maintain 12% soil moisture content when wind speed exceeds 15mph. *(Records of wind speeds and wind gusts must be maintained and provided to the APCD upon request.)*
- Construct fences 3-5 feet high with 50% or less porosity in conjunction with water application or dust suppressant when wind speeds exceed 15mph. *(Records of wind speeds and wind gusts must be maintained and provided to the APCD upon request.)*
- OTHER - If necessary attach separate sheet.



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SAMPLE FORMAT  
CONSTRUCTION  
DUST CONTROL PLAN

SECTION M-1

Project Name \_\_\_\_\_ Project CUP # \_\_\_\_\_

**WATER APPLICATION**

Complete this section if water application will be used as a control method for limiting visible dust emissions and stabilizing surface areas. Check and answer all sections that apply to this project. In addition, if there is no intention of applying water to any phase of the project explain below. (Rule 801 section F)

**NO WATER APPLICATION - EXPLAIN?**

**WATER APPLICATION SUPPLY - THE LOCATION OF EACH MUST BE IDENTIFIED ON THE PLOT PLAN**

Fire hydrants

Number of hydrants available      On-Site \_\_\_\_\_      Off-Site \_\_\_\_\_

Approval granted by the owner or public agency to use their fire hydrants for this project.

Owner or Agency granting approval \_\_\_\_\_

Contact Name and phone number \_\_\_\_\_

Storage tanks      Number of tanks \_\_\_\_\_      Capacity of each \_\_\_\_\_

Wells      Number of wells \_\_\_\_\_      Flow rate of each well \_\_\_\_\_

Canal, River, Pond, Lake etc.

Approval granted by the owner or public agency to use their water source for this project

Owner or Agency granting approval \_\_\_\_\_

Contact Name and phone number \_\_\_\_\_

Other explain





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SECTION M-1 CONTINUED

Project Name \_\_\_\_\_ Project CUP # \_\_\_\_\_

**WATER APPLICATION CONTINUED**

Complete this section if water application will be used as a control method for limiting visible dust emissions and stabilizing surface areas. Check and answer all sections that apply to this project. In addition, if there is no intention of applying water to any phase of the project explain above. (Rule 801 section F)

**WATER APPLICATION EQUIPMENT: THE LOCATION OF EACH MUST BE IDENTIFIED ON THE PLOT PLAN**

Sprinklers

Describe the activities that will utilize sprinklers

Minimum treated area \_\_\_\_\_  Square Feet      Frequency \_\_\_\_\_

Acres

Maximum treated area \_\_\_\_\_  Square Feet      Frequency \_\_\_\_\_

Acres

Water Truck     Other explain \_\_\_\_\_

Describe the activities that will utilize the equipment

Number of application equipment to be used \_\_\_\_\_ Hours of operation \_\_\_\_\_

Application equipment capacity \_\_\_\_\_

Application frequency must be once per day or more explain frequency below

Water application equipment is available to operate after normal working hours, on weekends and holidays

Name of contact after hours \_\_\_\_\_ Phone No. \_\_\_\_\_

Name of contact after hours \_\_\_\_\_ Phone No. \_\_\_\_\_



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SAMPLE FORMAT  
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SECTION M-2

Project Name \_\_\_\_\_ Project CUP # \_\_\_\_\_

**DUST SUPPRESSANT PRODUCTS**

Complete this section if a dust suppressant product will be used. These materials include but are not limited to: hygroscopic suppressants (road salts), adhesives, petroleum emulsions, polymer emulsions and bituminous materials (road oils).

**Not Applicable** - The only control method will be the application of water *(Complete section M-1)*

Application Area; Explain where the dust suppressant will be applied below

Product (Manufacturer) Name \_\_\_\_\_

Name of contractor \_\_\_\_\_ Phone No. \_\_\_\_\_

Explain the rate of application including the amount of gallons of undiluted material per mile or per acre below.

Explain the application frequency; type and number of equipment; capacity including the amount of gallons of undiluted material per mile or per acre below.

Utilizing the checklist below attach each of the following pieces of information that fully describes the product to be used. All information must be submitted with this plan.

- Product Specifications. (MSDS, Product Safety Data Sheet, etc.)
- Manufacturer's Usage Instructions. (method, frequency and intensity of application)
- Environmental impacts and approvals or certifications related to the appropriate and safe use for ground application.
- Check here if more than one dust suppressant will be utilized and include the necessary copies of this page with the information for each dust suppressant to be used.



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SAMPLE FORMAT  
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DUST CONTROL PLAN

SECTION M-3

Project Name \_\_\_\_\_ Project CUP # \_\_\_\_\_

**OTHER DUST CONTROL METHODS**

Check below all other types of dust control methods that will be employed at the construction site.

Physical barriers for restricting unauthorized vehicle access

- Fences     Gates     Posts     Berms     Concrete Barriers  
 Other explain below

Wind barriers describe below.

Re-establish vegetation for temporarily stabilizing previously disturbed surfaces explain below.

Apply Gravel- for the application of gravel identify where application will occur such as haul road, access roads, equipment storage yards (areas), vehicle traffic areas etc explain below.

Apply pavement - explain where paving will occur.

Other explain below.



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SAMPLE FORMAT  
CONSTRUCTION  
DUST CONTROL PLAN

SECTION M-4

Project Name \_\_\_\_\_

Project CUP # \_\_\_\_\_

**TREATMENTS FOR PREVENTING TRACKOUT**

Select the control devices that will be used for preventing trackout from occurring onto paved public roads. Trackout is any material that adheres to vehicle tires and is deposited onto a paved public road or the paved shoulder of a paved public road. Check all that apply to this project below.

- Grizzly:** Rails, pipes, or grates used to dislodge debris off of vehicles before exiting the site. Extends from the intersection with the paved public road surface for the full width of the unpaved exit surface for a distance of at least 25 feet. **Describe below**

- Gravel Pad:** A layer of washed gravel at least three (3) inches deep which extends from the intersection with the public paved road surface for the full width of the unpaved exit surface for a distance of at least 50 feet. Identify gravel size in inches, the pad width in feet, including the length and depth of the gravel below.

- Paved Surface:** Extends from the intersection with the paved public road surface for the full width of the unpaved access road for at least 50 feet to allow mud and dirt to drop off of vehicles before exiting the site. Identify the width and length of the paved surface below in feet.

Mud and dirt deposits within an urban area shall be cleaned immediately when trackout or carryout extends a cumulative distance of 50 linear feet or more otherwise clean up must be at the end of the workday.

- Wheel Washer:** Uses water to dislodge debris from tires and vehicle undercarriage. If utilizing a wheel washer describe the location, type and operation of the wheel washer below.

- Other -** describe any other measure utilized to prevent trackout below.



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SECTION M-5

Project Name \_\_\_\_\_ Project CUP # \_\_\_\_\_

**TREATMENTS FOR PREVENTING CARRYOUT**

Report the required treatments that will be used for preventing carryout from occurring on paved public roads. Carryout occurs when materials from emptied or loaded haul trucks, vehicles, or trailers fall onto a paved public road or paved shoulder of a paved public road. Check all that apply.

No haul trucks will be routinely entering or leaving the project site explain below.

**Emptied Haul Trucks:**

Interior cargo compartments will be cleaned before leaving the project site. Explain below how emptied haul truck will be washed and the source of the water supply.

Cargo compartment will be covered with a tarp or suitable cover before leaving the project site.

**Loaded Haul Trucks:**

Spillage or loss of materials from holes or other opening(s) in the cargo compartment will be prevented when material transported onto any paved public access road.

Haul trucks will be loaded such that the freeboard is not less than six inches.

Other describe below.



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SECTION M-6

Project Name \_\_\_\_\_

Project CUP # \_\_\_\_\_

**CLEANING UP CARRYOUT AND TRACKOUT**

Check and report below the methods and frequency for cleaning up carryout and trackout from the surface and paved shoulder of paved public roads. All material tracked or carried out onto paved road must be removed. Check all that apply.

**The project is located in**

**An Urban Area**

Identify the urban area by location, description etc. below.

Minimum cleanup frequency will be at the end of the workday and removed immediately if carryout and trackout, extends beyond 50 feet.

**Non Urban Area**

Identify the non urban area by location, description etc. below.

At the end of the workday

**Optional - Clean up Method**

Manually sweeping and picking up.

Mechanical sweeping with a rotary brush or broom accompanied or preceded by water.

Describe types of equipment that will be used.

The use of blower devices, or dry rotary brushers or brooms, for removal of carryout and trackout from paved public roads is not recommended.



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Project Name \_\_\_\_\_ Project CUP # \_\_\_\_\_

**RECORD KEEPING**

Records and/or any other supporting documents used for the demonstration of compliance must be maintained for two years and provided to the Air Pollution Control District upon request.

**CERTIFICATION**

I certify that all information contained herein and information submitted in the attachments to these documents are true and correct.

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Phone Number

\_\_\_\_\_  
Fax Number

\_\_\_\_\_  
Cell Number

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Steel reinforcement bars.

### 1.2 ACTION SUBMITTALS

#### A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Bar supports.

#### B. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

#### C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of Architect.

### 1.3 INFORMATIONAL SUBMITTALS

#### A. Material Test Reports: For the following, from a qualified testing agency:

1. Steel Reinforcement

## PART 2 - PRODUCTS

### 2.1 STEEL REINFORCEMENT

#### A. Reinforcing Bars: ASTM A615, Grade 60, deformed.

### 2.2 REINFORCEMENT ACCESSORIES

#### A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.



1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
  - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
- B. Steel Tie Wire: ASTM A1064, annealed steel, not less than 0.0508 inch in diameter.

## 2.3 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protection of In-Place Conditions:
  1. Do not cut or puncture vapor retarder.
  2. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

### 3.2 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.
  1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
  2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318.
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
  1. Bars indicated to be continuous, and all vertical bars to be lapped not less than 36 bar diameters at splices, or 24 inches whichever is greater.
  2. Stagger splices in accordance with ACI 318.

### 3.3 JOINTS

- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 1. Place joints perpendicular to main reinforcement.
  - 2. Continue reinforcement across construction joints unless otherwise indicated.
  - 3. Do not continue reinforcement through sides of strip placements of floors and slabs.

### 3.4 INSTALLATION TOLERANCES

- A. Comply with ACI 117.

### 3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare test reports.
- B. Inspections:
  - 1. Steel-reinforcement placement.

END OF SECTION 032000

## SECTION 033000 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

##### B. Related Requirements:

1. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
2. Section 312000 "Earth Moving" for drainage fill under slabs-on-ground.

#### 1.2 DEFINITIONS

- ##### A. Cementitious Materials:
- Portland cement alone or in combination with one or more of the following: fly ash, slag cement, and other pozzolans materials subject to compliance with requirements.

- ##### B. Water/Cement Ratio (w/cm):
- The ratio by weight of water to cementitious materials.

#### 1.3 ACTION SUBMITTALS

##### A. Product Data:

For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Aggregates.
5. Admixtures:

- a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

6. Vapor retarders.

##### B. Design Mixtures:

For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.

5. Slump limit.
6. Air content.
7. Nominal maximum aggregate size.
8. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
9. Intended placement method.
10. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
  - a. Location of construction joints is subject to approval of the Architect.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

#### 1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Vapor retarders.
5. .

B. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Aggregates.
5. Admixtures:

C. Research Reports: For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.

D. Preconstruction Test Reports: For each mix design.

- E. Field quality-control reports.

## 1.5 QUALITY ASSURANCE

- A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
  - 1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

## 1.7 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 306.1.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M).

## PART 2 - PRODUCTS

### 2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 (ACI 301M) unless modified by requirements in the Contract Documents.

### 2.2 CONCRETE MATERIALS

- A. Cementitious Materials:
  - 1. Portland Cement: ASTM C150/C150M, Type I gray
  - 2. Fly Ash: ASTM C618, Class C or F.
  - 3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C33/C33M, Class 1N aggregate or better, graded. Provide aggregates from a single source.
  - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
- C. Air-Entraining Admixture: ASTM C260/C260M.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete.

Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

- E. Water and Water Used to Make Ice: ASTM C94/C94M, potable or complying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4.

### 2.3 VAPOR RETARDERS

- A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A >; not less than 10 mils (0.25 mm) thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

### 2.4 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301. (ACI 301M).

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Other Pozzolans: 25 percent by mass.
2. Slag Cement: 50 percent by mass.
3. Total of Fly Ash or Other Pozzolans, Slag Cement: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass.
4. Total of Fly Ash or Other Pozzolans: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass.

- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

### 2.5 CONCRETE MIXTURES

- A. Class A: Normal-weight concrete used for footings, grade beams, and slabs-on-grade.

1. Exposure Class: ACI 318 F0, S0, W0, C1.
2. Minimum Compressive Strength: As shown on plan.
3. Maximum w/cm: As shown on plan.
4. Slump Limit: As shown on plan.
5. Air Content:

- a. Exposure Class F0: 2.0 percent, plus or minus 1.0% at point of delivery.
- 6. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

## 2.6 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94 and furnish batch ticket information.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
  - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.

### 3.2 INSTALLATION OF VAPOR RETARDER

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
  - 1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
  - 2. Face laps away from exposed direction of concrete pour.
  - 3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
  - 4. Lap joints 6 inches and seal with manufacturer's recommended tape.
  - 5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
  - 6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
  - 7. Protect vapor retarder during placement of reinforcement and concrete.
    - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

### 3.3 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
  - a. Continue reinforcement across construction joints unless otherwise indicated.
  - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least 1" of concrete thickness as follows:
  1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
- E. Doweled Joints:
  1. Install dowel bars and support assemblies at joints where indicated on Drawings.
  2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

### 3.4 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
  1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
  2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M), but not to exceed the amount indicated on the concrete delivery ticket.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
  1. If a section cannot be placed continuously, provide construction joints as indicated.



2. Deposit concrete to avoid segregation.
  3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301 (ACI 301M).
    - a. Do not use vibrators to transport concrete inside forms.
    - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Do not place concrete floors and slabs in a checkerboard sequence.
  2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  3. Maintain reinforcement in position on chairs during concrete placement.
  4. Screed slab surfaces with a straightedge and strike off to correct elevations.
  5. Level concrete, cut high areas, and fill low areas.
  6. Slope surfaces uniformly to drains where required.
  7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
  8. Do not further disturb slab surfaces before starting finishing operations.

### 3.5 FINISHING FORMED SURFACES

Retain types of formed finishes required in this article. Coordinate finishes retained with Drawing Room Finish Schedule, or indicate location of each finish on Drawings.

#### A. As-Cast Surface Finishes:

1. **ACI 301 (ACI 301M)** Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
  - a. Patch voids larger than **1-1/2 inches (38 mm)** wide or **1/2 inch (13 mm)** deep.
  - b. Remove projections larger than **1 inch (25 mm)**.
  - c. Tie holes do not require patching.
  - d. Surface Tolerance: **ACI 117 (ACI 117M)** Class D.
  - e. Apply to concrete surfaces [**not exposed to public view**] **<Insert locations>**.
2. **ACI 301 (ACI 301M)** Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
  - a. Patch voids larger than **3/4 inch (19 mm)** wide or **1/2 inch (13 mm)** deep.

- b. Remove projections larger than **1/4 inch (6 mm)**.
- c. Patch tie holes.
- d. Surface Tolerance: **ACI 117 (ACI 117M)** Class B.

Revise locations in "Locations" Subparagraph below to suit Project, or delete subparagraph and indicate locations on Drawings. Retain second option if additional finishing is required.

- e. Locations: Apply to concrete surfaces [**exposed to public view,**] [**to receive a rubbed finish,**] [**or to be covered with a coating or covering material applied directly to concrete**] <Insert locations>.

3. **ACI 301 (ACI 301M)** Surface Finish SF-3.0:

- a. Patch voids larger than **3/4 inch (19 mm)** wide or **1/2 inch (13 mm)** deep.
- b. Remove projections larger than **1/8 inch (3 mm)**.
- c. Patch tie holes.
- d. Surface Tolerance: **ACI 117 (ACI 117M)** Class A.

Revise locations in "Locations" Subparagraph below to suit Project, or delete subparagraph and indicate locations on Drawings. Retain second option if additional finishing is required.

- e. Locations: Apply to concrete surfaces [**exposed to public view,**] [**to receive a rubbed finish,**] [**or to be covered with a coating or covering material applied directly to concrete**] <Insert locations>.

B. Related Unformed Surfaces:

- 1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
- 2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.6 FINISHING FLOORS AND SLABS

- A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

Retain one or more of "Scratch Finish," "Float Finish," "Trowel Finish," "Trowel and Fine-Broom Finish," "Broom Finish," and "Slip-Resistive Finish" paragraphs below for types of slab finishes required. Coordinate slab finishes retained with finish schedule, or indicate location of each finish on Drawings.

B. Scratch Finish:

- 1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
- 2. Use stiff brushes, brooms, or rakes to produce a profile depth of **1/4 inch (6 mm)** in one direction.

Revise locations of scratch finish in subparagraph below to suit Project, or delete subparagraph and indicate locations on Drawings.

3. Apply scratch finish to surfaces **[to receive concrete floor toppings] [to receive mortar setting beds for bonded cementitious floor finishes]** <Insert locations>.

C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with **ACI 117 (ACI A117M)** tolerances for conventional concrete.

Revise locations of float finish in subparagraph below to suit Project, or delete subparagraph and indicate locations on Drawings.

3. Apply float finish to surfaces **[to receive trowel finish] [and] [to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo]** <Insert locations>.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.

Revise locations of trowel finish in first subparagraph below to suit Project, or delete subparagraph and indicate locations on Drawings.

6. Apply a trowel finish to surfaces **[exposed to view] [or] [to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system]** <Insert locations>.

ACI 301 (ACI 301M) suggests that all residential floors and nonresidential floors less than 10,000 sq. ft. (929 sq. m) be measured by straightedge method and that other nonresidential floors be measured by F-number system. Retain first subparagraph below for floor areas less than 10,000 sq. ft. (929 sq. m). Fourth option is requirement for gauged porcelain tile.

7. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, **10-ft.- (3.05-m-)** long straightedge resting on two high spots and placed anywhere on the surface does not exceed **[1/4 inch (6 mm)] [3/16 inch (4.8 mm)] [1/8 inch (3 mm)] [1/8 inch (3 mm)] and also no more than 1/16 inch (1.6 mm) in 2 feet (610 mm)].**

- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces **[indicated on Drawings] [where ceramic or quarry tile is to be installed by either thickset or thinset method]**. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

Retain "Broom Finish" Paragraph below if applicable. Broom finish is generally used on exterior concrete steps and platforms, ramps, and other surfaces subject to light foot traffic.

- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
  2. Coordinate required final finish with Architect before application.

Retain "Slip-Resistive Finish" Paragraph below if applicable. This finish is generally used on interior and exterior concrete treads, platforms, and ramps subject to moderate foot traffic.

- G. Slip-Resistive Finish: Before final floating, apply slip-resistive [**aggregate**] [**aluminum granule**] finish to concrete stair treads, platforms, ramps as indicated on Drawings
1. Apply in accordance with manufacturer's written instructions and as follows:
    - a. Uniformly spread [**25 lb/100 sq. ft. (12 kg/10 sq. m)**] <Insert rate> of dampened slip-resistive [**aggregate**] [**aluminum granules**] over surface in one or two applications.
    - b. Tamp aggregate flush with surface, but do not force below surface.

Revise float finish in first subparagraph below to trowel finish if required.

- c. After broadcasting and tamping, apply float finish.
- d. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive [**aggregate**] [**aluminum granules**].

### 3.7 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

#### A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

### 3.8 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
1. Comply with ACI 301 (ACI 301M) and ACI 306.1 for cold weather protection during curing.

2. Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h (1 kg/sq. m x h), calculated in accordance with ACI 305.1, before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. If forms remain during curing period, moist cure after loosening forms.
3. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
  - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
  - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
  - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
  - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
  - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
    - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
    - 2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:
  - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
    - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
      - a) Lap edges and ends of absorptive cover not less than 12 inches.
      - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
    - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
      - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

- b) Cure for not less than seven days.
- 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
  - a) Water.
  - b) Continuous water-fog spray.
- b. Floors to Receive Curing Compound:
  - 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
  - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
  - 3) Maintain continuity of coating, and repair damage during curing period.
- c. Floors to Receive Curing and Sealing Compound:
  - 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
  - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
  - 3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

### 3.9 TOLERANCES

- A. Conform to ACI 117 (ACI 117M).

### 3.10 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
  - 1. Testing agency to be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31.
  - 2. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
  - 3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

- a. Test reports to include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
  - 1) Project name.
  - 2) Name of testing agency.
  - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
  - 4) Name of concrete manufacturer.
  - 5) Date and time of inspection, sampling, and field testing.
  - 6) Date and time of concrete placement.
  - 7) Location in Work of concrete represented by samples.
  - 8) Date and time sample was obtained.
  - 9) Truck and batch ticket numbers.
  - 10) Design compressive strength at 28 days.
  - 11) Concrete mixture designation, proportions, and materials.
  - 12) Field test results.
  - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
  - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- D. Inspections:
  1. Headed bolts and studs.
  2. Verification of use of required design mixture.
  3. Concrete placement, including conveying and depositing.
  4. Curing procedures and maintenance of curing temperature.
  5. Verification of concrete strength before removal of shores and forms from beams and slabs.
  6. Batch Plant Inspections: On a random basis, as determined by Architect.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:
  1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
    - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  2. Slump: ASTM C143/C143M:

- a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  - b. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete:
  - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064/C1064M:
  - a. One test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31:
  - a. Cast and laboratory cure two sets of three 6-inch (150 mm) by 12-inch (300 mm) or 4-inch (100 mm) by 8-inch (200 mm) cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39/C39M.
  - a. Test one set of three laboratory-cured specimens at seven days and one set of two specimens at 28 days.
  - b. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa) if specified compressive strength is 5000 psi (34.5 MPa) or less, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi (34.5 MPa).
8. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
9. Additional Tests:
  - a. Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
  - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
    - 1) Acceptance criteria for concrete strength to be in accordance with ACI 301 (ACI 301M), Section 1.6.6.3.
10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.



11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

### 3.11 PROTECTION

#### A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 033000

**SECTION 04 10 00**  
**REINFORCED MASONRY**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Description: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with all masonry work and concrete block indicated on the Drawings, specified herein, or reasonably required to complete all masonry work. Coordinate with other trades and install all embeds and inserts required.
- B. Related Work: The following related work is described under other sections of these Specifications:
  - 1. Section 03200 - Reinforcement Steel
  - 2. Section 04200 - Mortar and Grout for Masonry Work

**1.02 SUBMITTALS**

- A. Submit shop drawings indicating bar sizes, spaces, locations, quantities of reinforcement, bending and cutting schedules and spacing devices.
- B. Submit product data on masonry units.
- C. Coating System for masonry walls.

**1.03 QUALITY CONTROL**

- A. Company specializing in performance of work of this Section for a minimum of 5 years. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. ~~Masonry work shall be inspected under the direction of a Registered Civil Construction Manager experienced in design of this work and licensed in the State of California.~~

**1.04 DELIVERY AND STORAGE**

- A. All materials shall be delivered, stored and handled so as to prevent the inclusion of foreign materials and/or damage. Packaged materials shall be delivered and stored in original packages until ready for use. Packages or materials showing evidence of damage shall be rejected.

## **PART 2 – PRODUCTS**

### **2.01 MASONRY UNITS**

- A. Concrete block shall be hollow concrete masonry units conforming to the requirements for Grade N units, Type I under ASTM Specification C 90.
- B. Masonry units shall be 8"x8"x16" nominal as manufactured by Orco Block Co. or approved equal.
  - 1. Block types, sizes, and patterns as indicated on the Drawings.

### **2.02 MORTAR AND GROUT**

- A. Mortar shall be as specified in Section 04200 and shall develop a compressive strength of not less than 750 lbs. per square inch at seven (7) days or less than 1800 pounds per square inch at twenty-eight (28) days or as specified on the Plans. The total clay content, including that in the sand, shall not exceed 2 percent of the sand content or 6 percent of the cement content.
- B. Grout fill for cells shall consist coarse grade. Minimum grout strength to be 2000 pounds per square inch (PSI) unless otherwise specified on the Plans.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify items provided by other Sections of work are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.
- D. Beginning of installation means installer accepts existing conditions.

### **3.02 PREPARATION**

- A. Direct and coordinate placement of metal anchors per the Plans.
- B. Provide temporary bracing during installation of masonry work as required. Maintain in place until building structure provides permanent bracing.
- C. Preparation: Concrete surface to receive masonry shall be free from all dirt, oil, curling compound, or other deleterious substance. All such surfaces shall be thoroughly washed with water before laying block and shall be in a condition to provide maximum suction at the time the mortar bed is placed.

**3.03 COURSING**

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Lay concrete masonry units in running bond. One Course is one unit and one mortar joint and is equal to 8 inches. Form flush mortar joints. Do not use chipped or broken units.

**3.04 ENVIRONMENTAL CONDITIONS**

- A. Do not place masonry units when air temperature is below 40°F.
- B. Protect masonry from direct exposure to wind and sun when erected in ambient air temperature of 99°F or greater in the shade, with relative humidity less than 50%.

**3.05 PLACING AND BONDING - CMU**

- A. General:
  - 1. Do not commence installation of the work of this Section until horizontal and vertical alignment of foundation is within ½ inch of plumb and the lines shown on the Plans.
  - 2. Use masonry saws to cut and fit masonry units.
  - 3. Set units plumb, true to line, and with level courses accurately spaced.
  - 4. Clean the top surface of foundation free from dirt, debris, and laitance, and expose the aggregate prior to start of installing first course of sandblasting or water blasting.
  - 5. Accurately fit the units to plumbing, ducts, openings, and other interfaces, neatly patching all holes.
  - 6. Keep the walls continuously clean, preventing grout and mortar stains. If grout does run over, clean immediately.
  - 7. All bolts embedded in masonry shall be grouted in place with not less than 1 inch of grout between the bolt and a masonry unit and shall be accurately set with templates.
- B. Do not use chipped or broken units. If such units are discovered in the finished wall, the Construction Manager shall require the immediate removal and replacement of the damaged units with new units at no additional cost to the Owner.
- C. Laying Up: Pattern shall be running bond.
  - 1. Place units in mortar with full shoved bed and head joints.
  - 2. Align vertical cells of hollow units to maintain a clear and unobstructed system of flues.
  - 3. Hold racking to an absolute minimum.
  - 4. Provide running bond with vertical joints located at center of masonry units in

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**REINFORCED MASONRY**

the alternate course below.

5. Lay solid masonry units in full bed or mortar, with full head joints, uniformly jointed with other work.
  6. Interlock intersections and external corners.
- D. Buttering corners of joints or excessive furrowing of mortar joints shall not be permitted.
  - E. Remove excess mortar as Work progresses.
  - F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
  - G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
  - H. Cut mortar joints flush where resilient base is scheduled. Joints shall be 3/8 inch thick. Split block joints shall be raked.
  - I. Isolate masonry partitions from vertical structural framing members with a control joint.
  - J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

### **3.06 REINFORCEMENT AND ANCHORAGES - CONCRETE UNIT MASONRY**

- A. Install horizontal joint reinforcement 16 inches unless Plans note otherwise.
- B. Place joint reinforcement continuous in first joint below top of walls or as illustrated on the Plans.
- C. Lap joint reinforcement ends minimum 40 bar diameters. Install reinforcement in first horizontal course above openings. Extend minimum 24 inches each side of openings.
- D. Support and secure reinforcing bars from displacement. Maintain position with 1/2 inch of dimensioned position. Provide metal accessories to ensure adequate alignment of steel during grout filling operations.
- E. Embed anchors attached to structural steel members. Embed anchorages in every second block joint.
- F. Reinforce joint corners and intersections with strap anchors 16 inches OC or as illustrated on the Plans.

### 3.07 GROUTED COMPONENTS

- A. Support and secure reinforcing bars from displacement. Maintain position within ½ inch of dimensioned position.
- B. Place and consolidate grout fill without displacing reinforcing. Solidly fill all cells and courses unless otherwise indicated on the Drawings. Maximum grout lift shall be 24 inches.
- C. Consolidate grout at time of pour by puddling with mechanical vibrator to completely fit all voids and interstices in the masonry work.

### 3.08 CONSTRUCTION MANAGERED MASONRY

- A. Lay masonry units with core cells vertically aligned clear of mortar and unobstructed.
- B. Place mortar in masonry unit bed joints back ¼ inch from edge of unit grout spaces, bevel back and upward. Permit mortar to cure seven (7) days before placing grout.
- C. Reinforce masonry unit cores with reinforcement bars and grout as indicated.
- D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters or as illustrated on the Plans. See the Plans for indication of locations where splicing is unacceptable.
- E. Wet masonry unit surfaces in contact with grout just prior to grout placement.
- F. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces equal to or greater than 2 inches in width with course grout using high or low lift grouting techniques.
- G. When grouting is stopped for more than one (1) hour, terminate grout 1-1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.
- H. Low Lift Grouting: Place first lift of grout to a height of 16 inches and rod for grout consolidation. Place subsequent lifts in 8 inch increments and rod for grout consolidation.

### 3.09 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control joints.
- B. Install performed control joint devices in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions. Control joints shall be 12'-0" O.C. maximum.

### 3.10 BUILT-IN WORK

- A. As work progresses, build in metal door frames, anchor bolts, plates, and other items furnished by other Sections.
- B. Build in items plumb and level.
- C. Bed anchors of metal doorframes in adjacent mortar joints. Fill frame voids solid with grout. Fill adjacent masonry cores with grout minimum 12 inches from framed

openings.

- D. Do not build in organic materials subject to deterioration.

### 3.11 DEFECTIVE MASONRY OR MATERIALS

- A. Any masonry materials delivered to the job site that do not conform to the requirements of these Specifications, shall be immediately removed from the Work. Completed masonry that does not conform to the requirements of the Plans and these Specifications shall be deemed defective materials and/or workmanship, and the Contractor shall remove it from the site, at no extra cost to the Owner.

### 3.12 CURING

- A. All masonry work shall be kept continuously moist until and for not less than three (3) days after grouting. Curing water shall not be permitted to pond around buildings or structures.

### 3.13 TOLERANCES

- A. Maximum Variation from Alignment of Columns: ¼ inch.
- B. Maximum Variation from Unit to Adjacent Units: 1/32 inch.
- C. Maximum Variation from Plane of Wall: ¼ inch in 10 feet and ½ inch in 20 feet or more.
- D. Maximum Variation from Plumb: ¼ inch per story non-cumulative.
- E. Maximum Variation from Level Coursing: 1/8 inch to 3 feet and ¼ inch in 10 feet; ½ inch in 30 feet.
- F. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

### 3.14 CUTTING AND FITTING

- A. Cut and fit for pipes, conduits, sleeves, and grounds. Coordinate with other Sections of work to provide correct size, shape, and location.
- B. Obtain Construction Manager approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

### 3.15 CLEANING

- A. Clean surfaces of masonry as required for proper application of the specified finishes.
- B. Concrete Unit Masonry:
  - 1. Use all means necessary to prevent staining of the exposed face by mortar, grout, and other material.
  - 2. Remove mortar and grout stains as the work progresses.
  - 3. Upon completion of the work of this Section, clean all exposed veneer surfaces with a 10% solution of muriatic acid in clear water, using fiber bristle brooms or brushes, followed by thorough rinsing with clear water.
  - 4. In the event ordinary cleaning is not adequate, use a light sandblasting or other means as directed by the Construction Manager, and at no additional cost to the Owner.
  - 5. Replace defective mortar. Match adjacent work.

### 3.16 CONTINUOUS INSPECTION

- A. Masonry work shall be inspected during laying of masonry units, placing of reinforcing bars and grouting by the Construction Manager. The Construction Manager shall coordinate the obtaining of test samples with the approved Geotechnical Testing Consultant Firm employed by the Contractor. The Construction Manager shall check the materials, details of construction and construction procedures.

### 3.17 TEST

- A. Test masonry prisms as per quantity and method in U.B.C. 7105.3.2.
- B. Mortar shall be tested as per U.B.C. Standards.
- C. Grout shall be tested as per U.B.C. Standards.

### 3.18 PROTECTION OF FINISHED WORK

- A. Protect finished installation.
- B. Without damaging completed work, provide protective boards at exposed external corners, which may be damaged by construction activities.

**END OF SECTION**



**SECTION 04 20 00**  
**MORTAR AND GROUT FOR MASONRY WORK**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Description:
  - 1. Mortar and grout for masonry construction.
- B. Related Work:
  - 1. Section 04100 - Reinforced Masonry

**1.02 SUBMITTALS**

- A. Submit product data and samples.

**1.03 DELIVERY, STORAGE AND HANDLING**

- A. Deliver products to site. Protection of products delivered to the site.
- B. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

**1.04 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain materials and surrounding air temperatures to minimum 40°F prior to, during, and 48 hours after completion of masonry work.
- B. Protect construction from direct exposure to wind and sun when erected in ambient air temperature of 99°F or greater in the shade, with relative humidity less than 50%.

**1.05 MIX TESTS**

- A. Testing of Mortar Mix: In accordance with ASTM C 780. Test mortar mix for compressive strength. Minimum compressive strength shall be 1,800 pounds per square inch.

- B. Testing of Grout Mix: In accordance with ASTM C 1019. Test grout mix for compressive strength. Minimum compressive strength shall be 2,000 pounds per square inch. ~~For this project, the contractor shall be required to compensate a Geotechnical Consultant for all costs to perform a minimum of four (4) separate compressive strength tests.~~

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Portland Cement: ASTM C 150, Type V.
- B. Mortar Aggregate: ASTM C 144, standard masonry type.
1. Provide clean, sharp, well-graded aggregate free from injurious amounts of dust, lumps, shale, alkali, surface coatings, and organic matter complying with UBC Standards.
  2. Not less than 3% shall pass the No. 100 sieve.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Grout "Coarse": 1 part Portland Cement to 2-1/4 parts minimum to 3 parts maximum of damp loose sand to 1/10 part lime putty and 2 parts coarse of maximum 3/8 inch aggregate with sufficient water to achieve fluid consistency per ASTM C476. Not less than 5% of the sand shall pass No. 100 sieve. Use in grout spaces 2 inches wide or more and in all filled cell construction.
- E. Grout "Fine": 2-1/4 to 3 parts maximum damp, loose sand to 1/2 to 1/4 part lime putty with 1 part Portland Cement and sufficient water to achieve fluid consistent per ASTM C 476. Not less than 5% of the sand shall pass No. 100 sieve. To be used where shown on Plans and where grout space is less than 2 inches in the least dimension.
- F. Water: Clean, potable and free from deleterious amounts of acids, alkalis and organic materials.
- G. Lime Putty: Shall be made from pulverized (processed) quick lime or from hydrated lime.

### 2.02 COLOR

- A. Mortar and Grout Color: Provide pre-ground mineral oxides, non-fading and alkali proof as manufactured by L.M. Scofield or approved equal. Color shall be selected by the Construction Manager.

### 2.03 MORTAR MIXING

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C 270 - Type S.

- B. Add mortar color in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar. Do not use any admixtures unless specifically accepted in advance by the Construction Manager through the submittal process.
- D. Use mortar within 2 hours after mixing at temperatures of 80°F, or 2-1/2 hours at temperatures under 50°F.
- E. Mechanically mix in a batch mixer for not less than 3 minutes, using only sufficient water to produce a mortar which is spreadable and of a workable consistency.
- F. Re-temper mortar with water as required to maintain high plasticity. Do not re-temper mortar after 1-1/2 hours following initial mixing.

#### **2.04 GROUT MIXING**

- A. Mix concrete in accordance with ASTM C 94.
- B. Add admixtures in accordance with manufacturer's instructions when previously approved. Provide uniformity of mix.
  - 1. Waterproofing admixture shall be A.C. Horn's "Hydratite" or approved equal.
  - 2. To reduce early water loss and produce expansive action admixture shall be Sika Grout Aid.
- C. Do not use anti-freeze compounds to lower the freezing point of grout.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Request inspection of spaces to be grouted. Do not proceed until all sub-surfaces and spaces are acceptable.

#### **3.02 INSTALLATION**

- A. Install mortar and grout to requirements of the specific masonry Sections.
- B. Work grout into masonry cores and cavities to eliminate voids.
- C. Do not displace reinforcement while placing grout.
- D. Remove grout spaces of excess mortar.

**END OF SECTION**

**SECTION 05 50 00**  
**METAL FABRICATIONS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes:
1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
  2. Metal bollards.

**1.02 COORDINATION**

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For the following:
1. Shop primers.
  2. Shrinkage-resisting grout.
  3. Slotted channel framing.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
1. Steel framing and supports for overhead doors.
  2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
  3. Metal bollards.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

### 1.05 QUALITY ASSURANCE

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

### 1.06 FIELD CONDITIONS

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

## PART 2 - PRODUCTS

### 2.01 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

### 2.02 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
- D. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- E. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
  1. Size of Channels: 1-5/8 by 1-5/8 inches.
  2. Material: Cold-rolled steel, ASTM A1008/A1008M, structural steel, Grade 33; 0.0677-inch minimum thickness; coated with rust-inhibitive, baked-on, acrylic enamel.
- F. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

### 2.03 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

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## METAL FABRICATIONS

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- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- C. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 1.
- D. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
  - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.
- F. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
  - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

#### 2.04 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- D. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi.

#### 2.05 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.
- 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 are 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.
- J. Where units are indicated to be cast into concrete, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

## **2.06 MISCELLANEOUS FRAMING AND SUPPORTS**

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
  - 1. Fabricate units from slotted channel framing where indicated.

## 2.07 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
  - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

## 2.08 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 40 steel pipe.
- B. Where indicated to be surface mounted, fabricate bollards with 3/8-inch-thick, steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch anchor bolts.

## 2.09 METAL DOWNSPOUT BOOTS

- A. 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:
  - 1. J.R. Hoe & Sons Inc.
  - 2. Neenah Foundry Company.
- B. Source Limitations: Obtain downspout boots from single source from single manufacturer.
- C. Provide downspout boots made from cast iron in heights indicated with inlets of size and shape to suit downspouts. Provide units with flanges and holes for countersunk anchor bolts.
  - 1. Outlet: Vertical, to discharge into pipe.

## 2.10 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

## 2.11 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
  - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

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- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
  - 1. Shop prime with universal shop primer unless indicated.
- D. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

### **PART 3 - EXECUTION**

#### **3.01 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.

### **3.02 INSTALLATION OF 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.

### **3.03 INSTALLATION OF METAL BOLLARDS**

- A. Anchor surface-mounted bollards to concrete slabs with expansion anchors. Provide four 3/4-inch bolts at each bollard unless otherwise indicated.
  - 1. Embed anchor bolts at least 4 inches in concrete.
- B. Anchor bollards in concrete in formed or core-drilled holes not less than 42 inches deep and 3/4 inch larger than OD of bollard. Fill annular space around bollard solidly with shrinkage-resistant grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward bollard.
- C. Fill bollards solidly with concrete, mounding top surface to shed water.
  - 1. Do not fill removable bollards with concrete.

### **3.04 REPAIRS**

- A. Touchup Painting:
  - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
    - a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

**END OF SECTION**

**SECTION 06 10 53**  
**MISCELLANEOUS ROUGH CARPENTRY**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes:
1. Wood blocking and nailers.
  2. Plywood backing panels.

**1.02 DEFINITIONS**

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
  2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
  3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
  4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Evaluation Reports: For the following, from ICC-ES:
1. Preservative-treated wood.
  2. Fire-retardant-treated wood.
  3. Power-driven fasteners.
  4. Post-installed anchors.

### 1.05 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

### 2.01 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

### 2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
  - 1. Wood nailers, blocking, stripping, and similar members in connection with flashing, vapor barriers, and waterproofing.
  - 2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.

### 2.03 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of

significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Treatment shall not promote corrosion of metal fasteners.
  2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings, and the following:
1. Plywood backing panels.

#### **2.04 MISCELLANEOUS LUMBER**

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
  2. Nailers.
- B. Dimension Lumber Items: Standard, Stud, or No. 3 grade lumber of any species.
- C. Concealed Boards: 15 percent maximum moisture content of any of the following species and grades:
1. Western woods, Standard or No. 3 Common grade; WCLIB or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

#### **2.05 PLYWOOD BACKING PANELS**

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, C-C Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

#### **2.06 FASTENERS**

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.
- D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC58 or ICC-ES AC308 as appropriate for the substrate.
  1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

## **2.07 MISCELLANEOUS MATERIALS**

- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION, GENERAL**

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- C. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- D. Sort and select lumber so that natural characteristics do 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.
- E. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  1. Use inorganic boron for items that are continuously protected from liquid water.
  2. Use copper naphthenate for items not continuously protected from liquid water.

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### **MISCELLANEOUS ROUGH CARPENTRY**

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- F. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- G. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
  - 2. FM Global Property Loss Prevention Data Sheet 1-49 for wood blocking and nailers at roofing and flashing.
  - 3. ICC-ES evaluation report for fastener.
- H. 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.

### **3.02 WOOD BLOCKING AND NAILER INSTALLATION**

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

### **3.03 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**

**SECTION 06 41 16**  
**PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

A. Section includes:

1. Plastic-laminate-clad architectural cabinets.
2. Cabinet hardware and accessories.
3. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.

B. Related Sections include:

1. Division 06 Section "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
2. Division 12 countertop sections for metal countertops and quartz agglomerate countertops installed over plastic-laminate-clad architectural cabinets.

**1.02 COORDINATION**

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

**1.03 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

**1.04 ACTION SUBMITTALS**

- A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.



C. Samples: For the following:

1. Plastic Laminates: 8 by 10 inches, for each type, color, pattern, and surface finish required.
  - a. Provide one sample applied to core material with specified edge material applied to one edge.
2. Thermally Fused Laminate (TFL) Panels: 8 by 10 inches, for each color, pattern, and surface finish.
  - a. Provide edge banding on one edge.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Manufacturer of products.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

**1.07 FIELD CONDITIONS**

- A. Environmental Limitations without Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

## PART 2 - PRODUCTS

### 2.01 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
  - 1. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
- B. Architectural Woodwork Standards Grade: Premium.
- C. Type of Construction: Frameless.
- D. Door and Drawer-Front Style: As indicated.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
  - 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. Abet Laminati Inc.
    - b. Formica Corporation.
    - c. Lamin-Art, Inc.
    - d. Pionite; a Panolam Industries International, Inc. brand.
    - e. Wilsonart LLC.
- F. Laminate Cladding for Exposed Surfaces:
  - 1. Horizontal Surfaces: Grade HGS.
  - 2. Vertical Surfaces: Grade HGS.
  - 3. Edges: Grade HGS.
  - 4. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.
- G. Materials for Semiexposed Surfaces:
  - 1. Surfaces Other Than Drawer Bodies: Thermally fused laminate panels.
    - a. Edges of Plastic-Laminate Shelves: PVC edge banding, 3.0 mm thick, matching laminate in color, pattern, and finish.
    - b. Edges of Thermally Fused Laminate Panel Shelves: PVC or polyester edge banding.
    - c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade CLS.
  - 2. Drawer Sides and Backs: Thermally fused laminate panels with PVC or polyester edge banding.

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### PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

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3. Drawer Bottoms: Thermally fused laminate panels.
- H. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
  1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.
- J. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces as indicated by laminate manufacturer's designations or if not indicated as selected by Architect from laminate manufacturer's full range in solid colors, matte finish.

## 2.02 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  1. Wood Moisture Content: 4 to 9 percent.
- B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
  2. Particleboard (Medium Density): Not permitted.
  3. Softwood Plywood: DOC PS 1, medium-density overlay.
  4. Thermally Fused Laminate (TFL) Panels: MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

## 2.03 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087100 "Door Hardware."
  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. Accuride International.
    - b. Blum, Julius & Co., Inc.
    - c. C.R. Laurence Co., Inc.
    - d. Grass America Inc.
    - e. Hafele.
    - f. Knape & Vogt Manufacturing Company.

- g. Stanley Manufacturing Co.
- B. Butt Hinges: 2-3/4-inch, five-knuckle steel hinges made from 0.095-inch-thick metal, and as follows:
  - 1. Semiconcealed Hinges for Overlay Doors: ANSI/BHMA A156.9, B01521.
- C. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
- D. Catches: Roller catches, ANSI/BHMA A156.9, B03071.
- E. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081.
- F. Drawer Slides: ANSI/BHMA A156.9.
  - 1. Standard Duty (Grade 1 and Grade 2): Side mount.
  - 2. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): Side mount.
    - a. Type: Full extension.
    - b. Material: Epoxy-coated polymer or zinc-plated ball bearing slides.
  - 3. General-purpose drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide 75 lb load capacity.
  - 4. File drawers more than 6 inches high or more than 24 inches wide, provide 100 lb load capacity.
- G. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.
- H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.
  - 1. Satin Chromium Plated: ANSI/BHMA 626 for brass or bronze base; ANSI/BHMA 652 for steel base.
  - 2. Satin Stainless Steel: ANSI/BHMA 630.
- I. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

#### **2.04 MISCELLANEOUS MATERIALS**

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

## 2.05 FABRICATION

- A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

### 3.02 INSTALLATION

- A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
  - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
  - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

### 3.03 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.

**END OF SECTION**

## SECTION 07 21 00 THERMAL INSULATION

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes glass-fiber blanket.
- B. Related Sections include:
  - 1. Division 09 Section "Gypsum Board" for sound attenuation blanket used as acoustic insulation.
  - 2. Division 13 Section "Metal Building Systems" for insulation installed as part of metal building system.

#### 1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.

#### 1.03 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

### PART 2 - PRODUCTS

#### 2.01 GLASS-FIBER BLANKET

- A. Insulation shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
  - 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. CertainTeed Corporation.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Knauf Insulation.
    - d. Owens Corning.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

### **3.02 INSTALLATION, GENERAL**

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

### **3.03 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION**

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
  - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
  - 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

### **3.04 PROTECTION**

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

**END OF SECTION**



**SECTION 07 26 16**  
**UNDER-SLAB VAPOR RETARDER**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes vapor retarders for installation under concrete slabs on grade.

**1.02 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

**1.03 ACTION SUBMITTALS**

- A. Product Data: Include manufacturer's written instructions for installation, seaming, of vapor retarder.
- B. Samples: For each product specified

**1.04 QUALITY ASSURANCE**

- A. Installer Qualifications: A firm experienced in installing under-slab vapor retarder materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store rolls according to manufacturer's written instructions.
- B. Protect stored materials from direct sunlight.

**1.06 PROJECT CONDITIONS**

- A. Environmental Limitations: Apply vapor retarder materials within the range of ambient and substrate temperatures recommended by manufacturer of vapor retarder materials. Protect substrates from environmental conditions that affect performance of vapor retarder.

**PART 2 - PRODUCTS**

**2.01 PLASTIC SHEET VAPOR RETARDERS**

- A. Vapor Barrier Sheet: Plastic sheet recommended by manufacturer for use as a vapor barrier retarder when installed on prepared subgrade before placing steel-reinforced

concrete slabs on grade and meeting the requirements for Class A vapor retarders when tested according to ASTM E1745.

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Insulation Solutions, Inc.
  - b. Poly-America, LP.
  - c. Raven Industries Inc.
  - d. Stego Industries, LLC.
  - e. Tex-Trude, LP.
2. Minimum Thickness: 15 mils.
3. Permeance: Not more than 0.010 perms when tested according to ASTM E1249 or E154
4. Durability Performance: Comply with the requirements of ASTM E1745 and the following:
  - a. Minimum Tensile Strength: 75 lbf. per in. when tested according to ASTM E154.
  - b. Minimum Resistance to Puncture: 2300 g when tested according to ASTM D1709.

## **2.02 AUXILIARY MATERIALS**

- A. Seam tape, adhesives, pipe boots, detail strips with vapor permeance not less than the membrane, as required by manufacturer.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. General: Comply with ASTM E1643 and manufacturer's written instructions for substrate preparation and sheet vapor retarder installation, protection, and repair.
- B. Do not allow penetration of vapor retarder except for reinforcing steel and permanent utilities, which are to be sealed.
  1. Seal membrane penetrations as required by manufacturer.
- C. Repair tears, voids, and lapped seams in vapor retarder not complying with requirements. Slit and flatten fishmouths and blisters. Patch with vapor retarder and tape extending beyond repaired areas in all directions.

### **3.02 PROTECTION**

- A. Protect vapor retarder from damage during installation of reinforcing and utilities.
- B. Protect vapor retarder from damage and wear during remainder of construction period.

**END OF SECTION**

## SECTION 07 62 00

### SHEET METAL FLASHING AND TRIM

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section includes formed wall sheet metal fabrications.
- B. Related Sections include Division 13 Section "Metal Building Systems" for sheet metal roof drainage installed as part of the metal building system.

##### 1.02 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

##### 1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
  - 3. Review requirements for insurance and certificates if applicable.
  - 4. Review sheet metal flashing observation and repair procedures after flashing installation.

##### 1.04 ACTION SUBMITTALS

- A. Shop Drawings: For sheet metal flashing and trim.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
  - 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
  - 4. Include details for forming, including profiles, shapes, seams, and dimensions.
  - 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
  - 6. Include details of termination points and assemblies.
  - 7. Include details of connections to adjoining work.

8. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.
- B. Samples: For each type of sheet metal and accessory indicated with factory-applied finishes.

### **1.05 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

## **PART 2 - PRODUCTS**

### **2.01 PERFORMANCE REQUIREMENTS**

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

### **2.02 SHEET METALS**

- A. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed; with smooth, flat surface.
  1. Finish: 2D (dull, cold rolled) or 2B (bright, cold rolled).

### **2.03 UNDERLAYMENT MATERIALS**

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to

withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

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. Carlisle Coatings & Waterproofing Inc.
  - b. GCP Applied Technologies Inc. (formerly Grace Construction Products).
  - c. Henry Company.
  - d. Kirsch Building Products, LLC.
  - e. Owens Corning.
  - f. Polyguard Products, Inc.
  - g. Protecto Wrap Company.
2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F or higher.
3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F or lower.

## 2.04 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
  1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
  2. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- C. Solder:
  1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

## 2.05 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
  - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
  - 2. Obtain field measurements for accurate fit before shop fabrication.
  - 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
  - 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
  - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
  - 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

## 2.06 WALL SHEET METAL FABRICATIONS

- A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams.
  - 1. Fabricate from stainless steel, 0.016 inch thick.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
  - 1. Verify compliance with requirements for installation tolerances of substrates.
  - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
  - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 UNDERLAYMENT INSTALLATION**

- A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.

### **3.03 INSTALLATION, GENERAL**

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
  - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  - 3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
  - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
  - 5. Torch cutting of sheet metal flashing and trim is not permitted.
  - 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or

corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
  2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Fasteners: Use fastener sizes that penetrate substrates as follows:
1. Wood Blocking or Sheathing: Not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
  2. Metal Framing: Not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- D. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- E. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
  2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not use torches for soldering.
  2. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
  3. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

### **3.04 WALL FLASHING INSTALLATION**

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.



- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend beyond wall openings.

### **3.05 ERECTION TOLERANCES**

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

### **3.06 CLEANING AND PROTECTION**

- A. Clean and neutralize flux materials. Clean off excess solder.
- B. Clean off excess sealants.
- C. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

**END OF SECTION**

## SECTION 07 84 13 PENETRATION FIRESTOPPING

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes penetrations in fire-resistance-rated walls.
- B. Related Sections include Division 07 Section "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

#### 1.02 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
  - 1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

#### 1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

#### 1.05 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

### **1.06 QUALITY ASSURANCE**

- A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

### **1.07 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

### **1.08 COORDINATION**

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

## **PART 2 - PRODUCTS**

### **2.01 PERFORMANCE REQUIREMENTS**

- A. Fire-Test-Response Characteristics:
  - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
    - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
      - 1) UL in its "Fire Resistance Directory."
      - 2) Intertek Group in its "Directory of Listed Building Products."
      - 3) FM Approval in its "Approval Guide."

### **2.02 PENETRATION FIRESTOPPING SYSTEMS**

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Basis of Design: Design is based on products listed in UL Design Numbers indicated on Drawings. Subject to compliance with requirements, provide named products or comparable products approved by Architect by one of the following:
  - a. 3M Fire Protection Products.
  - b. Hilti, Inc.
  - c. Passive Fire Protection Partners.
  - d. RectorSeal.
  - e. Specified Technologies, Inc.
  - f. Tremco, Inc.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
  1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
- D. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
  1. Permanent forming/damming/backing materials.
  2. Substrate primers.
  3. Collars.
  4. Steel sleeves.

### 2.03 FILL MATERIALS

- A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- C. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- D. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- E. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

- F. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- G. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- H. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- I. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

## **2.04 MIXING**

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
  - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
  - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

### 3.03 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.04 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
  - 1. Locate in attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Designation of applicable testing and inspecting agency.
  - 4. Date of installation.
  - 5. Manufacturer's name.
  - 6. Installer's name.

### 3.05 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.

- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

### **3.06 CLEANING AND PROTECTION**

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

**END OF SECTION**

## SECTION 07 84 43 JOINT FIRESTOPPING

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes joints in or between fire-resistance-rated constructions.
- B. Related Sections include:
  - 1. Division 07 Section "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and for wall identification.
  - 2. Division 09 Section "Non-Structural Metal Framing" for firestop tracks for metal-framed partition heads.

#### 1.02 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.
  - 1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

#### 1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

#### 1.05 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.



### 1.06 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

### 1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

### 1.08 COORDINATION

- A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of joints to accommodate joint firestopping systems.

## PART 2 - PRODUCTS

### 2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
  - 1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
    - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
      - 1) UL in its "Fire Resistance Directory."
      - 2) Intertek Group in its "Directory of Listed Building Products."

### 2.02 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.
  - 1. Basis of Design: Design is based on products listed in UL Design Numbers indicated on Drawings. Subject to compliance with requirements, provide named products or comparable products approved by Architect by one of the following:
    - a. Passive Fire Protection Partners.
    - b. RectorSeal.
    - c. Rockwool International.
    - d. Specified Technologies, Inc.
    - e. Thermafiber, Inc.; an Owens Corning company.
    - f. Tremco, Inc.
  - 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- C. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.
- D. Accessories: Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Surface Cleaning: Before installing joint firestopping systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
  - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
  - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

### **3.03 INSTALLATION**

- A. General: Install joint firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:
  - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
  - 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
  - 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### **3.04 FIELD QUALITY CONTROL**

- A. Inspecting Agency: Engage a qualified testing agency to perform tests and inspections according to ASTM E2393.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

### **3.05 CLEANING AND PROTECTION**

- A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated joint firestopping systems immediately and install new materials to produce joint firestopping systems complying with specified requirements.

**END OF SECTION**

**SECTION 07 92 00**  
**JOINT SEALANTS**

**PART 1 - GENERAL**

- A. Section includes:
  - 1. Silicone joint sealants.
  - 2. Urethane joint sealants.
  - 3. Mildew-resistant joint sealants.
  - 4. Latex joint sealants.
  
- B. Related Sections include Division 07 Section "Acoustical Joint Sealants" for sealing joints in sound-rated construction.

**1.02 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each joint-sealant product.
  
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
  
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
  
- D. Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Field-Adhesion-Test Reports: For each sealant application tested.
  
- B. Sample Warranties: For special warranties.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

- B. Product Testing: Test joint sealants using a qualified testing agency.
  - 1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

#### **1.06 FIELD 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.

#### **1.07 WARRANTY**

- A. Special Installer's Warranty: 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.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period:
    - a. Urethane Sealants: Five years from date of Substantial Completion.
    - b. Silicone Sealants: Ten years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
  - 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
  - 2. Disintegration of joint substrates from causes exceeding design specifications.
  - 3. Mechanical damage caused by individuals, tools, or other outside agents.
  - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## PART 2 - PRODUCTS

### 2.01 JOINT SEALANTS, 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.

### 2.02 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
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 Corning Corporation; Dow Corning 791 Silicone Weatherproofing Sealant or Dow Corning® 795 Silicone Building Sealant.
    - b. GE Construction Sealants; Momentive Performance Materials Inc.; SCS2000 SilPruf or GE Construction Sealants; Momentive Performance Materials Inc.; Silpruf NB.
    - c. Pecora Corporation; PCS or Pecora 895NST.
    - d. Sika Corporation; Joint Sealants; Sikasil WS-295.
    - e. Tremco Incorporated; Spectrem 2.

### 2.03 URETHANE JOINT SEALANTS

- A. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.
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. BASF Corporation; Construction Systems; MasterSeal SL 1.
    - b. Pecora Corporation; NR-201.
    - c. Polymeric Systems, Inc; Flexiprene 952.
    - d. Schnee-Morehead, Inc., an ITW company; Permthane SM7101.

### 2.04 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
  - 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 Corning Corporation; DOW CORNING® 786 SILICONE SEALANT -.
    - b. GE Construction Sealants; Momentive Performance Materials Inc.; SCS1700 Sanitary.
    - c. Pecora Corporation; Pecora 860.
    - d. Tremco Incorporated; Tremsil 200.

## 2.05 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
  - 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. Franklin International; Titebond Painter's Plus Caulk.
    - b. Pecora Corporation; AVW-920.
    - c. Sherwin-Williams Company (The); 850A Siliconized Acrylic Latex Caulk.
    - d. Tremco Incorporated; Tremflex 834.

## 2.06 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
  - 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. Adfast.
    - b. Alcot Plastics Ltd.
    - c. BASF Corporation; Construction Systems.
    - d. Construction Foam Products; a division of Nomaco, Inc.
- B. Cylindrical Sealant Backings: ASTM C 1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
  - 1. Provide any of the following types, as approved in writing by joint-sealant manufacturer for joint application indicated:
    - a. Type C (closed-cell material with a surface skin).
    - b. Type O (open-cell material).
    - c. Type B (bicellular material with a surface skin).

- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

## **2.07 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**

### **3.01 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 performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 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.
  - 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. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant 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.

### 3.03 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 bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. 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.
- F. 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.
4. Provide flush joint profile at locations indicated on Drawings according to Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated on Drawings according to Figure 8C in ASTM C 1193.
  - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

### 3.04 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:
  - a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
  - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.
2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
  - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
3. Inspect tested joints and report on the following:
  - a. Whether sealants filled joint cavities and are free of voids.
  - b. Whether sealant dimensions and configurations comply with specified requirements.
  - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

### **3.05 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.

### **3.06 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, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

### **3.07 JOINT-SEALANT SCHEDULE**

- A. Exterior joints in horizontal traffic surfaces:
  - 1. For joints in concrete paving and walks, refer to Division 32 Section "Concrete Paving Joint Sealants".
- B. Exterior joints in vertical surfaces and horizontal nontraffic at porous surfaces.
  - 1. Joint Locations:
    - a. Control and expansion joints in stone masonry.
    - b. Control and expansion joints in portland cement plasterwork.
    - c. Joints between different materials listed above.
    - d. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
    - e. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Exterior joints in vertical surfaces and horizontal nontraffic at non-porous surfaces.
  - 1. Joint Locations:
    - a. Joints in aluminum framing systems.
    - b. Joints between aluminum framing systems and glass.
    - c. Joints in metal wall panels.
    - d. Perimeter joints between materials listed above and frames of doors, windows, and louvers.

- e. Joints between different materials listed above.
  - f. Other joints as indicated on Drawings.
- 2. Joint Sealant: Silicone, S, NS, 50, NT.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Interior joints in horizontal traffic surfaces.
- 1. Joint Locations:
    - a. Isolation joints in cast-in-place concrete slabs.
    - b. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Urethane, S, P, 25, T, NT.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Interior joints in vertical surfaces and horizontal nontraffic surfaces at exterior walls and joints subject to significant movement.
- 1. Joint Locations:
    - a. Control and expansion joints on exposed interior surfaces of exterior walls.
    - b. Vertical joints on exposed surfaces of unit masonry walls.
    - c. Perimeter joints between materials listed above and frames of exterior doors and windows.
    - d. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Silicone, S, NS, 50, NT.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
- 1. Joint Locations:
    - a. Control joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
    - c. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Acrylic latex.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- G. Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
- 1. Joint Locations:
    - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - b. Tile control and expansion joints where indicated.
    - c. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
  - 3. Joint-Sealant Color: White.

- H. Joint-Sealant Application: Concealed mastics.
  - 1. Joint Locations:
    - a. Aluminum thresholds.
    - b. Sill plates.
    - c. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Silicone, S, NS, 50, NT.

**END OF SECTION**

**SECTION 07 92 19**  
**ACOUSTICAL JOINT SEALANTS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes acoustical joint sealants.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each acoustical joint sealant.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of acoustical joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Acoustical-Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
  2. Joint-sealant manufacturer and product name.
  3. Joint-sealant formulation.
  4. Joint-sealant color.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Sample Warranties: For special warranties.

**1.04 WARRANTY**

- A. Special Installer's Warranty: Installer agrees to repair or replace acoustical 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.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish acoustical joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.01 PERFORMANCE REQUIREMENTS**

- A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E 90.

### **2.02 ACOUSTICAL JOINT SEALANTS**

- A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C 834.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Accumetric LLC.
    - b. GE Construction Sealants; Momentive Performance Materials Inc.
    - c. Grabber Construction Products.
    - d. Hilti, Inc.
    - e. Pecora Corporation.
    - f. Tremco Incorporated.
  - 2. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.

### **2.03 MISCELLANEOUS MATERIALS**

- A. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.
- 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**

### **3.01 EXAMINATION**

- A. Examine joints indicated to receive acoustical joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer. 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.

### **3.03 INSTALLATION OF ACOUSTICAL JOINT SEALANTS**

- A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.
- B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.
- C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

### **3.04 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 acoustical joint sealants and of products in which joints occur.

### **3.05 PROTECTION**

- A. Protect acoustical 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, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

**END OF SECTION**



**SECTION 08 11 13**  
**HOLLOW METAL DOORS AND FRAMES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes:
1. Interior standard steel doors and frames identified on the Drawings as hollow metal doors and frames.
  2. Interior standard steel frames to receive flush wood doors identified on the Drawings as steel frames.
  3. Exterior standard steel doors and frames identified on the Drawings as hollow metal doors and frames.

**1.02 DEFINITIONS**

- A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

**1.03 COORDINATION**

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

**1.04 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

**1.05 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
1. Elevations of each door type.

2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
  3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  4. Locations of reinforcement and preparations for hardware.
  5. Details of each different wall opening condition.
  6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems, if any.
  7. Details of anchorages, joints, field splices, and connections.
  8. Details of accessories.
  9. Details of moldings, removable stops, and glazing.
- C. Samples for Verification:
1. Finishes: For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
- D. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

### **PART 2 - PRODUCTS**

#### **2.01 PERFORMANCE REQUIREMENTS**

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
- B. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.61 deg Btu/F x h x sq. ft. when tested in accordance with ASTM C518.

## 2.02 INTERIOR STANDARD STEEL DOORS AND FRAMES

- A. 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:
  - 1. Ceco Door; ASSA ABLOY.
  - 2. Pioneer Industries.
  - 3. Republic Doors and Frames.
  - 4. Steelcraft; an Allegion brand.
- B. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- C. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B..
  - 1. Doors:
    - a. Type: As indicated in the Door and Frame Schedule.
    - b. Thickness: 1-3/4 inches.
    - c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch.
    - d. Edge Construction: Model 1, Full Flush.
    - e. Edge Bevel: Bevel lock and hinge edges 1/8 inch in 2 inches.
    - f. Core: Manufacturer's standard.
    - g. Fire-Rated Core: Manufacturer's standard vertical steel stiffener or laminated mineral board core for fire-rated doors.
  - 2. Frames:
    - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch.
    - b. Construction: Full profile welded.
  - 3. Exposed Finish: Prime.

## 2.03 INTERIOR STANDARD STEEL FRAMES (FOR FLUSH WOOD DOORS)

- A. Basis of Design: Design is based on Timely Industries C-Series Frames. Subject to compliance with requirements, provide named product or comparable product approved by Architect by one of the following:
  - 1. Ceco Door; ASSA ABLOY.
  - 2. Pioneer Industries.
  - 3. Republic Doors and Frames.
  - 4. Steelcraft; an Allegion brand.
- B. Construct steel frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

- C. Standard-Duty Frames: ANSI/SDI A250.8, Level 1; ANSI/SDI A250.4, Level C.
  - 1. Frames:
    - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.042 inch.
    - b. Construction: Knocked down.
    - c. Exposed Finish: Factory.
  - 2. Casings: Aluminum sheet formed to be applied to heat-treated clips on frame face after frame installation.

#### **2.04 EXTERIOR STANDARD STEEL DOORS AND FRAMES**

- A. 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:
  - 1. Ceco Door; ASSA ABLOY.
  - 2. Pioneer Industries.
  - 3. Republic Doors and Frames.
  - 4. Steelcraft; an Allegion brand.
- B. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- C. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A.
  - 1. Doors:
    - a. Type: As indicated in the Door and Frame Schedule.
    - b. Thickness: 1-3/4 inches.
    - c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
    - d. Edge Construction: Model 2, Seamless.
    - e. Edge Bevel: Bevel lock and hinge edges 1/8 inch in 2 inches.
    - f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
    - g. Bottom Edges: Close bottom edges of doors with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
    - h. Core: Manufacturer's standard as required to comply with specified performance.
  - 2. Frames:
    - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
    - b. Construction: Full profile welded.

3. Exposed Finish: Prime.

## 2.05 FRAME ANCHORS

### A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
3. Postinstalled Expansion Anchor: Minimum 3/8-inch-diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

### B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

### C. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

## 2.06 MATERIALS

### A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

### B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

### C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

### D. Aluminum Sheet: ASTM B209.

### E. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

### F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

### G. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

### H. Glazing:

1. Comply with requirements in Division 08 Section "Glazing" except comply with Division 08 Section "Fire-Rated Glazing" for glazing in fire-rated doors.

## 2.07 FABRICATION

- A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
  - 1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  - 2. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
    - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- B. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
  - 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
  - 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

## 2.08 STEEL FINISHES

- A. Prime Finish for Hollow Metal Doors and Frames: Clean, pretreat, and apply manufacturer's standard primer.
  - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
- B. Factory Finish for Steel Frames:
  - 1. Frames: Clean, pretreat, and apply manufacturer's proprietary factory applied impact resistant, polyurethane baked enamel finish.
    - a. Color and Gloss: As indicated by manufacturer's designations.
  - 2. Aluminum Casings: Clear anodized finish complying with AAMA 611, AA-M12C22A41, Class I, 0.018 mm.

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

### 3.02 INSTALLATION

- A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.
  - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
    - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
    - b. Install frames with removable stops located on secure side of opening.
  - 2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
  - 3. Floor Anchors: Secure with postinstalled expansion anchors.
    - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
  - 4. Solidly pack mineral-fiber insulation inside frames.
  - 5. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
  - 1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.

2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.
- D. Glazing:
1. General: Comply with installation requirements in Division 08 Section "Glazing" and with hollow-metal manufacturer's written instructions.
  2. For fire-rated doors, comply with installation requirements in Division 08 Section "Fire-Rated Glazing" for fire-protection-rated glazing.

### **3.03 REPAIR**

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- B. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.

**END OF SECTION**



## SECTION 08 14 16 FLUSH WOOD DOORS

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes:
  - 1. Solid-core flush wood doors with plastic-laminate-faces.
  - 2. Factory fitting flush wood doors to frames and factory machining for hardware.
- B. Related Sections include Division 08 Section "Glazing" for glass view panels in flush wood doors.

#### 1.02 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product, including the following:
  - 1. Door core materials and construction.
  - 2. Door edge construction
  - 3. Door face type and characteristics.
  - 4. Door trim for openings.
  - 5. Door frame construction.
  - 6. Factory-machining criteria.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:
  - 1. Door schedule indicating door location, type, size, fire protection rating, and swing.
  - 2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
  - 3. Details of frame for each frame type, including dimensions and profile.
  - 4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems, if any.
  - 5. Dimensions and locations of blocking for hardware attachment.
  - 6. Dimensions and locations of mortises and holes for hardware.
  - 7. Clearances and undercuts.
- C. Samples for Initial Selection: For plastic-laminate door faces.

D. Samples for Verification:

1. Plastic laminate, 6 inches square, for each color, texture, and pattern selected.
2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
3. Frames for light openings, 6 inches long, for each material, type, and finish required.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Sample Warranty: For special warranty.

**1.05 CLOSEOUT SUBMITTALS**

- A. Special warranties.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Mark each door on top and bottom rail with opening number used on Shop Drawings.

**1.07 FIELD CONDITIONS**

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of construction period.

**1.08 WARRANTY**

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
    - a. Delamination of veneer.
    - b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
  2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
  3. Warranty Period for Solid-Core Interior Doors: Life of installation.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. Source Limitations: Obtain flush wood doors from single manufacturer.

## 2.02 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Wood Door: Doorss complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with UL 10C or NFPA 252.

## 2.03 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/WI's "Architectural Woodwork Standards."
  - 1. The Contract Documents may contain requirements that are more stringent than the referenced quality standard. Comply with the Contract Documents in addition to those of the referenced quality standard.

## 2.04 SOLID-CORE FLUSH WOOD DOORS WITH PLASTIC-LAMINATE FACES

- A. Interior Doors:
  - 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. General Veneer Manufacturing Co.
    - b. Haley Brothers, Inc.
    - c. Lambton Doors.
    - d. Masonite Architectural.
    - e. Vancouver Door Company.
    - f. VT Industries Inc.
  - 2. Architectural Woodwork Standards Grade: Premium.
  - 3. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS.
  - 4. Colors, Patterns, and Finishes: As indicated or if not indicated as selected by Architect from laminate manufacturer's full range of products.
  - 5. Exposed Vertical Edges: Hardwood edges for painting Plastic laminate that matches faces, applied before faces.
    - a. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
      - 1) Screw-Holding Capability: 550 lbf in accordance with WDMA T.M. 10.
  - 6. Core for Non-Fire-Rated Doors:
    - a. Glued wood stave.

- b. WDMA I.S. 10 structural composite lumber.
  - 1) Screw Withdrawal, Door Face: 550 lbf.
  - 2) Screw Withdrawal, Vertical Door Edge: 550 lbf.
- c. Either glued wood stave or WDMA I.S. 10 structural composite lumber.
- 7. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.
- 8. Construction: Three plies, hot-pressed or cold-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before faces are applied.

## 2.05 LIGHT FRAMES

- A. Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish.

## 2.06 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated.
  - 1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  - 2. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.
  - 1. Locate hardware to comply with DHI-WDHS-3.
  - 2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
  - 3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
  - 4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
- C. Openings: Factory cut and trim openings through doors.
  - 1. Light Openings: Trim openings with moldings of material and profile indicated.
  - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
  - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.

2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 INSTALLATION**

A. Hardware: For installation, see Division 08 Section "Door Hardware."

B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

### **3.03 ADJUSTING**

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

**END OF SECTION**

**SECTION 08 31 13**  
**ACCESS DOORS AND FRAMES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes access doors and frames.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product. Include construction details material descriptions, dimensions of individual components and profiles, and finishes.
- B. Product Schedule: For access doors and frames. Use same designations indicated on Drawings.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. 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:
1. ACUDOR Products, Inc.
  2. Karp Associates, Inc.
  3. Larsens Manufacturing Company.
  4. MIFAB, Inc.
  5. Milcor; a division of Hart & Cooley, Inc.
  6. Nystrom.

**2.02 ACCESS DOORS AND FRAMES**

- A. Flush Access Doors with Exposed Flanges: Typical applications except as otherwise indicated:
1. Description: Face of door flush with frame, with exposed flange and concealed hinge.
  2. Locations: Wall and ceiling.
  3. Door Size: As required to access and operate valve or damper but not less than 12 inches square.
  4. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage, factory primed.
  5. Frame Material: Same material, thickness, and finish as door.
  6. Latch and Lock: Cam latch, screwdriver operated.

- B. Flush Access Doors with Exposed Flanges: For Installation at Rest Rooms, Washroom, Janitor, and Similar Service Areas:
  - 1. Description: Face of door flush with frame, with exposed flange and concealed hinge.
  - 2. Locations: Wall and ceiling.
  - 3. Door Size: As required to access and operate valve or damper but not less than 12 inches square.
  - 4. Stainless Steel Sheet for Door: Nominal 0.062 inch, 16 gage, ASTM A480/A480M No. 4 finish.
  - 5. Frame Material: Same material, thickness, and finish as door.
  - 6. Latch and Lock: Cam latch, screwdriver operated.

### 2.03 MATERIALS

- A. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- B. Stainless Steel Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 304. Remove tool and die marks and stretch lines, or blend into finish.
- C. Frame Anchors: Same material as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

### 2.04 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
- D. Latch Hardware: Furnish number of latches and locks required to hold doors tightly closed.

### 2.05 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  - 1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
- E. Stainless Steel Finishes:
  - 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
  - 2. Polished Finish: ASTM A480/A480M No. 4 finish. Grind and polish surfaces to produce uniform finish, free of cross scratches.
    - a. Run grain of directional finishes with long dimension of each piece.
    - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.02 INSTALLATION**

- A. Comply with manufacturer's written instructions for installing access doors and frames.

#### **3.03 ADJUSTING**

- A. Adjust doors and hardware, after installation, for proper operation.

**END OF SECTION**



## **SECTION 08 33 23**

### **OVERHEAD COILING DOORS**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. Section includes insulated service doors.
- B. Related Sections include Division 05 Section "Metal Fabrications" for miscellaneous steel supports, door-opening framing, corner guards, and bollards.

##### **1.02 ACTION SUBMITTALS**

- A. Product Data: For each type and size of overhead coiling door and accessory.
  - 1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
  - 1. Include plans, elevations, sections, and mounting details.
  - 2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
  - 4. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
  - 5. Show locations of controls, locking devices, and other accessories.
  - 6. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
  - 1. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:
  - 1. Curtain slats.
  - 2. Bottom bar.

### **1.03 INFORMATIONAL SUBMITTALS**

- A. Sample Warranty: For special warranty.

### **1.04 CLOSEOUT SUBMITTALS**

- A. Special warranty.
- B. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

### **1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
  - 1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

### **1.06 WARRANTY**

- A. Special Warranty: Manufacturer agrees to repair or replace components of doors that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.
  - 1. Obtain operators and controls from overhead coiling-door manufacturer.

### **2.02 PERFORMANCE REQUIREMENTS**

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".
- B. Structural Performance, Exterior Doors: Capable of withstanding the following design wind loads:
  - 1. Design Wind Load: Uniform pressure (velocity pressure) of 30 lbf/sq. ft., acting inward and outward.
  - 2. Testing: According to ASTM E 330/E 330M.
  - 3. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.

4. Operability under Wind Load: Design overhead coiling doors to remain operable under uniform pressure (velocity pressure) of 20-lbf/sq. ft. wind load, acting inward and outward.
- C. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  1. Component Importance Factor: 1.5.

### 2.03 DOOR ASSEMBLIES

- A. Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
  1. Basis of Design: Design is based on CornellCookson, LLC Thermiser Max Door Model ESD30. Subject to compliance with requirements, provide named product or comparable product approved by Architect by one of the following:
    - a. Clopay Building Products.
    - b. Overhead Door Corporation.
    - c. Wayne-Dalton Corp.
- B. Operation Cycles: Door components and operators capable of operating for not less than 20,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
- C. Air Infiltration: Maximum rate of 1.0 cfm/sq. ft. at 15 and 25 mph when tested according to ASTM E 283.
- D. Curtain R-Value: 8 deg F x h x sq. ft./Btu.
- E. Door Curtain Material: Galvanized steel.
- F. Door Curtain Slats: Flat profile slats of 2-5/8-inch to 3-1/4-inch center-to-center height.
  1. Insulated-Slat Interior Facing: Metal.
  2. Gasket Seal. Manufacturer's standard continuous gaskets between slats.
- G. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from hot-dip galvanized steel and finished to match door.
- H. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.
- I. Hood: Match curtain material and finish.
  1. Shape: Round.
  2. Mounting: Face of wall.

- J. Locking Devices: Equip door with locking device assembly.
  - 1. Locking Device Assembly: Single-jamb side locking bars, operable from inside with thumbturn.
  
- K. Electric Door Operator:
  - 1. Usage Classification: Medium duty, up to 12 cycles per hour and up to 50 cycles per day.
  - 2. Operator Location: Front of hood.
  - 3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 feet or lower.
  - 4. Motor Exposure: Interior.
  - 5. Motor Electrical Characteristics:
    - a. Horsepower: As required to operated overhead coiling doors indicated.
    - b. Voltage: 115-V ac, single phase, 60 Hz.
  - 6. Emergency Manual Operation: Push-up type.
  - 7. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar; self-monitoring type.
    - a. Sensor Edge Bulb Color: Black.
  - 8. Control Station(s): Interior mounted.
  - 9. Other Equipment: Audible and visual signals.
  
- L. Curtain Accessories: Equip door with weatherseals and push/pull handles.
  
- M. Door Finish:
  - 1. Powder-Coated Finish: Color as indicated by manufacturer's designations or if not indicated as selected by Architect from manufacturer's full range.
  - 2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

#### **2.04 MATERIALS, GENERAL**

- 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.

## 2.05 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural-steel sheet; complying with ASTM A 653/A 653M, with G90 zinc coating; nominal sheet thickness (coated) of 0.028 inch; and as required.
  2. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84 or UL 723. Enclose insulation completely within slat faces.
  3. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face, with minimum steel thickness of 0.010 inch.
- B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.

## 2.06 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
1. Galvanized Steel: Nominal 0.028-inch-thick, hot-dip galvanized-steel sheet with G90 zinc coating, complying with ASTM A 653/A 653M.
  2. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.

## 2.07 LOCKING DEVICES

- A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
1. Lock Cylinders: As specified in Division 08 Section "Door Hardware".
- B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

## 2.08 CURTAIN ACCESSORIES

- A. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.
  - 1. At door head, use 1/8-inch-thick, replaceable, continuous-sheet baffle secured to inside of hood or field-installed on the header.
  - 2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch-thick seals of flexible vinyl, rubber, or neoprene.
- B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

## 2.09 COUNTERBALANCE MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
- D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

## 2.10 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
  - 1. Comply with NFPA 70.
  - 2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

- C. Door Operator Location(s): Operator location indicated for each door.
  - 1. Front-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on coil side of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.
- D. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated for each door assembly.
  - 1. Electrical Characteristics: Minimum as indicated for each door assembly. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
  - 2. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
  - 3. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
- E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- F. Obstruction-Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.
  - 1. Electric Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
    - a. Self-Monitoring Type: Four-wire-configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.
- G. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."
  - 1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
- H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.
- I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit

switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

- J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
- K. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with the accessibility standard.

## **2.11 GENERAL FINISH REQUIREMENTS**

- A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## **2.12 STEEL AND GALVANIZED-STEEL FINISHES**

- A. Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

# **PART 3 - EXECUTION**

## **3.01 EXAMINATION**

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## **3.02 INSTALLATION**

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors, hoods, controls, and operators at the mounting locations indicated for each door.
- C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with the accessibility standard.
- D. Power-Operated Doors: Install according to UL 325.



### **3.03 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.
  - 2. After electrical circuitry has been energized, operate doors to confirm proper motor rotation and door performance.
  - 3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

### **3.04 ADJUSTING**

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
  - 1. Adjust exterior doors and components to be weather resistant.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide tight fit around entire perimeter.

### **3.05 MAINTENANCE SERVICE**

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of coiling-door Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 1. Perform maintenance, including emergency callback service, during normal working hours.
  - 2. Include 24-hour-per-day, seven-day-per-week, emergency callback service.

### **3.06 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

**END OF SECTION**

**SECTION 08 43 13**  
**ALUMINUM-FRAMED STOREFRONTS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes aluminum-framed storefront systems for punched openings.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For aluminum-framed storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
  2. Include full-size isometric details of each type of vertical-to-horizontal intersection of aluminum-framed storefronts, showing the following:
    - a. Joinery, including concealed welds.
    - b. Anchorage.
    - c. Expansion provisions.
    - d. Glazing.
    - e. Flashing and drainage.
  3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- C. Samples: For each type of exposed finish required, in manufacturer's standard sizes.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Qualification Data:
1. For Installer.
- B. Energy Performance Certificates: For aluminum-framed storefronts, accessories, and components, from manufacturer.
1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed storefront.
- C. Product Test Reports: For aluminum-framed storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.

- D. Field quality-control reports.
- E. Sample Warranties: For special warranties.

#### **1.04 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For aluminum-framed storefronts to include in maintenance manuals.

#### **1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
  - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

#### **1.06 WARRANTY**

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures, including, but not limited to, excessive deflection.
    - b. Noise or vibration created by wind and thermal and structural movements.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - d. Water penetration through fixed glazing and framing areas.
  - 2. Warranty Period: Five years from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. 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:
  - 1. Arcadia, Inc.
  - 2. EFCO Corporation.
  - 3. Kawneer Company, Inc.; Arconic Corporation.
  - 4. Trulite Glass & Aluminum Solutions, LLC.

5. U.S. Aluminum; C.R. Laurence Co., Inc.; CRH Americas, Inc.
- B. Source Limitations: Obtain all components of aluminum-framed storefront system, including framing and accessories, from single manufacturer.

## 2.02 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  1. Aluminum-framed storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
- B. Structural Loads:
  1. Wind Loads: As indicated on Structural Drawings.
- C. Deflection of Framing Members Supporting Glass: At design wind load, as follows:
  1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans of up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches.
  2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.
- D. Structural: Test in accordance with ASTM E330/E330M as follows:
  1. When tested at positive and negative wind-load design pressures, storefront assemblies do not evidence deflection exceeding specified limits.
  2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- E. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:
  1. No evidence of water penetration through fixed glazing and framing areas when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

- F. Seismic Performance: Aluminum-framed storefronts shall withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.
  - 1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.6 at design displacement and 1.5 times the design displacement.
- G. Energy Performance: Certified and labelled by manufacturer for energy performance as follows:
  - 1. Thermal Transmittance (U-factor):
    - a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.50 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.
  - 2. Solar Heat Gain Coefficient (SHGC):
    - a. Fixed Glazing and Framing Areas: SHGC for the system of not more than 0.25 as determined in accordance with NFRC 200.
  - 3. Air Leakage:
    - a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft. when tested in accordance with ASTM E283.
- H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
  - 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested in accordance with AAMA 501.5.
    - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
    - b. Low Exterior Ambient-Air Temperature: 0 deg F.
    - c. Interior Ambient-Air Temperature: 75 deg F Insert temperature.

### **2.03 ALUMINUM-FRAMED STOREFRONT SYSTEMS**

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  - 1. Exterior Framing Construction: Thermally broken.
  - 2. Glazing System: Retained mechanically with gaskets on four sides.
  - 3. Finish: Clear anodic finish.
  - 4. Fabrication Method: Field-fabricated stick system.
  - 5. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

6. Steel Reinforcement: As required by manufacturer.
- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

#### **2.04 GLAZING**

- A. Glazing: Comply with Division 08 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.

#### **2.05 MATERIALS**

- A. Sheet and Plate: ASTM B209.
- B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
- C. Structural Profiles: ASTM B308/B308M.
- D. Steel Reinforcement:
  1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
  2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
  3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.
- E. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

#### **2.06 ACCESSORIES**

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
  1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
  2. Reinforce members as required to receive fastener threads.
  3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system, fabricated from 300 series stainless steel.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

- C. Concealed Flashing: Dead-soft, 0.018-inch-thick stainless steel, complying with ASTM A240/A240M, of type recommended by manufacturer.

## **2.07 FABRICATION**

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 5. Provisions for field replacement of glazing from interior.
  - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Storefront Framing: Fabricate components for assembly using shear-block system or screw-spline system.
- F. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

## **2.08 ALUMINUM FINISHES**

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 INSTALLATION, GENERAL**

- A. Comply with manufacturer's written instructions.
- B. Do not install damaged components.

- C. Fit joints to produce hairline joints free of burrs and distortion.
- D. Rigidly secure nonmovement joints.
- E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- F. Seal perimeter and other joints watertight unless otherwise indicated.
- G. Metal Protection:
  - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
- H. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.
- I. Install joint filler behind sealant as recommended by sealant manufacturer.
- J. Install components plumb and true in alignment with established lines and grades.

### **3.03 INSTALLATION OF GLAZING**

- A. Install glazing as specified in Division 08 Section "Glazing."

### **3.04 ERECTION TOLERANCES**

- A. Install aluminum storefront framing to comply with the following maximum tolerances:
  - 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
  - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
  - 3. Alignment:
    - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
  - 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

### **3.05 FIELD QUALITY CONTROL**

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.



- B. Field Quality-Control Testing: Perform the following test on each installation of aluminum-framed storefronts.
  - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested in accordance with AAMA 501.2 and shall not evidence water penetration.
- C. Aluminum-framed storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

**END OF SECTION**

## SECTION 08 71 00 DOOR HARDWARE

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes:
  - 1. Mechanical door hardware for swinging doors.
  - 2. Cylinders for door hardware specified in other Sections.
- B. Related Sections include Division 08 Section "Overhead Coiling Doors" for door hardware provided as part of overhead coiling door assemblies.

#### 1.02 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- C. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

#### 1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Conference participants shall include Installer's Architectural Hardware Consultant.
- B. Keying Conference: Conduct conference at Project site.
  - 1. Conference participants shall include Installer's Architectural Hardware Consultant.
  - 2. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:
    - a. Flow of traffic and degree of security required.
    - b. Preliminary key system schematic diagram.
    - c. Requirements for key control system.
    - d. Address for delivery of keys.

#### 1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples: For each exposed product in each finish specified, in manufacturer's standard size.
  - 1. Tag Samples with full product description to coordinate Samples with door hardware schedule.
- C. Samples for Verification: For each type of exposed product, in each finish specified.
  - 1. Sample Size: Minimum 2-by-4-inch Samples for sheet and 4-inch long Samples for other products.
  - 2. Tag Samples with full product description to coordinate Samples with door hardware schedule.
- D. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - 1. Submittal Sequence: Submit door hardware schedule after submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
  - 2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
  - 3. Content: Include the following information:
    - a. Identification number, location, hand, fire rating, size, and material of each door and frame.
    - b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
    - c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
    - d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
    - e. Fastenings and other installation information.
    - f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
    - g. Mounting locations for door hardware.
    - h. List of related door devices specified in other Sections for each door and frame.
- E. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

### **1.05 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer.
- B. Field quality-control reports.
- C. Sample Warranty: For special warranty.

### **1.06 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals.
- B. Schedules: Final door hardware and keying schedule.

### **1.07 QUALITY ASSURANCE**

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.
  - 1. Warehousing Facilities: In Project's vicinity.
  - 2. Scheduling Responsibility: Preparation of door hardware and keying schedule.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC).

### **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
- D. Deliver keys to Owner by registered mail or overnight package service.

### **1.09 WARRANTY**

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including excessive deflection, cracking, or breakage.

- b. Faulty operation of doors and door hardware.
  - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
2. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:
- a. Exit Devices: Five years from date of Substantial Completion.
  - b. Manual Closers: 10 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Source Limitations: Obtain each type of door hardware from single manufacturer.

### **2.02 PERFORMANCE REQUIREMENTS**

- A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
- B. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- C. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the DOJ's "2010 ADA Standards for Accessible Design".
  - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
  - 2. Comply with the following maximum opening-force requirements:
    - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
    - b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
  - 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
  - 4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
  - 5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

### 2.03 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
  - 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. Allegion plc.
    - b. Bommer Industries, Inc.
    - c. Hager Companies.
    - d. McKinney Products Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY.
    - e. STANLEY; dormakaba USA, Inc.

### 2.04 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
  - 1. Bored Locks: Minimum 1/2-inch latchbolt throw.
  - 2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
  - 3. Deadbolts: Minimum 1-inch bolt throw.
- C. Lock Backset: 2-3/4 inches unless otherwise indicated.
- D. Lock Trim:
  - 1. Description: [As indicated on Drawings] <Insert description or manufacturer's design designation>.
  - 2. Levers: Cast.
  - 3. Escutcheons (Roses): Wrought.
  - 4. Dummy Trim: Match lever lock trim and escutcheons.
- E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
- F. Bored Locks: BHMA A156.2; Grade 1; Series 4000.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allegion plc.
    - b. Best Access Systems; Stanley Security Solutions, Inc.
    - c. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
    - d. Hager Companies.
    - e. SARGENT Manufacturing Company; ASSA ABLOY.

## 2.05 AUXILIARY LOCKS

- A. Bored Auxiliary Locks: BHMA A156.36: Grade 1; with strike that suits frame.
  - 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. Allegion plc.
    - b. BEST Access Solutions, Inc.; dormakaba USA Inc.
    - c. Hager Companies.
    - d. SARGENT Manufacturing Company; ASSA ABLOY.
    - e. STANLEY; dormakaba USA, Inc.

## 2.06 AUTOMATIC AND SELF-LATCHING FLUSH BOLTS

- A. Automatic Flush Bolts: BHMA A156.3, Type 25; minimum 3/4-inch throw; with dust-proof strikes; designed for mortising into door edge.
  - 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. Allegion plc.
    - b. Rutherford Controls Int'l. (RCI); dormakaba Group.
    - c. Trimco.

## 2.07 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.
  - 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. Allegion plc.
    - b. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
    - c. Hager Companies.
    - d. SARGENT Manufacturing Company; ASSA ABLOY.

## 2.08 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinder from same manufacturer of locking devices.
- B. Standard Lock Cylinders: BHMA A156.5; Grade 1A permanent cores; face finished to match lockset.
- C. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

## 2.09 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock. Incorporate decisions made in keying conference.
  - 1. Master Key System: Change keys and a master key operate cylinders.
    - a. Provide three cylinder change keys and five master keys.
- B. Keys: Nickel silver.
  - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
    - a. Notation: "DO NOT DUPLICATE."

## 2.10 KEY CONTROL SYSTEM

- A. Key Control Cabinet: BHMA A156.28; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, two sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.
  - 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. American Key Boxes and Cabinets.
    - b. Lund Equipment Co., Inc.
    - c. TelKee; Oasis International.
  - 2. Wall-Mounted Cabinet: Grade 1 cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.
- B. Key Lock Boxes: Designed for storage of two keys.
  - 1. Manufacturer: Subject to compliance with requirements, provide products manufactured by Knox Company.

## 2.11 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; stainless steel unless otherwise indicated.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allegion plc.
    - b. Hager Companies.
    - c. Hiawatha, Inc; a division of the Activar Construction Products Group.



- d. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
- e. Trimco.

## **2.12 ACCESSORIES FOR PAIRS OF DOORS**

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release; and with internal override.
- B. Astragals: BHMA A156.22.

## **2.13 SURFACE CLOSERS**

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allegion plc.
    - b. Norton Door Controls; an ASSA ABLOY Group company.
    - c. SARGENT Manufacturing Company; ASSA ABLOY.

## **2.14 MECHANICAL STOPS AND HOLDERS**

- A. Wall- and Floor-Mounted Stops: BHMA A156.16.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allegion plc.
    - b. Hager Companies.
    - c. Hiawatha, Inc; a division of the Activar Construction Products Group.
    - d. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
    - e. Trimco.

## **2.15 DOOR GASKETING**

- A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
  - 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. Hager Companies.
    - b. National Guard Products, Inc.

- c. Pemko; an ASSA ABLOY Group Company.
  - d. Reese Enterprises, Inc.
  - e. Zero International; an Allegion brand.
- B. Maximum Air Leakage: When tested in accordance with ASTM E283 with tested pressure differential of 0.3-inch wg, as follows:
- 1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. of door opening.
  - 2. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.
  - 3. Gasketing on Double Doors: 0.50 cfm per ft. of door opening.

## 2.16 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Hager Companies.
    - b. National Guard Products, Inc.
    - c. Pemko; an ASSA ABLOY Group Company.
    - d. Reese Enterprises, Inc.
    - e. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
    - f. Zero International; an Allegion brand.

## 2.17 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch-thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allegion plc.
    - b. Hager Companies.
    - c. Hiawatha, Inc; a division of the Activar Construction Products Group.
    - d. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
    - e. Trimco.

## 2.18 AUXILIARY DOOR HARDWARE

- A. Auxiliary Hardware: BHMA A156.16.
- 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. Allegion plc.
    - b. Hager Companies.
    - c. Rockwood Manufacturing Company; an ASSA ABLOY Group company.

- d. Trimco.

## 2.19 FABRICATION

- A. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
- B. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.
  - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
  - 2. Fire-Rated Applications:
    - a. Wood or Machine Screws: For the following:
      - 1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors.
      - 2) Strike plates to frames.
      - 3) Closers to doors and frames.
  - 3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
  - 4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

## 2.20 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames in accordance with ANSI/SDI A250.6.
- B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

### **3.03 INSTALLATION**

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
  - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
  - 2. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
  - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Key Control System:
  - 1. Key Control Cabinet: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
  - 2. Key Lock Boxes: Install where indicated or approved by Architect to provide controlled access for fire and medical emergency personnel.

- E. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of silicone sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- F. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- G. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
  - 1. Do not notch perimeter gasketing to install other surface-applied hardware.
- H. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- I. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

### **3.04 FIELD QUALITY CONTROL**

- A. Independent Architectural Hardware Consultant: Engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
  - 1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

### **3.05 ADJUSTING**

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

### **3.06 CLEANING AND PROTECTION**

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

**3.07 DEMONSTRATION**

- A. Train Owner's maintenance personnel to adjust, operate, and maintain door hardware.

**3.08 DOOR HARDWARE SCHEDULE**

- A. Refer to Drawings.

**END OF SECTION**

**SECTION 08 80 00**  
**GLAZING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

1. Glazing for:
    - a. Doors.
    - b. Storefront framing.
  2. Glazing includes:
    - a. Monolithic coated glass.
    - b. Insulated glazing units with low-e coating.
  3. Glazing sealants and accessories.
- B. Related Sections include Division 08 Section "Fire-Rated Glazing."

**1.02 DEFINITIONS**

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

**1.03 COORDINATION**

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

**1.04 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.
  1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  2. Review temporary protection requirements for glazing during and after installation.

### **1.05 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

### **1.06 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For manufacturers of fabricated glass units.
- B. Product Certificates: For glass.
- C. Sample Warranties: For special warranties.

### **1.07 QUALITY ASSURANCE**

- A. Fabricated-Glass Manufacturer Qualifications: A qualified manufacturer of fabricated glass units who is approved and certified by primary glass manufacturer.

### **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

### **1.09 FIELD CONDITIONS**

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
  - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

### **1.10 WARRANTY**

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's



written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.
1. Warranty Period: 10 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Source Limitations for Glass: Obtain tinted and coated glass from single source from single manufacturer.
- B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

### **2.02 PERFORMANCE REQUIREMENTS**

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the CBC and ASTM E1300:
  1. Design Wind Pressures: Determine design wind pressures applicable to Project in accordance with ASCE/SEI 7, based on heights above grade indicated on Drawings.
    - a. Wind Design Data: As indicated on Drawings.
  2. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
  3. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.
- C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
  2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
  3. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F.
  4. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.

### 2.03 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. NGA Publications: "Glazing Manual."
  2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.
1. Minimum Glass Thickness for Exterior Lites: 6 mm.
  2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- D. Strength:
1. Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article.
  2. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article.
  3. Where fully tempered float glass is indicated, provide fully tempered float glass.

### 2.04 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

- B. Tinted Annealed Float Glass: ASTM C1036, Type I, Class 2 (tinted), Quality-Q3.
- C. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- D. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

## 2.05 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.
  - 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
  - 2. Perimeter Spacer: Manufacturer's standard spacer material and construction.
  - 3. Desiccant: Molecular sieve or silica gel, or a blend of both.

## 2.06 GLAZING SEALANTS

- A. General:
  - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range of industry colors.
- B. Acid-Curing Silicone Glazing Sealant, Class 25: Complying with ASTM C920, Type S, Grade NS, Use NT.

## 2.07 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for

application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
  2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.
  2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

## **2.08 MISCELLANEOUS GLAZING MATERIALS**

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks:
1. EPDM with Shore A durometer hardness of 85, plus or minus 5.
  2. Type recommended in writing by sealant or glass manufacturer.
- D. Spacers:
1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
  2. Type recommended in writing by sealant or glass manufacturer.
- E. Edge Blocks:
1. EPDM with Shore A durometer hardness per manufacturer's written instructions.
  2. Type recommended in writing by sealant or glass manufacturer.
- F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

## **2.09 FABRICATION OF GLAZING UNITS**

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions

of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
  - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
  1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  2. Presence and functioning of weep systems.
  3. Minimum required face and edge clearances.
  4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

### **3.03 GLAZING, GENERAL**

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch-minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

#### **3.04 TAPE GLAZING**

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- G. Apply cap bead of elastomeric sealant over exposed edge of tape.

#### **3.05 GASKET GLAZING (DRY)**

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

### **3.06 SEALANT GLAZING (WET)**

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

### **3.07 CLEANING AND PROTECTION**

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
  - 1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

### 3.08 MONOLITHIC GLASS SCHEDULE

- A. Clear Glass for Applications Where Safety Glazing is Not Indicated or Required: Annealed float glass.
  - 1. Minimum Thickness: 6 mm.
- B. Clear Glass for Applications Where Safety Glazing is Not Indicated or Required: Fully tempered float glass.
  - 1. Minimum Thickness: 6 mm.
  - 2. Safety glazing required.
- C. Tinted Glass for Installation at Exterior Doors: Fully tempered float glass.
  - 1. Basis-of-Design Product: Vitro Optigray.
  - 2. Tint Color: Gray.
  - 3. Minimum Thickness: 6 mm.
  - 4. Winter Nighttime U-Factor: 1.03 maximum.
  - 5. Visible Light Transmittance: 63 percent minimum.
  - 6. SHGC: 0.65 maximum.
  - 7. Safety glazing required.

### 3.09 INSULATING GLASS SCHEDULE

- A. Low-E-Coated, Tinted Insulating Glass Type:
  - 1. Basis-of-Design Product: Vitro Solarban 70 on Optigray.
  - 2. Overall Unit Thickness: 1 inch.
  - 3. Minimum Thickness of Each Glass Lite: 6 mm.
  - 4. Outdoor Lite: Tinted fully tempered float glass.
  - 5. Tint Color: Gray.
  - 6. Interspace Content: Air.
  - 7. Indoor Lite: Clear annealed float glass.
  - 8. Low-E Coating: Sputtered on second surface.
  - 9. Winter Nighttime U-Factor: 0.29 maximum.
  - 10. Visible Light Transmittance: 46 percent minimum.
  - 11. SGHC: 0.23 maximum.

**END OF SECTION**



**SECTION 08 88 13**  
**FIRE-RATED GLAZING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes fire-protection-rated glazing for use in fire-rated doors.

**1.02 DEFINITIONS**

- A. Fire-Protection-Rated Glazing: Glazing in rated doors and openings up to 45 minutes, limited in size, and not capable of blocking radiant heat.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

**1.03 COORDINATION**

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

**1.04 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product; 12 inches square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

**1.05 INFORMATIONAL SUBMITTALS**

- A. Product Certificates: For each type of glass and glazing product.
- B. Sample Warranties: For special warranties.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

### 1.07 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install fire-resistant glazing until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature conditions at occupancy levels during remainder of construction period.

### 1.08 WARRANTY

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Source Limitations for Glass: For each glass type, obtain from single source from single manufacturer.
- B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

### 2.02 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

### 2.03 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. NGA Publications: "Glazing Manual."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of manufacturer. Label shall indicate manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

### 2.04 GLASS PRODUCTS

- A. Low-Iron Float Glass: ASTM C1036, Type I, Quality-Q3, Class I (clear), with visible light transmission not less than 91 percent.
- B. Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class I (clear) unless otherwise indicated, Quality-Q3.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

## 2.05 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing in accordance with NFPA 257 or UL 9, including hose-stream test, and shall comply with NFPA 80.
- B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether glazing has passed hose-stream test; whether glazing meets 450 deg F temperature-rise limitation; and fire-resistance rating in minutes.
- C. Fire-Protection-Rated Monolithic Glass for Doors and Protected Openings: 19-mm thickness; low-iron fire-protection-rated glass; complying with 16 CFR 1201, Category II. UL listed and tested in accordance with NFPA 252 for fire-rated doors and NFPA 257 for protected openings with hose-stream testing.
  - 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. SAFTI FIRST Fire Rated Glazing Solutions; SuperClear 45-HS.
    - b. Schott North America, Inc.; PYRAN Platinum fire-rated glass-ceramic.

## 2.06 GLAZING ACCESSORIES

- A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.
- B. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.
  - 1. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range of industry colors.
- C. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
  - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  - 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

- D. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
  - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.
  - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

## **2.07 MISCELLANEOUS GLAZING MATERIALS**

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- C. Perimeter Insulation for Fire-Resistance-Rated Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

## **2.08 FABRICATION OF GLAZING UNITS**

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

# **PART 3 - EXECUTION**

## **3.01 EXAMINATION**

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with manufacturing and installation tolerances, including those for size, squareness, and offsets at corners, and for compliance with minimum required face and edge clearances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## **3.02 PREPARATION**

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate fire side and protected side. Label or mark units as needed so that fire side and protected side are readily identifiable. Do not use materials that leave visible marks in the completed Work.

### 3.03 GLAZING, GENERAL

- A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.
- B. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches.
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch-minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.
- I. Set glass lites with proper orientation so that coatings face fire side or protected side as specified.

### 3.04 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

### **3.05 SEALANT GLAZING (WET)**

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

### **3.06 CLEANING AND PROTECTION**

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
  - 1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

**END OF SECTION**

## SECTION 08 91 19 FIXED LOUVERS

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes fixed extruded-aluminum louvers.

#### 1.02 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven-rain performance, as determined by testing according to AMCA 500-L.

#### 1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
  - 1. Show weep paths, gaskets, flashings, sealants, and other means of preventing water intrusion.
  - 2. Show mullion profiles and locations.
- C. Samples: For each type of metal finish required.
- D. Delegated-Design Submittal: For louvers indicated to comply with structural and seismic performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.04 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.
- B. Sample Warranties: For manufacturer's special warranties.

### 1.05 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

### 1.06 WARRANTY

- A. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.
  - 1. Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Source Limitations: Obtain fixed louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

### 2.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural and seismic performance requirements and design criteria indicated.
- B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
  - 1. Design Wind Pressures: Determine positive and negative wind pressures according to ASCE/SEI 7 using wind speed criteria indicated on Structural Drawings but not less than 30 lbs./sq. ft.
- C. Seismic Performance: As indicated on drawings.
- D. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.



- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- F. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

## **2.03 FIXED EXTRUDED-ALUMINUM LOUVERS**

- A. Horizontal, Wind-Driven-Rain-Resistant Louver:
  - 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. Airolite Company, LLC (The).
    - b. Arrow United Industries.
    - c. Construction Specialties, Inc.
    - d. Greenheck Fan Corporation.
    - e. Industrial Louvers Inc.
    - f. NCA Manufacturing, Inc.
    - g. Reliable Products, Inc.
    - h. Ruskin Company.
  - 2. Louver Depth: 4 inches.
  - 3. Frame and Blade Nominal Thickness: Not less than 0.060 inch for blades and 0.080 inch for frames.
  - 4. Louver Performance Ratings:
    - a. Free Area: Not less than 6.0 sq. ft. for 48-inch-wide by 48-inch-high louver.
    - b. Air Performance: Not more than 0.10-inch wg static pressure drop at 600-fpm free-area intake velocity.
    - c. Wind-Driven Rain Performance: Not less than 95 percent effectiveness when subjected to a rainfall rate of 8 inches per hour and a wind speed of 50 mph at a core-area intake velocity of 400 fpm.
  - 5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

## **2.04 LOUVER SCREENS**

- A. General: Provide screen at each exterior louver.
  - 1. Screen Location for Fixed Louvers: Interior face.
  - 2. Screening Type: Bird screening.
- B. Secure screen frames to louver frames with machine screws with heads finished to match louver, spaced a maximum of 6 inches from each corner and at 12 inches o.c.

- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
  - 1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
  - 2. Finish: Mill finish unless otherwise indicated.
  - 3. Type: Non-rewirable, U-shaped frames.
- D. Louver Screening for Aluminum Louvers:
  - 1. Bird Screening: Aluminum, 1/2-inch-square mesh, 0.063-inch wire.

## 2.05 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005, with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
  - 1. Use hex-head or Phillips pan-head screws for exposed fasteners unless otherwise indicated.
  - 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
  - 3. For color-finished louvers, use fasteners with heads that match color of louvers.
- D. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, fabricated from stainless-steel components, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing according to ASTM E 488/E 488M conducted by a qualified testing agency.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

## 2.06 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
- C. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
  - 1. Frame Type: Exterior flange unless otherwise indicated.

- E. Include supports, anchorages, and accessories required for complete assembly.
- F. Provide subsills made of same material as louvers for recessed louvers.
- G. Join frame members to each other and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

## **2.07 ALUMINUM FINISHES**

- A. Finish louvers after assembly.
- B. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 1. Color and Gloss: As indicated by manufacturer's designations or if not indicated as selected by Architect from manufacturer's full range.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

### **3.03 INSTALLATION**

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a

heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

### **3.04 ADJUSTING AND CLEANING**

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction, so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
  - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

**END OF SECTION**

## SECTION 09 22 16 NON-STRUCTURAL METAL FRAMING

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes:
  - 1. Non-load-bearing steel framing systems for interior partitions.
  - 2. Suspension systems for interior ceilings and soffits.
  - 3. Grid suspension systems for gypsum board ceilings.

#### 1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include data indicating compliance with performance standards. Clearly indicate on Product Data size and thickness of framing required for each condition.

#### 1.03 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.
- B. Evaluation Reports: For firestop tracks, post-installed anchors, and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

#### 1.04 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, or the Steel Stud Manufacturers Association.

### PART 2 - PRODUCTS

#### 2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

- C. Steel Framing: Metal thicknesses indicated are minimum thickness selected to meet structural design criteria for non-structural, interior partitions. Where metal framing manufacturer's published Product Data recommends a greater thickness for the condition indicated, provide metal framing in recommended thickness.
  - 1. Lateral Load: 5 lbs/sq. ft.
  - 2. Maximum Allowable Deflection:
    - a. Typical Partitions: L/240.
    - b. Partitions with Tile Finishes: L/480.

## 2.02 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
  - 2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.
- B. Studs and Tracks: ASTM C 645.
  - 1. Steel Studs and Tracks:
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) CEMCO; California Expanded Metal Products Co.
      - 2) ClarkDietrich.
      - 3) MarinoWARE.
      - 4) Mill Steel Framing.
      - 5) SCAFCO Steel Stud Company.
      - 6) Telling Industries.
    - b. Minimum Base-Metal Thickness: As required by performance requirements for horizontal deflection.
    - c. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
  - 1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 2-inch minimum vertical movement.
    - a. 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:
      - 1) ClarkDietrich.
      - 2) Fire Trak Corp.

- 3) MarinoWARE.
  - 4) SCAFCO Steel Stud Company.
  - 5) The Steel Network, Inc.
2. Single Long-Leg Track System: ASTM C 645 top track with 2-inch-deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
  3. Double-Track System: ASTM C 645 top outer tracks, inside track with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
  4. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
    - a. 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:
      - 1) ClarkDietrich.
      - 2) MarinoWARE.
      - 3) MBA Building Supplies.
      - 4) SCAFCO Steel Stud Company.
      - 5) The Steel Network, Inc.
- D. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
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. ClarkDietrich.
    - b. Fire Trak Corp.
    - c. MarinoWARE.
    - d. SCAFCO Steel Stud Company.
    - e. The Steel Network, Inc.
- E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: 0.538 inch.
- F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch-wide flanges.
1. Depth: 1-1/2 inches.

2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.
- G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base-Metal Thickness: 0.0179 inch.
  2. Depth: 7/8 inch.
- H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.
1. Depth: 3/4 inch.
  2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
  3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.

### 2.03 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- C. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- D. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.
1. Depth: 2-1/2 inches.
- E. Furring Channels (Furring Members):
1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
  2. Steel Studs and Tracks: ASTM C 645.
    - a. Minimum Base-Metal Thickness: 0.0179 inch.
    - b. Depth: 2-1/2 inches.
  3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
    - a. Minimum Base-Metal Thickness: 0.0179 inch.



- F. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
  - 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. Armstrong World Industries, Inc.
    - b. Chicago Metallic Corporation.
    - c. USG Corporation.

## **2.04 AUXILIARY MATERIALS**

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

### **3.03 INSTALLATION, GENERAL**

- A. Installation Standard: ASTM C 754.
  - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

### **3.04 INSTALLING FRAMED ASSEMBLIES**

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
  - 1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
  - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
  - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
    - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
  - 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

- E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

### **3.05 INSTALLING CEILING SUSPENSION SYSTEMS**

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
  - 1. Hangers: 48 inches o.c.
  - 2. Carrying Channels (Main Runners): 48 inches o.c.
  - 3. Furring Channels (Furring Members): 16 inches o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
    - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
  - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 5. Do not attach hangers to steel roof deck.
  - 6. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

**END OF SECTION**

## SECTION 09 29 00 GYPSUM BOARD

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes interior gypsum board.
- B. Related Sections include:
  - 1. Division 07 Section "Acoustical Joint Sealants" for acoustical joint sealants installed in gypsum board assemblies.
  - 2. Division 09 Section "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

#### 1.02 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Gypsum wallboard.
  - 2. Abuse-resistant gypsum board.
  - 3. Interior trim.
  - 4. Sound-attenuation blankets.
- B. Samples: For the following products:
  - 1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

#### 1.03 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

#### 1.04 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

- C. Do not install panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

## **PART 2 - PRODUCTS**

### **2.01 PERFORMANCE REQUIREMENTS**

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

### **2.02 GYPSUM BOARD, GENERAL**

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

### **2.03 INTERIOR GYPSUM BOARD**

- A. Gypsum Board, Type X: ASTM C1396/C1396M.
  - 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. American Gypsum.
    - b. Certainteed; SAINT-GOBAIN.
    - c. Continental Building Products Inc.
    - d. Georgia-Pacific Gypsum LLC.
    - e. National Gypsum Company.
    - f. PABCO Gypsum.
    - g. USG Corporation.
  - 2. Thickness: 5/8 inch.
  - 3. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

- B. Abuse-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.
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. American Gypsum.
    - b. Certainteed; SAINT-GOBAIN.
    - c. Continental Building Products Inc.
    - d. Georgia-Pacific Gypsum LLC.
    - e. National Gypsum Company.
    - f. PABCO Gypsum.
    - g. USG Corporation.
  2. Core: 5/8 inch, Type X.
  3. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 2 requirements.
  4. Indentation: ASTM C1629/C1629M, meets or exceeds Level 2 requirements.
  5. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 2 requirements.
  6. Long Edges: Tapered.
  7. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

#### **2.04 TRIM ACCESSORIES**

- A. Interior Trim: ASTM C1047.
1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
  2. Shapes:
    - a. Cornerbead.
    - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    - c. L-Bead: L-shaped; exposed long flange receives joint compound.
    - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
    - e. Expansion (control) joint.

#### **2.05 JOINT TREATMENT MATERIALS**

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
1. Interior Gypsum Board: Paper.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.

2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
  - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.

## 2.06 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
  1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
- C. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
  1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- D. Acoustical Sealant: As specified in Division 07 Section "Acoustical Joint Sealants."
  1. Verify sealant has a VOC content of 250 g/L or less.
- E. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A. Comply with ASTM C840.



- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

### **3.03 INSTALLATION OF INTERIOR GYPSUM BOARD**

- A. Install interior gypsum board in the following locations:
  - 1. Type X: Typical unless otherwise indicated.
  - 2. Abuse-Resistant Type: Hallways and Cooling Center.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
  - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

**3.04 INSTALLATION OF TRIM ACCESSORIES**

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
  1. Cornerbead: Use at outside corners unless otherwise indicated.
  2. LC-Bead: Use at exposed panel edges.
  3. L-Bead: Use where indicated.
  4. U-Bead: Use at exposed panel edges.

**3.05 FINISHING GYPSUM BOARD**

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
  1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  2. Level 3: Where indicated on Drawings.
  3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
    - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

### **3.06 PROTECTION**

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

**END OF SECTION**

**SECTION 09 65 13**  
**RESILIENT BASE AND ACCESSORIES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes thermoplastic-rubber base.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.
- C. Product Schedule: For resilient base and accessory products.

**1.03 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

**1.05 FIELD CONDITIONS**

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

- C. Install resilient products after other finishing operations, including painting, have been completed.

## **PART 2 - PRODUCTS**

### **2.01 THERMOPLASTIC-RUBBER BASE**

- A. 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:
  - 1. Allstate Rubber Corp.
  - 2. Armstrong World Industries, Inc.
  - 3. Flexco; Roppe Holding Company.
  - 4. Johnsonite; a Tarkett company.
  - 5. Roppe Corporation; Roppe Holding Company.
- B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).
  - 1. Group: I (solid, homogeneous).
  - 2. Style: Style B, Cove: .
- C. Thickness: 0.125 inch.
- D. Height: 4 inches.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Preformed.
- G. Inside Corners: Job formed or preformed.
- H. Colors: As indicated by manufacturer's designations or if not indicated as selected from manufacturer's full range.

### **2.02 RESILIENT MOLDING ACCESSORY**

### **2.03 VINYL MOLDING ACCESSORY**

- A. 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:
  - 1. Armstrong World Industries, Inc.
  - 2. Burke Mercer Flooring Products; a division of Burke Industries Inc.
  - 3. Flexco.
  - 4. Johnsonite; a Tarkett company.
  - 5. Musson Rubber Co.
  - 6. Roppe Corporation, USA.
- B. Description: Vinyl carpet edge for glue-down applications, nosing for resilient floor covering, and reducer strip for resilient floor covering.

- C. Profile and Dimensions: As indicated or if not indicated as selected by Architect.
- D. Locations: Provide vinyl molding accessories in areas indicated.
- E. Colors: As indicated by manufacturer's designations or if not indicated as selected from manufacturer's full range.

#### **2.04 INSTALLATION MATERIALS**

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
  - 1. Adhesives shall have a VOC content of 50 g/L or less.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

#### **3.02 PREPARATION**

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

### **3.03 RESILIENT BASE INSTALLATION**

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. Preformed Corners: Install preformed corners before installing straight pieces.
- G. Job-Formed Corners:
  - 1. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
    - a. Miter or cope corners to minimize open joints.

### **3.04 RESILIENT ACCESSORY INSTALLATION**

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

### **3.05 CLEANING AND PROTECTION**

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
  - 1. Remove adhesive and other blemishes from surfaces.
  - 2. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

**END OF SECTION**

**SECTION 09 65 19**  
**RESILIENT TILE FLOORING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes solid vinyl floor tile (LVT).

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of resilient floor tile.
  - 1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
  - 2. Show details of special patterns.
- C. Samples: Full-size units of each color, texture, and pattern of floor tile required.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer.

**1.04 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

**1.05 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. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

**1.06 QUALITY ASSURANCE**

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
  - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.



### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

### 1.08 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

### 2.01 SOLID VINYL FLOOR TILE

- A. 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:
  - 1. Armstrong World Industries, Inc.
  - 2. Congoleum Corporation.
  - 3. Johnsonite; a Tarkett company.
  - 4. Mannington Mills, Inc.
  - 5. Patcraft; a division of Shaw Industries, Inc.
  - 6. Shaw Contract Group; a Berkshire Hathaway company.
  - 7. TOLI International.
- B. Tile Standard: ASTM F 1700.
  - 1. Class: Class III, Printed Film Vinyl Tile.
  - 2. Type: A, Smooth Surface.
- C. Minimum Thickness: 0.080 inch.
- D. Size: 12 by 24 inches.

- E. Colors and Patterns: Colors: As indicated by manufacturer's designations or if not indicated as selected from manufacturer's full range.

## **2.02 INSTALLATION MATERIALS**

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
  - 1. Verify adhesives have a VOC content of 50 g/L or less.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.

4. Moisture Testing: Perform tests so that each test area does not exceed 250 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
  - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
  - b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
  1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### **3.03 FLOOR TILE INSTALLATION**

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
  1. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

### **3.04 CLEANING AND PROTECTION**

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
  - 1. Remove adhesive and other blemishes from surfaces.
  - 2. Sweep and vacuum surfaces thoroughly.
  - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
  - 1. Apply number of coats recommended by manufacturer.
- E. Cover floor tile until Substantial Completion.

**END OF SECTION**

## SECTION 09 68 13 TILE CARPETING

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes modular carpet tile.
- B. Related Sections include Division 09 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

#### 1.02 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
    - a. Review delivery, storage, and handling procedures.
    - b. Review ambient conditions and ventilation procedures.
    - c. Review subfloor preparation procedures.

#### 1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
  - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Shop Drawings: For carpet tile installation, plans showing the following:
  - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
  - 2. Carpet tile type, color, and dye lot.
  - 3. Type of subfloor.
  - 4. Type of installation.
  - 5. Pattern of installation.
  - 6. Pattern type, location, and direction.
  - 7. Pile direction.
  - 8. Type, color, and location of insets and borders.
  - 9. Type, color, and location of edge, transition, and other accessory strips.
  - 10. Transition details to other flooring materials.

- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
  - 1. Carpet Tile: Full-size Sample.
  - 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.

#### **1.04 INFORMATIONAL SUBMITTALS**

- A. Sample Warranty: For special warranty.

#### **1.05 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
  - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
  - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

#### **1.06 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with the Carpet and Rug Institute's CRI 104.

#### **1.08 FIELD CONDITIONS**

- A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

## 1.09 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
  - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
  - 2. Failures include, but are not limited to, the following:
    - a. More than 10 percent edge raveling, snags, and runs.
    - b. Dimensional instability.
    - c. Excess static discharge.
    - d. Loss of tuft-bind strength.
    - e. Loss of face fiber.
    - f. Delamination.
  - 3. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.01 CARPET TILE

- A. Basis of Design: Design is based on product indicated on Drawings. Subject to compliance with requirements, provide named product or comparable product approved by Architect.
- B. Color and Pattern: As indicated by manufacturer's designations.
- C. Minimum Total Weight: 4.5 oz./sq. yd. for finished carpet tile.
- D. Minimum Total Thickness: 0.205 inches for finished carpet tile.
- E. Size: 18 by 36 inches.
- F. Performance Characteristics:
  - 1. Dimensional Tolerance: Within 1/32 inch of specified size dimensions, as determined by physical measurement.
  - 2. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
  - 3. Noise Reduction Coefficient (NRC): 0.30 according to ASTM C423.
  - 4. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
  - 5. Colorfastness to Light: Not less than 4 after 40 AFU (AATCC fading units) according to AATCC 16, Option E.
  - 6. Electrostatic Propensity: Less than 3 kV according to AATCC 134.

### 2.02 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
  - 1. Adhesives shall have a VOC content of 50 g/L or less.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
  - 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
    - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without



using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.

- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

### **3.03 INSTALLATION**

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.

### **3.04 CLEANING AND PROTECTION**

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
  - 2. Remove yarns that protrude from carpet tile surface.
  - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

**END OF SECTION**

## SECTION 09 68 16 SHEET CARPETING

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes:
  - 1. Tufted carpet.
  - 2. [**Carpet cushion**].
- B. Related Sections include Division 09 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet.

#### 1.02 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to carpet installation including, but not limited to, the following:
    - a. Review delivery, storage, and handling procedures.
    - b. Review ambient conditions and ventilation procedures.
    - c. Review subfloor preparation procedures.

#### 1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include manufacturer's written data on physical characteristics and durability.
  - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Shop Drawings: For carpet installation, showing the following:
  - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
  - 2. Carpet type, color, and dye lot.
  - 3. Locations where dye lot changes occur.
  - 4. Seam locations, types, and methods.
  - 5. Type of subfloor.
  - 6. Type of installation.
  - 7. Pattern type, repeat size, location, direction, and starting point.
  - 8. Pile direction.
  - 9. Types, colors, and locations of insets and borders.

10. Types, colors, and locations of edge, transition, and other accessory strips.
  11. Transition details to other flooring materials.
  12. Type of carpet cushion.
- C. Samples for Initial Selection: For each type of product.
1. Include Samples of exposed edge, transition, and other accessory stripping involving color or finish selection.
- D. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
1. Carpet: 12-inch-square Sample.
  2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.
  3. Carpet Cushion: 6-inch-square Sample.
  4. Carpet Seam: 6-inch Sample.
- E. Product Schedule: For carpet[ **and carpet cushion**]. Use same designations indicated on Drawings.

#### **1.04 INFORMATIONAL SUBMITTALS**

- A. Sample Warranties: For special warranties.

#### **1.05 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For carpet to include in maintenance manuals. Include the following:
1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
  2. Precautions for cleaning materials and methods that could be detrimental to carpet[ **and carpet cushion**].

#### **1.06 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Carpet: Full-width rolls equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with the Carpet and Rug Institute's CRI 104.
- B. Deliver carpet in original mill protective covering with mill register numbers and tags attached.

### 1.08 FIELD CONDITIONS

- A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet[ **and carpet cushion**] until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet[ **and carpet cushion**] over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

### 1.09 WARRANTY

- A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
  - 1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
  - 2. Failures include, but are not limited to, the following:
    - a. More than 10 percent loss of face fiber, edge raveling, snags, and runs.
    - b. Loss of tuft bind strength.
    - c. Excess static discharge.
    - d. Delamination.
  - 3. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Warranty for Carpet Cushion: Manufacturer agrees to repair or replace components of carpet cushion installation that fail in materials or workmanship within specified warranty period.
  - 1. Warranty includes removal and replacement of carpet and accessories required by replacement of carpet cushion.
  - 2. Warranty does not include deterioration or failure of carpet cushion due to unusual traffic, failure of substrate, vandalism, or abuse.
  - 3. Failure includes, but is not limited to, permanent indentation or compression.
  - 4. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.01 TUFTED CARPET

- A. Basis of Design: Design is based on product scheduled on Drawings. Subject to compliance with requirements, provide named product or comparable product approved by Architect.
- B. Color: As indicated by manufacturer's designations.
- C. Applied Treatments:
  - 1. Applied Soil-Resistance Treatment: Manufacturer's standard material.
  - 2. Antimicrobial Treatment: Manufacturer's standard material.
    - a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.
- D. Performance Characteristics:
  - 1. Critical Radiant Flux Classification: Not less than **[0.45 W/sq. cm]** **[0.22 W/sq. cm]** according to NFPA 253.
  - 2. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.

### 2.02 CARPET CUSHION

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Traffic Classification: CCC [Class I, moderate] [Class II, heavy] [Class III, extra-heavy] traffic.
- C. Polyurethane-Foam Cushion: [Grafted prime] [Densified] [Bonded] [Mechanically frothed].
  - 1. Compression Force Deflection at 65 Percent: **<Insert lb/sq. in. of polymer density>** according to ASTM D3574.
  - 2. Thickness: **<Insert inches>**.
  - 3. Density: **<Insert lb/cu. ft. >**.
- D. Performance Characteristics:
  - 1. Critical Radiant Flux Classification: Not less than **[0.45 W/sq. cm]** **[0.22 W/sq. cm]** according to NFPA 253.

### 2.03 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by **[carpet]** **[carpet cushion]** manufacturer.

- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by [carpet manufacturer] [carpet and carpet cushion manufacturers].
  - 1. [<Double click to insert sustainable design text for VOC content of adhesive.>](#)
  - 2. [<Double click to insert sustainable design text for adhesives.>](#)
- C. Tackless Carpet Stripping: Water-resistant plywood, in strips as required to match cushion thickness and that comply with the Carpet and Rug Institute's CRI 104.
- D. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.
- E. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance.
- B. Examine carpet for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
  - 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
    - c. Perform additional moisture tests recommended in writing by [adhesive and carpet] [adhesive, carpet cushion, and carpet] manufacturers. Proceed with installation only after substrates pass testing.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet manufacturer's written installation instructions for preparing substrates.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by **[adhesive and carpet] [adhesive, carpet, and carpet cushion]** manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

### 3.03 INSTALLATION

- A. Comply with the Carpet and Rug Institute's CRI 104 and **[carpet manufacturer's] [carpet and carpet cushion manufacturers']** written installation instructions for the following:
  - 1. Direct-glue-down installation.
  - 2. Double-glue-down installation.
  - 3. Carpet with attached-cushion installation.
  - 4. Preapplied adhesive installation.
  - 5. Stretch-in installation.
- B. Comply with carpet manufacturer's written instructions and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
  - 1. Stretch-in Carpet Installation: Install carpet cushion seams at 90-degree angle with carpet seams.
- C. Install [pattern parallel to walls and borders] [as indicated on Drawings] <Insert requirements>.
- D. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- E. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet as marked on subfloor. Use nonpermanent, nonstaining marking device.

### 3.04 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet:
  - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
  - 2. Remove yarns that protrude from carpet surface.
  - 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with the Carpet and Rug Institute's CRI 104.
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods recommended in writing by carpet manufacturer [**and carpet cushion manufacturer**] [**and carpet adhesive manufacturer**] [**and carpet cushion and adhesive manufacturers**].

**END OF SECTION**



**SECTION 09 91 13**  
**EXTERIOR PAINTING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
  - 1. Steel and iron.
  - 2. Galvanized metal.
  
- B. Related Sections include Division 09 Section "High-Performance Coatings" for tile-like coatings.

**1.02 DEFINITIONS**

- A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
  - 2. Indicate VOC content.
  
- B. Samples for Initial Selection: For each type of topcoat product.
  
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Apply coats on Samples in steps to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.
  
- D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

#### **1.04 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. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

#### **1.05 QUALITY ASSURANCE**

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
    - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
    - b. Other Items: Architect will designate items or areas required.
  - 2. Final approval of color selections will be based on mockups.
    - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
  - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

#### **1.07 FIELD CONDITIONS**

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Behr Paint Company; Behr Process Corporation.
  - 2. Benjamin Moore & Co.
  - 3. PPG Paints.
  - 4. Sherwin-Williams Company (The).

### **2.02 PAINT, GENERAL**

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
  - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
  - 1. Nonflat Paints and Coatings: 100 g/L.
  - 2. Primers, Sealers, and Undercoaters: 100 g/L.
- D. Colors: As indicated in a color schedule or if not indicated as selected by Architect from manufacturer's full range.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

### 3.02 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

### 3.03 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
  - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
  - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

- C. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  - 1. Paint the following work where exposed to view:
    - a. Equipment, including panelboards and switch gear.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.

### **3.04 FIELD QUALITY CONTROL**

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

### **3.05 CLEANING AND PROTECTION**

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### **3.06 EXTERIOR PAINTING SCHEDULE**

- A. Steel and Iron Substrates:
  - 1. Water-Based Light Industrial Coating System MPI EXT 5.1C:
    - a. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
    - b. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5), MPI #163.

B. Galvanized-Metal Substrates:

1. Water-Based Light Industrial Coating System MPI EXT 5.3J:
  - a. Prime Coat: Primer, galvanized, water based, MPI #134.
  - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
  - c. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5), MPI #163.

**END OF SECTION**

## SECTION 09 91 23 INTERIOR PAINTING

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
  - 1. Steel and iron.
  - 2. Galvanized metal.
  - 3. Gypsum board.
- B. Related Sections include Division 09 Section "High-Performance Coatings" for tile-like coatings.

#### 1.02 DEFINITIONS

- A. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

#### 1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
  - 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Apply coats on Samples in steps to show each coat required for system.
  - 3. Label each coat of each Sample.

4. Label each Sample for location and application area.
- D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

#### **1.04 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. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

#### **1.05 QUALITY ASSURANCE**

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
    - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
    - b. Other Items: Architect will designate items or areas required.
  2. Final approval of color selections will be based on mockups.
    - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
  3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.

#### **1.07 FIELD CONDITIONS**

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.



## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. 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:
  - 1. Behr Process Corporation.
  - 2. Benjamin Moore & Co.
  - 3. PPG Paints.
  - 4. Sherwin-Williams Company (The).

### **2.02 PAINT, GENERAL**

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
  - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
  - 1. Flat Paints and Coatings: 50 g/L.
  - 2. Nonflat Paints and Coatings: 100 g/L.
  - 3. Primers, Sealers, and Undercoaters: 100 g/L.
- D. Colors: As indicated in a color schedule or if not indicated as selected by Architect from manufacturer's full range.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

### **3.02 PREPARATION**

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

### **3.03 APPLICATION**

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- C. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  1. Paint the following work where exposed in occupied spaces:
    - a. Equipment, including panelboards.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Other items as directed by Architect.
  2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

### **3.04 FIELD QUALITY CONTROL**

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  1. Contractor shall touch up and restore painted surfaces damaged by testing.
  2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

### **3.05 CLEANING AND PROTECTION**

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.06 INTERIOR PAINTING SCHEDULE

- A. Steel Substrates: Typical for steel substrates except as otherwise indicated.
  - 1. Latex System, Alkyd Primer MPI INT 5.1Q:
    - a. Prime Coat: Primer, alkyd, quick dry, for metal, MPI #76.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior, semi-gloss (MPI Gloss Level 5), MPI #54.
  
- B. Steel Substrates: Apply to substrates at steel doors and frames.
  - 1. Water-Based Light Industrial Coating System MPI INT 5.1B:
    - a. Prime Coat: Primer, rust-inhibitive, water based MPI #107.
    - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
    - c. Topcoat: Light industrial coating, interior, water based, semi-gloss (MPI Gloss Level 5), MPI #153.
  
- C. Galvanized-Metal Substrates:
  - 1. Latex System MPI INT 5.3J:
    - a. Prime Coat: Primer, galvanized, water based, MPI #134.
    - b. Topcoat: Latex, interior, semi-gloss (MPI Gloss Level 5), MPI #54.
  
- D. Gypsum Board Substrates: Typical for gypsum board surfaces except as otherwise indicated.
  - 1. Latex over Latex Sealer System MPI INT 9.2A:
    - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
    - b. Prime Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior (MPI Gloss Level 3 or 4), MPI #52 or MPI #43.
  
- E. Gypsum Board Substrates: Typical for gypsum board surfaces at Cooling Center and Hallway.
  - 1. High-Performance Architectural Latex System MPI INT 9.2B:
    - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
    - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
    - c. Topcoat: Latex, interior, high performance architectural (MPI Gloss Level 3 or 4), MPI #139 or MPI #140.

- F. Gypsum Board Substrates: Typical for gypsum board ceilings.
  - 1. Latex over Latex Sealer System MPI INT 9.2A:
    - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
    - b. Prime Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior (MPI Gloss Level 2 or 3), MPI #44 or MPI #52.

**END OF SECTION**

## SECTION 09 96 00 HIGH-PERFORMANCE COATINGS

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes surface preparation and the application of high-performance coating systems on interior gypsum board substrates.
- B. Related Sections include:
  - 1. Division 09 Section "Exterior Painting" for general field painting.
  - 2. Division 09 Section "Interior Painting" for general field painting.

#### 1.02 DEFINITIONS

- A. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

#### 1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
  - 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Apply coats on Samples in steps to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

#### **1.04 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. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

#### **1.05 QUALITY ASSURANCE**

- A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Architect will select one surface to represent surfaces and conditions for application of each coating system.
    - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft.
    - b. Other Items: Architect will designate items or areas required.
  - 2. Final approval of color selections will be based on mockups.
    - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
  - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

#### **1.07 FIELD CONDITIONS**

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. 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:
  - 1. Sherwin-Williams Company (The).

### **2.02 HIGH-PERFORMANCE COATINGS, GENERAL**

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
  - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
  - 3. Products shall be of same manufacturer for each coat in a coating system.
- C. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
  - 1. Nonflat High Gloss Coatings: 150 g/L.
  - 2. Primers, Sealers, and Undercoaters: 100 g/L.
- D. Colors: As indicated in color schedule or if not indicated as selected by Architect from manufacturer's full range.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.



- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

### **3.02 PREPARATION**

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

### **3.03 APPLICATION**

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
  - 1. Use applicators and techniques suited for coating and substrate indicated.
  - 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  - 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

### **3.04 FIELD QUALITY CONTROL**

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
  - 1. Contractor shall touch up and restore coated surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

### **3.05 CLEANING AND PROTECTION**

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

### **3.06 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE**

- A. Gypsum Board Substrates:
  - 1. Epoxy System MPI INT 9.2E:
    - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
    - b. Intermediate Coat: Epoxy, matching topcoat.
    - c. Topcoat: Epoxy, gloss, MPI #77.

**END OF SECTION**

## SECTION 09 97 24 PENETRATING LIQUID FLOOR TREATMENT

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes penetrating liquid floor treatment applied to cured concrete where "Sealed Concrete" finish is indicated.
- B. Related Sections include Division 03 Section "Cast-In-Place Concrete" for reinforced concrete to receive concrete sealers.

#### 1.02 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain penetrating liquid floor treatment materials through one source from a single manufacturer.

### PART 2 - PRODUCTS

#### 2.01 FLOOR AND SLAB TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Burke by Edoco; Titan Hard.
    - b. Curecrete Distribution Inc.; Ashford Formula.
    - c. Dayton Superior Corporation; Day-Chem Sure Hard.
    - d. Euclid Chemical Company (The); Euco Diamond Hard.
    - e. Meadows, W. R., Inc.; Liqui-Hard.
    - f. Symons Corporation, a Dayton Superior Company; Buff Hard.

- B. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
  - 1. Reactive Penetrating Sealers: 350 g/L.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content of surfaces exceeds that permitted in manufacturer's written instructions.

### **3.02 LIQUID FLOOR TREATMENTS**

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
  - 1. Apply to concrete that is fully cured; do not apply to concrete that is less than 28 days' old.
  - 2. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

### **3.03 CLEANING AND PROTECTION**

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. Protect work of other trades against damage from floor treatment application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

**END OF SECTION**

**SECTION 10 14 16**  
**PLAQUES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes metal plaques.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: For plaques.
  - 1. Include fabrication and installation details and attachments to other work.
  - 2. Show plaque mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
  - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each plaque at least half size.
- C. Samples for Initial Selection: For each type of plaque, exposed component, and exposed finish.
  - 1. Include representative Samples of available typestyles and graphic symbols.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

**1.04 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For plaques to include in maintenance manuals.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

## 1.06 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of plaques that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering.
  - 2. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.01 METAL PLAQUES

- A. Cast Plaque: Cast-metal plaque with background texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
  - 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. Matthews International Corporation; Bronze Division.
    - b. Metallic Arts.
    - c. Southwell Company (The).
  - 2. Plaque Material: Cast aluminum.
  - 3. Plaque Thickness: 0.25 inch.
  - 4. Finishes:
    - a. Integral Aluminum Finish: Clear anodized.
  - 5. Background Texture: Stipple.
  - 6. Integrally Cast Border Style: Raised flat band.
  - 7. Mounting: Concealed studs.
  - 8. Text and Typeface: Typeface as selected by Architect from manufacturer's full range and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color.

### 2.02 MATERIALS

- A. Aluminum Castings: ASTM B26/B26M, alloy and temper recommended by plaque manufacturer for casting process used and for type of use and finish indicated.

### 2.03 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of plaques, noncorrosive and compatible with each material joined, and complying with the following:
  - 1. Use concealed fasteners and anchors unless indicated to be exposed.
  - 2. For exterior exposure, furnish nonferrous-metal or stainless steel devices unless otherwise indicated.
  - 3. Plaque Mounting Fasteners:
    - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of plaque, screwed into back of plaque, or screwed into tapped lugs cast integrally into back of plaque unless otherwise indicated.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

### 2.04 FABRICATION

- A. General: Provide manufacturer's standard plaques according to requirements indicated.
  - 1. Preassemble plaques in the shop to greatest extent possible. Disassemble plaques only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
  - 2. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
  - 3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
  - 4. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match plaque finish.
  - 5. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

### 2.05 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Anodic Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

## 2.06 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Verify that plaque-support surfaces are within tolerances to accommodate plaques without gaps or irregularities between backs of plaques and support surfaces unless otherwise indicated.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION OF METAL PLAQUES

- A. General: Install plaques using mounting methods indicated and according to manufacturer's written instructions.
  - 1. Install plaques level, plumb, true to line, and at locations and heights indicated, with plaque surfaces free of distortion and other defects in appearance.
  - 2. Install plaques so they do not protrude or obstruct according to the accessibility standard.
  - 3. Before installation, verify that plaque surfaces are clean and free of materials or debris that would impair installation.
  - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods:
  - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of plaque. Remove loose debris from hole and substrate surface.
    - a. Thin or Hollow Surfaces: Place plaque in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

### 3.03 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed plaques and plaques that do not comply with specified requirements. Replace plaques with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as plaques are installed.



- C. On completion of installation, clean exposed surfaces of plaques according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain plaques in a clean condition during construction and protect from damage until acceptance by Owner.

**END OF SECTION**

## SECTION 10 14 19 DIMENSIONAL LETTER SIGNAGE

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes cast dimensional characters.

#### 1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For signs.
  - 1. Include fabrication and installation details and attachments to other work.
  - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
  - 3. Show message list, typestyles, graphic elements, and layout for each sign at least quarter size.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
  - 1. Include representative Samples of available typestyles and graphic symbols.
- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
  - 1. Dimensional Characters: Full-size Sample of dimensional character.
- E. Product Schedule: For dimensional letter signs. Use same designations indicated on Drawings or specified.

#### 1.03 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

#### 1.04 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

### 1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

### 1.06 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering.
  - 2. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.01 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Signs and supporting elements shall withstand the effects of gravity and other loads within limits and under conditions indicated.
  - 1. Uniform Wind Load: As indicated on Drawings.

### 2.02 DIMENSIONAL CHARACTERS

- A. Cast Characters: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:
  - 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. ASI Sign Systems, Inc.
    - b. Matthews International Corporation; Bronze Division.
    - c. Metal Arts.
    - d. Metallic Arts.
    - e. Southwell Company (The).
  - 2. Character Material: Cast aluminum.
  - 3. Character Height: As indicated on Drawings.
  - 4. Thickness: Manufacturer's standard for size of character.
  - 5. Finishes:
    - a. Integral Aluminum Finish: Clear anodized.
  - 6. Mounting: Projecting studs.

7. Typeface: As indicated or if not indicated as selected by Architect from manufacturer's standard range.

## **2.03 DIMENSIONAL CHARACTER MATERIALS**

- A. Aluminum Castings: ASTM B26/B26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.

## **2.04 ACCESSORIES**

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
  1. Use concealed fasteners and anchors unless indicated to be exposed.
  2. For exterior exposure, furnish nonferrous-metal or stainless steel devices unless otherwise indicated.
  3. Sign Mounting Fasteners:
    - a. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

## **2.05 FABRICATION**

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
  1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
  2. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
  3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
  4. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
  5. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

## 2.06 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Anodic Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

## 2.07 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

### 3.02 INSTALLATION OF DIMENSIONAL CHARACTERS

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
  - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
  - 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
  - 3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods:
  - 1. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
    - a. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.

### **3.03 ADJUSTING AND CLEANING**

- A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

**END OF SECTION**

**SECTION 10 26 00**  
**WALL AND DOOR PROTECTION**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes corner guards.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For each type of wall protection showing locations and extent.
  - 1. Include plans, elevations, sections, and attachment details.
- C. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated, in each color and texture specified.
  - 1. Include Samples of accent strips and accessories to verify color selection.
- D. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:
  - 1. Corner and End-Wall Guards: 12 inches long. Include example top caps.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Sample Warranty: For special warranty.

**1.04 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For each type of wall protection product to include in maintenance manuals.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store wall protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
  - 1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.

2. Keep plastic materials out of direct sunlight.
3. Store plastic wall-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
  - a. Store corner-guard covers in a vertical position.

#### **1.06 WARRANTY**

- A. Special Warranty: Manufacturer agrees to repair or replace components of wall-protection units that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
    - b. Deterioration of plastics and other materials beyond normal use.
  2. Warranty Period: Five years from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Source Limitations: Obtain wall-protection products from single source from single manufacturer.

#### **2.02 PERFORMANCE REQUIREMENTS**

- A. Surface Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  1. Flame-Spread Index: 25 or less.
  2. Smoke-Developed Index: 450 or less.

#### **2.03 CORNER GUARDS**

- A. Surface-Mounted, Opaque-Plastic Corner Guards: Fabricated as one piece from PVC plastic or acrylic-modified vinyl sheet; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.
  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. Boston Retail Products.
    - b. Construction Specialties, Inc.
    - c. Inpro Corporation.
    - d. Korogard Wall Protection Systems; a division of RJF International Corporation.



- e. Nystrom.
  - f. Pawling Corporation.
  - g. Tepromark International, Inc.
- 2. Wing Size: Nominal 1-1/8 by 1-1/8 inches.
  - 3. Mounting: Adhesive.
  - 4. Color and Texture: As indicated by manufacturer's designations or if not indicated as selected by Architect from manufacturer's full range.

#### **2.04 MATERIALS**

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.

#### **2.05 FABRICATION**

- A. Fabricate wall protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.
- B. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

#### **2.06 FINISHES**

- A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.02 PREPARATION**

- A. Complete finishing operations, including painting, before installing wall protection.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

### **3.03 INSTALLATION**

- A. Installation Quality: Install wall protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
- B. Mounting Heights: Install wall protection in locations and at mounting heights indicated on Drawings. If not indicated on Drawings, install in 4-foot lengths from finished floor.

### **3.04 CLEANING**

- A. Immediately after completion of installation, clean plastic accessories using a standard ammonia-based household cleaning agent.

**END OF SECTION**

**SECTION 10 28 00**  
**TOILET, BATH, AND LAUNDRY ACCESSORIES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes:
  - 1. Public-use washroom accessories.
  - 2. Childcare accessories.
  - 3. Custodial accessories.
- B. Related Sections include Division 1- Section "Shower Enclosures" for handrails, shower seat, curtain rod and curtain provided with shower enclosure unit.

**1.02 COORDINATION**

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- B. Samples: For each exposed product and for each finish specified, full size.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
  - 1. Identify locations using room designations indicated.
  - 2. Identify accessories using designations indicated.
- D. Delegated Design Submittal: For grab bars and shower seats.
  - 1. Include structural design calculations indicating compliance with specified structural-performance requirements.

#### **1.04 INFORMATIONAL SUBMITTALS**

- A. Sample Warranty: For manufacturer's special warranties.

#### **1.05 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For accessories to include in maintenance manuals.

#### **1.06 WARRANTY**

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, visible silver spoilage defects.
  - 2. Warranty Period: 10 years from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### **2.01 PERFORMANCE REQUIREMENTS**

- A. Structural Performance: Design accessories and fasteners to comply with the following requirements:
  - 1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.
  - 2. Shower Seats: Installed units are able to resist 360 lbf applied in any direction and at any point.

#### **2.02 PUBLIC-USE WASHROOM ACCESSORIES**

- A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.
- B. Manufacturers: Provide public-use washroom accessories approved by Architect as described on the Drawings by one of the following:
  - 1. American Specialties, Inc. (ASI).
  - 2. Bobrick Washroom Equipment, Inc.
  - 3. Bradley Corporation.
  - 4. GAMCO Specialty Accessories; a division of Bobrick.
- C. Toilet Tissue (Roll) Dispenser:
  - 1. Basis of Design: Design is based on Bobrick Washroom Equipment, Inc. Model B-2840. Subject to compliance with requirements, provide named product or comparable product approved by Architect by one of the following:
    - a. American Specialties, Inc. (ASI).
    - b. Bradley Corporation.

2. Description: Double-roll dispenser with shelf.
  3. Mounting: Surface mounted.
  4. Operation: Noncontrol delivery with standard spindle.
  5. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
  6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- D. Combination Towel (Folded) Dispenser/Waste Receptacle:
1. Basis of Design: Design is based on Bobrick Washroom Equipment, Inc. Model B-3944. Subject to compliance with requirements, provide named product or comparable product approved by Architect by one of the following:
    - a. American Specialties, Inc. (ASI).
    - b. Bradley Corporation.
  2. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle.
  3. Mounting: Recessed with projecting receptacle.
    - a. Designed for nominal 4-inch wall depth.
  4. Minimum Towel-Dispenser Capacity: 600 C-fold or 800 multifold paper towels.
  5. Minimum Waste-Receptacle Capacity: 12 gal..
  6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
  7. Liner: Reusable, vinyl waste-receptacle liner.
  8. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.
- E. Soap Dispenser:
1. Basis of Design: Design is based on Bobrick Washroom Equipment, Inc. Model B-2111. Subject to compliance with requirements, provide named product or comparable product approved by Architect by one of the following:
    - a. American Specialties, Inc. (ASI).
    - b. Bradley Corporation.
  2. Description: Designed for manual operation and dispensing soap in liquid or lotion form.
  3. Mounting: Vertically oriented, surface mounted.
  4. Capacity: 40 fl. oz.
  5. Materials: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
  6. Lockset: Tumbler type.
  7. Refill Indicator: Window type.
- F. Grab Bar:
1. Basis of Design: Design is based on Bobrick Washroom Equipment, Inc. Model B-6806 Series. Subject to compliance with requirements, provide named product or comparable product approved by Architect by one of the following:
    - a. American Specialties, Inc. (ASI).

- b. Bradley Corporation.
  2. Mounting: Flanges with concealed fasteners.
  3. Material: Stainless steel, 0.05 inch thick.
    - a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin).
  4. Outside Diameter: 1-1/2 inches.
  5. Configuration and Length: As indicated on Drawings.
- G. Sanitary-Napkin Disposal Unit:
  1. Basis of Design: Design is based on Bobrick Washroom Equipment, Inc. Model B-270. Subject to compliance with requirements, provide named product or comparable product approved by Architect by one of the following:
    - a. American Specialties, Inc. (ASI).
    - b. Bradley Corporation.
  2. Mounting: Surface mounted.
  3. Door or Cover: Self-closing, disposal-opening cover.
  4. Receptacle: Removable.
  5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- H. Mirror Unit:
  1. Basis of Design: Design is based on Bobrick Washroom Equipment, Inc. Model B-125. Subject to compliance with requirements, provide named product or comparable product approved by Architect by one of the following:
    - a. American Specialties, Inc. (ASI).
    - b. Bradley Corporation.
  2. Frame: Stainless steel channel.
    - a. Corners: Mitered and mechanically interlocked.
  3. Size: As indicated on Drawings.
  4. Hangers: Manufacturer's standard rigid, tamper and theft resistant.

## **2.03 CHILDCARE ACCESSORIES**

- A. Diaper-Changing Station:
  1. Basis of Design: Design is based on Koala Kare Products. Model KB310. Subject to compliance with requirements, provide named product or comparable product approved by Architect by one of the following:
    - a. ASI American Specialties, Inc.; ASI Group.
    - b. Bradley Corporation.

2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
  - a. Engineered to support minimum of 200-lb static load when opened.
3. Mounting: Semirecessed, with unit projecting not more than 1 inch from wall when closed.
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin), with replaceable insulated polystyrene tray liner and rounded plastic corners.
6. Liner Dispenser: Provide built-in dispenser for disposable sanitary liners.

## 2.04 CUSTODIAL ACCESSORIES

- A. Source Limitations: Obtain custodial accessories from single source from single manufacturer.
- B. Custodial Mop and Broom Holder:
  1. Basis of Design: Design is based on Bobrick Washroom Equipment, Inc. Model B-223. Subject to compliance with requirements, provide named product or comparable product approved by Architect by one of the following:
    - a. American Specialties, Inc.
    - b. Bradley Corporation.
  2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf Insert description.
  3. Length: 36 inches.
  4. Hooks: Four.
  5. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
  6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
    - a. Shelf: Not less than nominal 0.05-inch-thick stainless steel.
    - b. Rod: Approximately 1/4-inch-diameter stainless steel.

## 2.05 MATERIALS

- A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch-minimum nominal thickness unless otherwise indicated.
- B. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.
- C. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.
- D. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

## **2.06 FABRICATION**

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
  - 1. Remove temporary labels and protective coatings.
- B. Grab Bars: Install to comply with specified structural-performance requirements.
- C. Shower Seats: Install to comply with specified structural-performance requirements.

### **3.02 ADJUSTING AND CLEANING**

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Clean and polish exposed surfaces according to manufacturer's written instructions.

**END OF SECTION**



**SECTION 10 29 19.23**  
**SHOWER ENCLOSURES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes gel-coat glass fiber shower pans and surrounds.
- B. Related Sections include Division 22 sections for plumbing service roughing-ins; drain traps; atmospheric vents; valves, pipes, and fittings; and other materials required to complete laundry equipment installation.

**1.02 COORDINATION**

- A. Coordinate layout and installation of shower pans and tub surrounds with plumbing work.

**1.03 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

**1.04 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and installation details.
  - 2. For shower bases, provide dimensions for location of drain in shower base.
- C. Samples: For each exposed product and for each color and texture specified.

**1.05 INFORMATIONAL SUBMITTALS**

- A. Sample warranty.

**1.06 CLOSEOUT SUBMITTALS**

- A. Maintenance data.

## PART 2 - PRODUCTS

### 2.01 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Design accessories and fasteners to comply with the following requirements:
  - 1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.
  - 2. Shower Seats: Installed units are able to resist 360 lbf applied in any direction and at any point.
- B. Accessibility Standard: For shower enclosure and accessories indicated to be accessible, comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

### 2.02 MANUFACTURERS

- A. Basis of Design: Design is based on Accessibility Professionals, Inc. Freedom ADA Roll-In Shower. Subject to compliance with requirements, provide named product or comparable product approved by Architect by one of the following:
  - 1. American Bath Enterprises, Inc.
  - 2. MAAX Bath Inc.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of shower pans and enclosures. Aesthetic effects are indicated by dimensions, arrangements, and alignment to adjoining construction.
  - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
  - 2. Where selection of comparable product required changes in building dimension, structure, or location of services, the Contractor shall be required to make those changes at no additional cost to the Owner.

### 2.03 SHOWER PANS AND SURROUNDS

- A. Provide single-piece shower unit fabricated of gel-coated glass fiber, reinforced as required for structural integrity and complete with the following accessories:
  - 1. Folding shower bench with HDPE seat.
  - 2. Grab bars.
  - 3. Curtain rod and shower curtain.
  - 4. Slide bar with hand-held shower and valve
  - 5. Drain.

## 2.04 MATERIALS

- A. Gel-Coated Glass Fiber: Fiberglass reinforced plastic (FRP) using chemically proven resins resistant to contaminants typically found in public shower areas, in manufacturer's standard thickness, and with precoated finish,
  - 1. Color: As indicated by manufacturer's designations on the Drawings.
- B. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch-minimum nominal thickness unless otherwise indicated.
- C. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).

## 2.05 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Adhesives: As recommended by manufacturer.
  - 1. Verify adhesive has a VOC content of 70 g/L or less.
- C. Sealants: Mildew-resistant silicone as specified in Division 07 Section "Joint Sealants."
  - 1. Verify sealant has a VOC content of 250 g/L or less.

## 2.06 FABRICATION

- A. Shower Pan: Fabricate in one piece with textured walking surface unless otherwise indicated.
- B. Tub Surround: Fabricate units in sizes indicated.
- C. Grab Bars: Install to comply with specified structural-performance requirements.
- D. Shower Seats: Install to comply with specified structural-performance requirements.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions where cast polymer fabrications will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed cultured marble fabrications.
  - 1. Verify that substrates for shower pan and enclosure units are firm, dry, clean, free of coatings that are incompatible with setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness and level tolerances required by manufacturer for installations indicated.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Fill cracks, holes, and depressions in concrete substrates for floors under cultured marble fabrications with trowelable leveling and patching compound.

### **3.03 INSTALLATION**

- A. Comply with manufacturer's instructions for setting shower pan and enclosure units in place.
  - 1. Install accessories according to manufacturer's instructions.
  - 2. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
  - 3. Fill joints with sealant.
- B. Verify that each accessory is operating properly. Repair or replace equipment that is defective in operation, including units that operate below required capacity.
  - 1. Operate and adjust plumbing fixtures and controls. Replace damaged and malfunctioning fittings and controls.
- C. Test water and drain, components for leaks. Repair or replace leaking components.
- D. Adjust water pressure at faucets to produce proper flow.

### **3.04 PROTECTION AND CLEANING**

- A. Comply with manufacturer's recommendations for protecting installed shower pan and enclosure units so that installed enclosures will be undamaged at the time of Substantial completion. Repair damaged units as approved by the Architect or replace units that cannot be repaired.
  - 1. Remove excess sealant and smears as enclosures is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.
- B. Immediately before Substantial Completion, clean surfaces of installed shower pan and enclosure units.
  - 1. Comply with manufacturer's recommendations for cleaning materials and procedures.

**END OF SECTION**

**SECTION 10 44 13**  
**FIRE PROTECTION CABINETS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes fire-protection cabinets for portable fire extinguishers.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: For fire-protection cabinets.

**1.03 CLOSEOUT SUBMITTALS**

- A. Maintenance data.

**1.04 COORDINATION**

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

**1.05 SEQUENCING**

- A. Apply vinyl lettering on field-painted fire-protection cabinets after painting is complete.

**PART 2 - PRODUCTS**

**2.01 FIRE-PROTECTION CABINET**

- A. Cabinet Type: Suitable for fire extinguisher.
  - 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. JL Industries, Inc.; a division of the Activar Construction Products Group.
    - b. Kidde Residential and Commercial Division.
    - c. Larsens Manufacturing Company.
    - d. MOON American.
    - e. Potter Roemer LLC.

- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Cold-rolled steel sheet.
- D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
  - 1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.
- E. Cabinet Trim Material: Steel sheet.
- F. Door Material: Steel sheet.
- G. Door Style: Vertical duo panel with frame.
- H. Door Glazing: Tempered float glass (clear).
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- J. Accessories:
  - 1. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
  - 2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated or if not indicated as directed by Architect.
    - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
      - 1) Location: Applied to cabinet door.
      - 2) Application Process: Pressure-sensitive vinyl letters.
      - 3) Lettering Color: Red.
      - 4) Orientation: Horizontal unless otherwise indicated.
- K. Materials:
  - 1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
    - a. Finish:
      - 1) Door and Trim: Factory primed for field painting.
      - 2) Cabinet: Baked enamel or powder coat in manufacturer's standard color.
  - 2. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

## **2.02 FABRICATION**

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.
- B. Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Identification: Apply vinyl lettering at locations indicated.
- E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

**END OF SECTION**

**SECTION 10 44 16**  
**FIRE EXTINGUISHERS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Warranty: Sample of special warranty.

**1.04 CLOSEOUT SUBMITTALS**

- A. Operation and maintenance data.

**1.05 COORDINATION**

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

**1.06 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Six years from date of Substantial Completion.



## **PART 2 - PRODUCTS**

### **2.01 PERFORMANCE REQUIREMENTS**

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

### **2.02 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS**

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet indicated.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
    - b. Larsens Manufacturing Company.
    - c. Potter Roemer LLC.
  - 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

### **2.03 MOUNTING BRACKETS**

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
    - b. Larsens Manufacturing Company.
    - c. Potter Roemer LLC.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
  - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
    - a. Orientation: Vertical.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine fire extinguishers for proper charging and tagging.
  - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.02 INSTALLATION**

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
  - 1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

**END OF SECTION**

**SECTION 10 58 00**  
**FIRE FIGHTING EQUIPMENT STORAGE**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes wall mount turnout gear lockers.

**1.02 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and mounting details.
  - 2. Include details of storage assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Detail fabrication and assembly of lockers.
- C. Samples: For each exposed product and for each color and texture specified.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Sample warranty.

**1.05 CLOSEOUT SUBMITTALS**

- A. Maintenance data.

**1.06 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

## 1.07 WARRANTY

- A. Manufacturer's Warranty: Repair or replace components of fire fighting equipment storage units that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.01 WALL MOUNT TURNOUT GEAR LOCKERS

- A. Basis of Design: Design for turnout gear lockers is based on GearGrid, LLC GearGrid Wall Mounted Storage System. Subject to compliance with requirements, provide named product or comparable product approved by Architect.
- B. Locker Sizes: Jumbo 24-inch Opening:
1. Overall dimension: 79 inches high by 25.25 inches wide by 20 inches deep.
  2. Clear Opening Width: 22.75 inches.
- C. Construction: Welded with cold formed metal frames. Use fasteners where required for knockdown shipping, securing units to mounting surface and on applicable accessories.
- D. Vertical Dividers:
1. Outer Frames: 1.25-inch O.D. by 16 gauge wall thickness steel tubing complying with ASTM A 513.
  2. Inner Grid: Welded wire mesh; 0.25-inch diameter cold drawn steel wire resistance welded to a 3-inch square pattern.
- E. Back Panel:
1. Grid: 0.25-inch diameter ASTM 510 cold drawn steel wire resistance welded to a 3" square pattern.
  2. Shelves:
    - a. Top and Bottom. 0.25-inch diameter ASTM 510 cold drawn steel wire resistance welded and cold formed.
    - b. Top shelf includes a 20 gauge steel bracket to accept a 2- by 16-inch name placard.
- F. Apparel Hooks: Three per opening, 0.25-inch diameter ASTM 510 cold drawn steel wire resistance welded and cold formed.
- G. Door:
1. Frame: 1.25-inch O.D. by 16 gauge wall thickness ASTM A513 steel tubing.
  2. Inner Grid: 0.25-inch diameter ASTM 510 cold drawn steel wire resistance welded to a 3-inch square pattern.

3. Top Cover: 0.25-inch diameter ASTM 510 cold drawn steel wire resistance welded to a 3-inch square pattern.
4. Hinge: Single pin welded style with brass pivot bushing.
5. Placard Channel: 20 gauge steel to accept a 2- by 12-inch name placard.
6. Latch/Hasp: Self-latching with padlock hasp. Lock by Owner.

H. Horizontal Hang Bar:

1. Tube: 1.25-inch O.D. by 16 gauge 304 stainless steel tubing.
2. Brackets: Attach to side mesh, powder coated.

I. Finish: Manufacturer's standard powder coated finish in color selected by Architect.

## 2.02 ACCESSORIES

- A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.
- B. Anchors: Material, type, and size required for secure anchorage to each substrate.
  1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts for corrosion resistance.
  2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. Wall Mount Lockers:
  1. Complete assembly of lockers as required.
  2. Install lockers level, plumb, and true; shim as required, using concealed shims.
  3. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.

### 3.03 ADJUSTING

- A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding.

**3.04 PROTECTION**

- A. Protect fire fighting equipment storage units from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.
- B. Touch up marred finishes, or replace fire fighting equipment storage units that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

**END OF SECTION**

## SECTION 10 75 00 FLAG POLES

### 1.01 GENERAL REQUIREMENTS

- A. The location of the flag pole is not illustrated on the plans. The location of the flag pole shall be determined by the Imperial County Fire Chief during the construction period. See the Flag Pole Footing Detail Drawing at the end of this Technical Specification Section.

### 1.02 SCOPE OF WORK SUMMARY

- A. Supply and install all Flagpoles, ~~as shown on Drawings and~~ as specified herein, including all materials and labor for a timely, complete, and proper installation.
- B. System description:
  - 1. Type: Ground set, fixed type
  - 2. Pole Design: Cone Tapered
  - 3. Nominal Height: As indicated in the Drawings
  - 4. Halyard: Internal type

### 1.03 STANDARDS AND REFERENCES

Comply with the Industry Standards and References as established by Manufacturer.

### 1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Design flagpole foundation, supports under direct supervision of a Professional Structural Engineer experienced in design of this work registered in the State of California.
- C. Pole with Flag Flying: Resistant without permanent deformation, 90-miles/hr. wind velocity, non-resonant, safety design factor of 2.

### 1.05 SUBSTITUTIONS

Substitutions will be considered per:

- A. Project Manual Volume One, Standard General Conditions – Section 21, Article 6.05, Substitutes and “or-Equals” on pages 00710 - 19, 20 and 21.

### **1.06 SUBMITTALS**

Provide in accordance with:

- A. Provide in accordance with Project Manual Volume One, Standard General Conditions, Article 6.17 – Shop Drawings and Samples on pages 00710 – 25 and 26.
- B. Provide in accordance with Project Manual Volume One, Supplementary Conditions, SC-6.17 – Shop Drawings and Samples on pages 00800 – 15, 16 and 17.
- C. Provide product data on pole, accessories, and configurations.
- D. Submit manufacturer's installation instructions.
- E. Indicate on shop drawings, detailed dimensions, base attachment details, anchor requirements and imposed loads.

### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Provide in accordance with Project Manual Volume One, Standard General Conditions, Article 6.03 on page 00710-18 – Services, Materials and Equipment.
- B. Provide in accordance with Project Manual Volume One, Supplementary Conditions, SC-6.03.B on page 00800-11 – Services, Materials and Equipment.
- C. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.
- D. Protect flagpole and accessories on site from damage or moisture.

### **1.08 OPERATION AND MAINTENANCE DATA**

Provide in accordance with:

- A. Project Manual Volume One, Standard General Conditions, Article 6.12 on page 00710 – 23.
- B. Project Manual Volume One, Supplementary Conditions, SC-6.12.A on page 00800-14.
- C. Project Manual Volume Three, Section 01 75 50 – Operation and Maintenance Manuals

### **1.09 EXTRA MATERIALS**

Not required.

### **1.10 RECORD DRAWINGS**

Provide in accordance with:

- A. Project Manual Volume One, Standard General Conditions, Article 6.12 on page 00710-23.
- B. Project Manual Volume One, Supplementary Conditions SC-6.12A on page 00800-14.

### **1.11 WARRANTY**

Provide in accordance with:

- A. Project Manual Volume One, Standard General Conditions, Article 6.19 on pages 00710-26 and 27.
- B. Project Manual Volume One, Supplementary Conditions SC-6.19C on page 00800-17.



## **PART 2 - PRODUCTS**

### **2.01 ACCEPTABLE MANUFACTURERS**

- A. L.A. Steelcraft
- B. Eder Flag
- C. Or Architect approved equal.

### **2.02 POLE MATERIALS**

Aluminum: 6063 alloy, T6 temper. Dark bronze anodized.

### **2.03 COMPONENTS AND ACCESSORIES**

- A. Finial Ball: Gold Tone, 6-inch diameter.
- B. Truck Assembly: Cast aluminum or Stainless steel; revolving; stainless steel ball bearings, non-fouling.
- C. Flag(s): Provided by Owner.
- D. Halyard: 1/8-inch diameter stainless steel cable.

### **2.04 MOUNTING COMPONENTS**

- A. Pole Base Attachment: Sleeve with base cover.
- B. Lightning Ground Rod and Cable: As recommended by manufacturer.

### **2.05 POLE FABRICATION**

- A. Outside Butt Diameter: 6 inches.
- B. Outside Tip Diameter: 3-1/2 inches.
- C. Nominal Thickness: 188 inches.

## **Part 3 – EXECUTION**

### **3.01 INSPECTION**

- A. Examine the areas and conditions under which work of this Section will be performed
- B. Verify that concrete foundation is ready to receive work and dimensions are as indicated on shop drawings and instructed by the manufacturer.
- C. Correct conditions detrimental to timely and proper completion of the Work.
- D. Do not proceed until unsatisfactory conditions are corrected.
- E. Beginning of installation means acceptance conditions.

### **3.02 PREPERATION**

Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphaltic paint.

**3.03 INSTALLATION**

- A. Install flagpole, base assembly, and fittings in accordance with manufacturer's instructions.
- B. Electrically ground flagpole installation.
- C. Install foundation plate and centering wedges for flagpoles base set in concrete base and fasten.

**3.04 TOLERANCES**

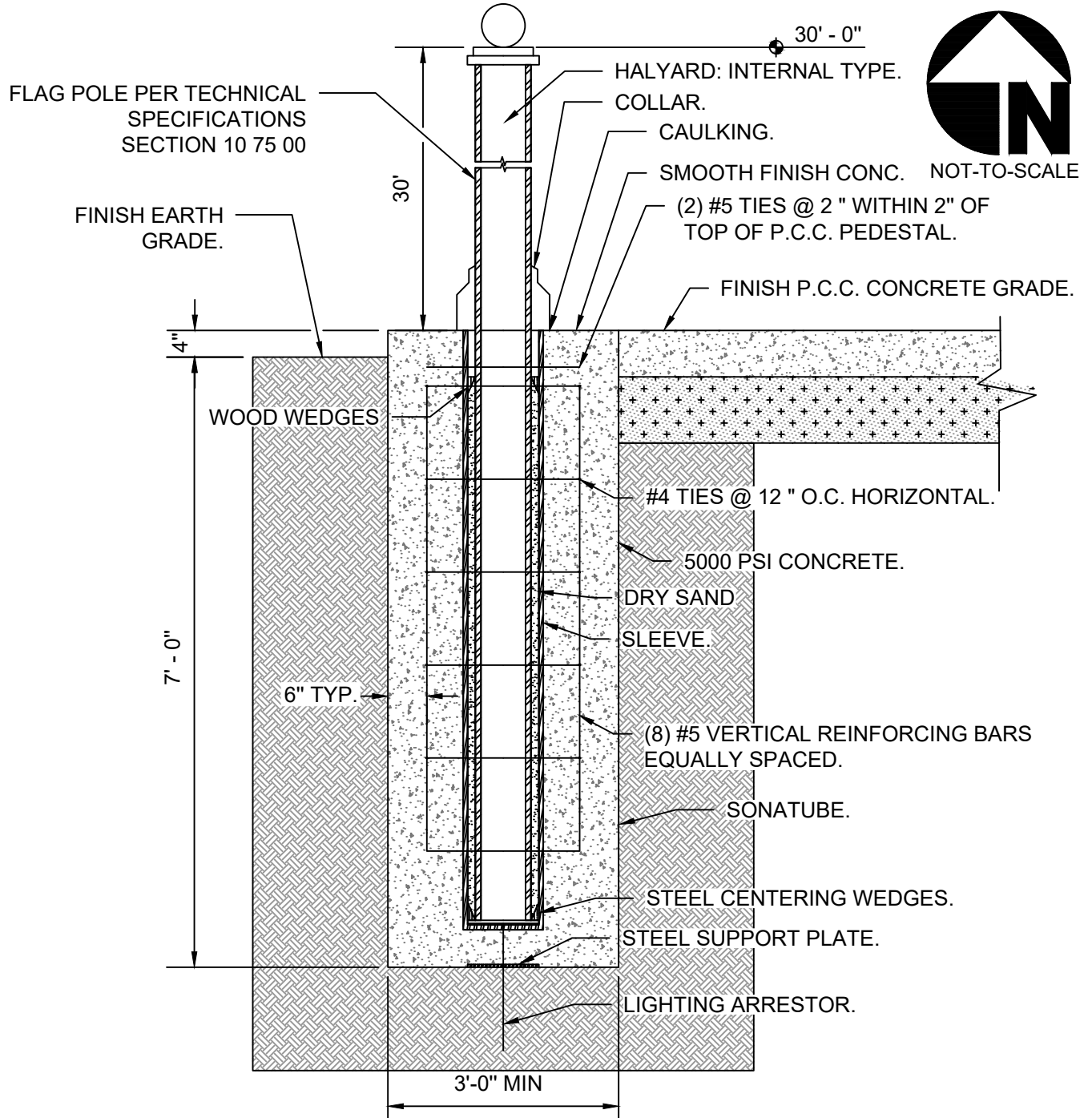
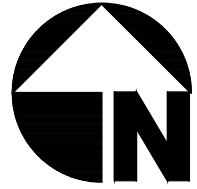
Maximum variation from plumb: One inch.

**3.05 ADJUSTING AND CLEANING**

- A. Clean surfaces.
- B. Adjust operating devices so that halyard and flag function smoothly.

**END OF SECTION**

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**NOTES:**

1. ALL REINFORCING STEEL SHALL NOT BE LESS THAN GRADE 60.
2. STRUCTURAL ENGINEER CALCULATION PREPARED AND STAMPED BY FLAG POLE MANUFACTURER CALIFORNIA CIVIL OR STRUCTURAL ENGINEER SHALL BE FORWARDED AS SUBMITTAL DOCUMENTS FOR REVIEW AND APPROVAL.
3. SEE TECHNICAL SPECIFICATION SECTION 10 75 00 FOR FLAG POLE REQUIREMENTS.
4. THE LOCATION OF THE FLAG POLE SHALL BE DETERMINED BY THE IMPERIAL COUNTY FIRE CHIEF DURING THE CONSTRUCTION PERIOD.

**FLAG POLE FOOTING DETAIL**  
NTS

<p><b>The Holt Group</b> ENGINEERING PLANNING SURVEYING</p>			<p>EXHIBIT: FLAG POLE FOOTING DETAIL - TECHNICAL SPECIFICATION 10 75 00</p>	<p>SHEET: <u>1</u> OF <u>1</u> SHEETS</p>
<p>1601 N. Imperial Ave. 201 E. Hobsonway</p>	<p>El Centro, CA 92243 Blythe, CA 92225</p>	<p>760.337.3883 760.922.4658</p>	<p>PROJECT: SEELEY FIRE STATION AND COOLING CENTER CLIENT: IMPERIAL COUNTY</p>	<p>BY: FBC JOB NUMBER: 542.088</p>

## SECTION 11 23 26 COMMERCIAL WASHERS AND EXTRACTORS

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes:
  - 1. Washer-extractor.
  - 2. Drying tumbler.
- B. Related Sections include:
  - 1. Refer to Divisions 22 and 23 Sections for exhaust ductwork; service roughing-ins; drain traps; atmospheric vents; valves, pipes, and fittings; and other materials required to complete laundry equipment installation.
  - 2. Refer to Divisions 26 and 27 Sections for connections to wiring, disconnects, and other electrical materials required to complete laundry equipment installation.

#### 1.02 SUBMITTALS

- A. Product Data: For each type of commercial laundry equipment indicated. Include manufacturer's model number and accessories and requirements for access and maintenance clearances, water and drainage, power or fuel, and service-connections including roughing-in dimensions.
- B. Shop Drawings: For commercial laundry equipment not manufactured as standard production and catalog items by manufacturers. Include plans, elevations, sections, roughing-in dimensions, fabrication details, service requirements, and attachments to other work.
  - 1. Wiring Diagrams: Details of wiring for power, signal, and control systems and differentiating between manufacturer-installed and field-installed wiring.
  - 2. Piping Diagrams: Details of piping systems and differentiating between manufacturer-installed and field-installed piping.
- C. Maintenance Data: Operation, maintenance, and parts data for commercial laundry equipment to include in maintenance manuals. Include a product schedule as follows:
  - 1. Product Schedule: For each laundry equipment item, include item number and description indicated in Contract Documents, manufacturer's name and model number, and authorized service agencies' addresses and telephone numbers.

### 1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing commercial laundry equipment, who has completed installations similar in design and extent to that indicated for this Project, and who has a record of successful in-service performance.
- B. Manufacturer Qualifications: Engage a firm experienced in manufacturing commercial laundry equipment similar to that indicated for this Project and with a record of successful in-service performance.
- C. Source Limitations: Obtain each type of commercial laundry equipment through one source from a single manufacturer.
- D. Product Options: Drawings indicate commercial laundry equipment based on the specific products indicated. Other manufacturers' equipment with equal size and performance characteristics may be considered. Refer to Division 01 Section "Substitutions."
- E. Regulatory Requirements: Comply with the following National Fire Protection Association (NFPA) codes:
  - 1. NFPA 54, "National Fuel Gas Code."
  - 2. NFPA 70, "National Electrical Code."
- F. Listing and Labeling: Provide electrically operated equipment or components specified in this Section that are listed and labeled.
  - 1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
  - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- G. AGA Certification: Provide gas-burning appliances certified by the American Gas Association (AGA).
- H. ANSI Standards: Comply with applicable ANSI standards for electric-powered and gas-burning appliances; for piping to compressed-gas cylinders; and for plumbing fittings, including vacuum breakers and air gaps, to prevent siphonage in water piping.

### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver commercial laundry equipment as factory-assembled units with protective crating and covering.
- B. Store commercial laundry equipment in original protective crating and covering and in a dry location.

### 1.05 COORDINATION

- A. Coordinate location and requirements of service-utility connections.

## 1.06 WARRANTY

- A. Special Warranties: Manufacturer's standard form in which the manufacturer of each item of commercial laundry equipment specified agrees to repair or replace commercial laundry equipment or components that fail in materials or workmanship within specified warranty period.
- B. Warranty Period:
  - 1. Washer/Extractor:
    - a. Parts: 3 years.
    - b. Labor: 90 days.
  - 2. Dryer:
    - a. Parts: 2 years.
    - b. Labor: 90 days.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Basis of Design: The design for each item of commercial laundry equipment is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

### 2.02 COMMERCIAL LAUNDRY EQUIPMENT

- A. Washer-Extractor: Front loading, hard-mount, commercial quality washer-extractor recommended by manufacturer for on-premise laundry applications.
  - 1. Basis of Design: Model No. [UW45][UW65] manufactured by Alliance Laundry Systems.
  - 2. Capacity: [45] [65] lbs.
  - 3. Cylinder Dimensions:
    - a. Diameter: 23 inches (minimum).
    - b. Depth: [16.6] [22.1] inches (minimum).
    - c. Volume: [7.3 ] [9.7 ]cu. ft. (minimum).
  - 4. Dimensions:
    - a. Height: 64.7 inches.
    - b. Width: 30 inches (maximum).
    - c. Depth: [54.3] [51.1] inches (w/o handle).
  - 5. Electrical Power Requirements: 208-240 volts, 60 hertz, 3 phase.
  - 6. Extraction Force: 75G (minimum).

7. Controls: Manufacturer's standard rotary controls with up to 8 wash cycle options for general laundry applications and rotary temperature control permitting operator to control water temperatures for wash bath.
    - a. Cycle advance for simple rinse and spin cycles.
    - b. Extract select button allowing on/off control for specialized loads.
    - c. Rotary cycle indicator allows visual confirmation of cycle progress.
    - d. Synthetic select button for automatic thermostatic cool down to eliminate thermal shock to linen and ultimately reduce linen wrinkles.
    - e. Automatic liquid chemical injection and auto-flush of 4 compartment dispenser.
  8. Base Frame: Manufacturer's standard heavy guage steel sheet, 6 inches high, with factory-applied epoxy coating.
- B. Drying Tumbler: Gas/Steam operation.
1. Basis of Design: Model No. [UT075][UTF75] manufactured by Alliance Laundry Systems.
  2. Capacity: 75 lbs. (dry weight).
  3. Cylinder Dimensions:
    - a. Diameter: 37 inches (minimum).
    - b. Depth: 36 inches (minimum).
    - c. Volume: 22.4 cu. ft. (minimum).
  4. Dimensions:
    - a. Height: 77.3 inches.
    - b. Width: 38.5 inches (maximum).
    - c. Depth: 53 inches (w/o handle).
  5. Electrical Power Requirements: 200-240 volts, 50-60 hertz, 1/3 phase.
  6. Energy Rating:
    - a. Gas: 165,000 BTU.
    - b. Steam: 153,985 BTU.
    - c. Electric 36 kW
  7. Controls: Dual manual controls.

### 2.03 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances, service-utility connections, and other conditions affecting installation and performance of commercial laundry equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Examine roughing-in for piping, mechanical, and electrical systems to verify actual locations of connections before installation.

### **3.02 INSTALLATION**

- A. Install commercial laundry equipment level and plumb, according to manufacturer's written instructions, original design, and referenced standards.
- B. Install equipment with access and maintenance clearances according to manufacturer's written instructions and requirements of authorities having jurisdiction.

### **3.03 PROTECTING**

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure commercial laundry equipment is without damage or deterioration at the time of Substantial Completion.

### **3.04 STARTUP SERVICES**

- A. Engage factory-authorized service representatives to perform startup services and to demonstrate and train Owner's maintenance personnel as specified below.
  - 1. Coordinate commercial laundry equipment startup with service-utility testing, balancing, and adjustments.
  - 2. Remove protective coverings and clean equipment, both inside and out, and relamp equipment with integral lighting. Where applicable, comply with manufacturer's written cleaning instructions.
  - 3. Test each equipment item for proper operation. Repair or replace equipment that is defective in operation, including units that operate below required capacity or that operate with excessive noise or vibration.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - 5. Test motors and rotating equipment for proper rotation and lubricate moving parts according to manufacturer's written instructions.
  - 6. Test water, drain, gas, and liquid-carrying components for leaks. Repair or replace leaking components.
  - 7. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance for each commercial laundry equipment item.
  - 8. Review data in the operation and maintenance manuals. Refer to Division 01 Section "Operation and Maintenance Data."



9. Schedule training with Owner, through Architect, with at least 7 days' advance notice.

**END OF SECTION**

## SECTION 11 30 13 RESIDENTIAL APPLIANCES

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes:
  - 1. Cooking appliances.
  - 2. Kitchen exhaust ventilation.
  - 3. Refrigeration appliances.
  - 4. Cleaning appliances.

#### 1.02 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include installation details, material descriptions, dimensions of individual components, and finishes for each appliance.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

#### 1.04 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Sample Warranties: For manufacturers' special warranties.

#### 1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

#### 1.06 WARRANTY

- A. Special Warranties: Manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period except as qualified below:
  - 1. Warranty Period: Five years from date of Substantial Completion.

- B. Electric Range: Limited warranty, including parts and labor for first year and parts thereafter, for on-site service on surface-burner elements.
- C. Refrigerator/Freezer, Sealed System: Limited warranty, including parts and labor for first year and parts thereafter, for on-site service on the product.
- D. Dishwasher: Limited warranty, including parts and labor for first year and parts thereafter, for on-site service on the product.
  - 1. Warranty Period for Deterioration of Tub and Metal Door Liner: Five years from date of Substantial Completion.
  - 2. Warranty Period for Other Components: Two years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Basis of Design: Design is based on product specified. Subject to compliance with requirements, provide named product or comparable product approved by Architect.

### **2.02 PERFORMANCE REQUIREMENTS**

- A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### **2.03 RANGES**

- A. Electric Range: Slide-in range with one oven(s) and complying with AHAM ER-1.
  - 1. Basis of Design: Frigidaire FGEH304vVF.
  - 2. Width: 30 inches.
  - 3. Electric Burner Elements: Five.
    - a. Radiant Type: Three 1200 W, one 2000 W, and one 3000W.
    - b. Controls: Digital panel controls, located on front.
  - 4. Oven Features:
    - a. Capacity: 5.4 cu. ft.
    - b. Operation: Baking and air fry.
    - c. Broiler: Located in top of oven.
    - d. Oven Door(s): Counterbalanced, removable, with observation window and full-width handle.
    - e. Electric Power Rating:
      - 1) Oven(s): 3500 W.
      - 2) Broiler: 3900 W.

- f. Controls: Digital panel controls and timer display, located on front.
- 5. Anti-Tip Device: Manufacturer's standard.
- 6. Electric Power Supply: 240 V, 60 Hz, 1 phase, 30 A.
- 7. Material: Black stainless steel with manufacturer's standard cooktop.

## 2.04 MICROWAVE OVENS

### A. Microwave Oven:

- 1. Basis of Design: Whirlpool Corporation Model No. WMC30516HS.
- 2. Mounting: Countertop.
- 3. Type: Conventional.
- 4. Dimensions:
  - a. Width: 21-3/4 inches.
  - b. Depth: 17-1/4 inches.
  - c. Height: 13 inches.
- 5. Capacity: 1.6 cu. ft.
- 6. Oven Door: Door with observation window and pushbutton latch release.
- 7. Microwave Power Rating: 1200 W.
- 8. Electric Power Supply: 120 V, 60 Hz, 1 phase, 15 A.
- 9. Controls: Digital panel controls and timer display.
- 10. Other Features: Turntable.
- 11. Material: Stainless steel.

## 2.05 KITCHEN EXHAUST VENTILATION

### A. Overhead Exhaust Hood:

- 1. Basis of Design: GE Model No. UVW8301.
- 2. Type: Wall-mounted, exhaust-hood system.
- 3. Dimensions:
  - a. Width: 30 inches.
  - b. Depth: 30 inches.
- 4. Exhaust Fan: Three-speed fan built into hood and with manufacturer's standard 350-cfm capacity.
  - a. Venting: **[Vented to outside through roof with weatherproof roof cap, backdraft damper, and rodent-proof screening] [Vented to outside through wall with weatherproof wall cap, backdraft damper, and rodent-proof screening] [Nonvented, recirculating type with charcoal filter] [As indicated on Drawings] <Insert requirement>**.
  - b. Fan Control: Hood-mounted fan switch, with separate hood-light control switch.
- 5. Duct Type: Manufacturer's standard.

6. Finish: Stainless steel.
7. Features:
  - a. Permanent, washable stainless-steel-mesh filter(s).
  - b. Built-in LED lighting.

## 2.06 REFRIGERATOR/FREEZERS

- A. Refrigerator/Freezer: Two-door, side-by-side refrigerator/freezer and complying with AHAM HRF-1.
  1. Basis of Design: Frigidaire GRSC2352AF
  2. Type: Freestanding.
  3. Dimensions:
    - a. Width: 36-1/2 inches.
    - b. Depth: 28-3/8 inches with door.
    - c. Height: 69-78 inches with hinge.
  4. Storage Capacity:
    - a. Refrigeration Compartment Volume: 22.2 cu. ft.
    - b. Freezer Volume: 7.9 cu. ft.
    - c. Shelf Area: Three adjustable glass shelves.
  5. General Features:
    - a. Door Configuration: Overlay.
    - b. Dispenser in door for ice and cold water.
    - c. Built-in water-filtration system.
    - d. Dual refrigeration systems.
  6. Refrigerator Features:
    - a. Interior light in refrigeration compartment.
    - b. Compartment Storage: Vegetable crisper and meat compartment.
    - c. Door Storage: Modular compartments.
    - d. Temperature-controlled meat/deli bin.
  7. Freezer Features: One freezer compartment(s).
    - a. Automatic defrost.
    - b. Interior light in freezer compartment.
    - c. Automatic icemaker and storage bin.
  8. Front Panel(s): Stainless steel.
  9. Appliance Color/Finish: Stainless steel.

## 2.07 DISHWASHERS

- A. Basis of Design: Frigidaire FFBD2420US
- B. Type: Built-in undercounter.
- C. Dimensions:
  - 1. Width: 24 inches.
  - 2. Depth: 24 inches.
  - 3. Minimum Height: 32-2/5 inches.
- D. Capacity:
  - 1. Water Consumption for Full Load: 8.5 gal. per cycle.
- E. Tub and Door Liner: Stainless steel with sealed detergent and automatic rinsing-aid dispensers.
- F. Rack System: Nylon-coated sliding dish racks, with removable cutlery basket.
- G. Controls: Touch-pad controls with six wash cycles and hot-air and heat-off drying cycle options.
- H. Features:
  - 1. Waste food disposer.
  - 2. Self-cleaning food-filter system.
  - 3. Hot-water booster heater for 140 deg F wash water with incoming water at 100 deg F.
  - 4. Digital display panel.
  - 5. Soil-sensing water use control system.
- I. Front Panel: Stainless steel.

## 2.08 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.

- B. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.
- C. Examine walls, ceilings, and roofs for suitable conditions where overhead exhaust hoods will be installed.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 INSTALLATION**

- A. Install appliances according to manufacturer's written instructions.
- B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- D. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.

### **3.03 FIELD QUALITY CONTROL**

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
  - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
  - 3. Operational Test: After installation, start units to confirm proper operation.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- B. An appliance will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

### **3.04 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain residential appliances.

**END OF SECTION**

## SECTION 12 21 13 HORIZONTAL LOUVER BLINDS

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes horizontal louver blinds with polymer slats.

#### 1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For horizontal louver blinds, include fabrication and installation details.
- C. Samples for Initial Selection: For each type and color of horizontal louver blind.
  - 1. Include Samples of accessories involving color selection.
- D. Samples for Verification: For each type and color of horizontal louver blind indicated.
  - 1. Slat: Not less than 12 inches long.
- E. Product Schedule: For horizontal louver blinds. Use same designations indicated on Drawings.

#### 1.03 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

#### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver horizontal louver blinds in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

#### 1.05 FIELD CONDITIONS

- A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet-work and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.



- B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Source Limitations: Obtain horizontal louver blinds from single source from single manufacturer.

### **2.02 HORIZONTAL LOUVER BLINDS, POLYMER SLATS**

- A. 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:
1. Comfortex Window Fashions; Comfortex Corporation.
  2. Hunter Douglas, Inc.
  3. Levolor Inc.
  4. Springs Window Fashions; SWFcontract.
- B. Flame-Resistance Rating: Comply with NFPA 701; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- C. Slats: Polymers that are lead free, UV stabilized, integrally colored, opaque, and will not crack or yellow; antistatic, dust-repellent treated.
1. Formulation: Permanently flexible, extruded PVC or olymer/wood composite.
  2. Width: 2 inches.
  3. Thickness: 0.105 inch.
  4. Spacing: Manufacturer's standard.
  5. Profile: Manufacturer's standard.
  6. Lift-Cord Rout Holes: Minimum size required for lift cord and located near back (outside) edge of slat to maximize slat overlap and minimize light gaps between slats.
- D. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrail fully encloses operating mechanisms on three sides and ends.
1. Capacity: One blinds per headrail unless otherwise indicated.
  2. Manual Lift Mechanism:
    - a. Lift-Cord Lock: Variable; stops lift cord at user-selected position within full operating range.

- b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.
  3. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
    - a. Tilt: Full.
    - b. Operator: Clear-plastic wand.
    - c. Over-Rotation Protection: Manufacturer's detachable operator or slip clutch to prevent over rotation of gear.
  4. Manual Lift-Operator and Tilt-Operator Lengths: Manufacturer's standard.
  5. Manual Lift-Operator and Tilt-Operator Locations: Manufacturer's standard unless otherwise indicated.
- E. Bottom Rail: Secures and protects ends of ladders and lift cords.
  1. Type: Manufacturer's standard.
- F. Lift Cord: Manufacturer's standard braided cord.
- G. Ladders: Evenly spaced across headrail at spacing that prevents long-term slat sag.
  1. Type: Braided cord.
- H. Valance: Manufacturer's standard.
- I. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.
  1. Type: Overhead.
- J. Colors, Textures, Patterns, and Gloss:
  1. Slats: As selected by Architect from manufacturer's full range.
  2. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.

### **2.03 HORIZONTAL LOUVER BLIND FABRICATION**

- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
  1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch per side or 1/2 inch total, plus or minus

1/8 inch. Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch, plus or minus 1/8 inch.

- C. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
  - 1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.
- D. Mounting and Intermediate Brackets: Designed for removal and reinstallation of blind without damaging blind and adjacent surfaces, for supporting blind components, and for bracket positions and blind placement indicated.
- E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to brackets and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 INSTALLATION**

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.
  - 1. Locate so exterior slat edges are not closer than 2 inches from interior faces of glass and not closer than 1-1/2 inches from interior faces of glazing frames through full operating ranges of blinds.
  - 2. Install mounting and intermediate brackets to prevent deflection of headrails.
  - 3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.

### **3.03 ADJUSTING**

- A. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.

**3.04 CLEANING AND PROTECTION**

- A. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensures that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged horizontal louver blinds that cannot be repaired in a manner approved by Architect before time of Substantial Completion.

**END OF SECTION**

**SECTION 12 36 16**  
**METAL COUNTERTOPS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes:
1. Stainless-steel countertops.
  2. Stainless-steel sinks.

**1.02 ACTION SUBMITTALS**

- A. Shop Drawings: For metal fabrications.
1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
  2. For countertops, show locations and sizes of cutouts and holes for items installed in metal countertops.

**1.03 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products only after casework and supports on which they will be installed has been completed in installation areas.
- B. Keep finished surfaces of products covered with polyethylene film or other protective covering during handling and installation.

**1.04 FIELD CONDITIONS**

- A. Established Dimensions: Where products are indicated to fit to other construction, establish dimensions for areas where products are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

**PART 2 - PRODUCTS**

**2.01 STAINLESS-STEEL FABRICATIONS**

- A. Countertops: Fabricate from 0.062-inch-thick, stainless-steel sheet. Provide smooth, clean exposed tops and edges in uniform plane, free of defects. Provide front and end overhang of 1 inch over the base cabinets.
1. Joints: Fabricate countertops without field-made joints.
  2. Weld shop-made joints.

3. Sound deaden the undersurface with heavy-build mastic coating.
  4. Extend the top down to provide a 1-inch-thick edge with a 1/2-inch return flange.
  5. Form the backsplash coved to and integral with top surface, with a 1/2-inch-thick top edge and 1/2-inch return flange.
  6. Provide raised (marine) edge around perimeter of tops containing sinks; pitch tops containing sinks two ways to provide drainage without channeling or grooving.
- B. Stainless-Steel Sinks: Fabricate from stainless-steel sheet, not less than 0.050-inch nominal thickness. Fabricate with corners rounded and coved to at least 5/8-inch radius. Slope the sink bottoms to outlet without channeling or grooving. Provide continuous butt-welded joints.
1. Provide sizes indicated or manufacturer's closest standard size of equal or greater volume, as approved by Architect.
  2. Provide double-wall construction for sink partitions with top edge rounded to at least 1/2-inch diameter.
  3. Factory punch holes for fittings.
  4. Provide sinks with stainless-steel strainers and tailpieces.
  5. Factory weld sinks to stainless-steel countertops to provide one, integral unit.
  6. Apply 1/8-inch-thick coating of heat-resistant, sound-deadening mastic to undersink surfaces.

## 2.02 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- B. Sealant for Countertops: Manufacturer's standard sealant that complies with applicable requirements in Division 07 Section "Joint Sealants" and the following:
1. Mildew-Resistant Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, silicone.

## 2.03 STAINLESS-STEEL FINISH

- A. Grind and polish surfaces to produce uniform, directional satin finish matching No. 4 finish, with no evidence of welds and free of cross scratches. Run grain with long dimension of each piece. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces clean.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. Install metal countertops level, plumb, and true; shim as required, using concealed shims.
- B. Field Jointing: Where possible, make field jointing in the same manner as shop jointing; use fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
- C. Secure countertops to cabinets with Z- or L-type fasteners or equivalent; use two or more fasteners at each front, end, and back.
- D. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.
- E. Seal junctures of countertops, splashes, and walls with sealant for countertops.

### 3.03 CLEANING AND PROTECTION

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces. Remove and replace damaged products or touch up and refinish damaged areas to match original factory finish, as approved by Architect.
- C. Protection: Provide 6-mil plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

**END OF SECTION**

**SECTION 12 36 61.19**  
**QUARTZ AGGLOMERATE COUNTERTOPS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes:
  - 1. Quartz agglomerate countertops.
  - 2. Quartz agglomerate backsplashes.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For countertop materials.
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
  - 1. Show locations and details of joints.
  - 2. Show direction of directional pattern, if any.
- C. Samples for Initial Selection: For each type of material exposed to view.
- D. Samples for Verification: For the following products:
  - 1. Countertop material, 6 inches square.

**1.03 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For quartz agglomerate countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

**1.04 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of countertops.

**1.05 FIELD CONDITIONS**

- A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.



## 1.06 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

## PART 2 - PRODUCTS

### 2.01 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

- A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.
  - 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&C North America, Inc.; Cosentino North America.
    - b. Caesarstone.
    - c. Cambria.
    - d. E. I. du Pont de Nemours and Company.
    - e. LG Chemical, Ltd.
    - f. Technistone USA, Inc.
    - g. Wilsonart LLC.
  - 2. Colors and Patterns: As indicated by manufacturer's designations or if not indicated as selected by Architect from manufacturer's full range.
- B. Particleboard: Not permitted.
- C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

### 2.02 COUNTERTOP FABRICATION

- A. Fabricate countertops according to quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."
  - 1. Grade: Premium.
- B. Configuration: As indicated on Drawings.
- C. Countertops: 3/4-inch- thick, quartz agglomerate with front edge built up with same material.
- D. Backsplashes: 3/4-inch- thick, quartz agglomerate.
- E. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

- F. Joints: Fabricate countertops in sections for joining in field, with joints at locations indicated.
  - 1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.
  - 2. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.
- G. Cutouts and Holes:
  - 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
    - a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
  - 2. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

### 2.03 INSTALLATION MATERIALS

- A. Sealant for Countertops: Comply with applicable requirements in Division 07 Section "Joint Sealants."

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates to receive quartz agglomerate countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- D. Secure countertops to subtops with adhesive according to quartz agglomerate manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to

match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

- E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
  - 1. Install metal splines in kerfs in countertop edges at joints where indicated. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
  - 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- G. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
- H. Apply sealant to gaps at walls; comply with Division 07 Section "Joint Sealants."

**END OF SECTION**

## SECTION 13 34 19 METAL BUILDING SYSTEMS

### PART 1 - GENERAL

#### 1.01 SUMMARY

A. Section includes:

1. Structural-steel framing.
2. Metal roof panels.
3. Metal wall panels.
4. Metal liner panels.
5. Thermal insulation.
6. Accessories.

B. Related Sections include:

1. Division 08 Section "Hollow Metal Doors and Frames" for hollow metal doors and frames installed in metal building systems.
2. Division 08 Section "Overhead Coiling Doors" for coiling vehicular doors in metal building systems.
3. Division 08 Section "Aluminum-Framed Storefronts" for aluminum-framed storefront framing installed in metal building systems.

#### 1.02 DEFINITIONS

- A. Terminology Standard: See MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in standards referenced by this Section.

#### 1.03 COORDINATION

- A. Coordinate sizes and locations of concrete foundations and casting of anchor-rod inserts into foundation walls and footings. Anchor rod installation, concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."
- B. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

#### 1.04 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
1. Review methods and procedures related to metal building systems including, but not limited to, the following:
    - a. Condition of foundations and other preparatory work performed by other trades.
    - b. Structural load limitations.
    - c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
    - d. Required tests, inspections, and certifications.
    - e. Unfavorable weather and forecasted weather conditions and impact on construction schedule.
  2. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:
    - a. Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
    - b. Structural limitations of purlins and rafters during and after roofing.
    - c. Flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
    - d. Temporary protection requirements for metal roof panel assembly during and after installation.
    - e. Roof observation and repair after metal roof panel installation.
  3. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:
    - a. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
    - b. Structural limitations of girts and columns during and after wall panel installation.
    - c. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
    - d. Temporary protection requirements for metal wall panel assembly during and after installation.
    - e. Wall observation and repair after metal wall panel installation.

#### 1.05 ACTION SUBMITTALS

- A. Product Data: For each type of metal building system component.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
    - a. Metal roof panels.

- b. Metal wall panels.
  - c. Metal liner panels.
  - d. Thermal insulation and vapor-retarder facings.
- B. Shop Drawings: Indicate components by others. Include full building plan, elevations, sections, details and the following:
- 1. Anchor-Rod Plans: Submit anchor-rod plans and templates before foundation work begins. Include location, diameter, and minimum required projection of anchor rods required to attach metal building to foundation. Indicate column reactions at each location.
  - 2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
  - 3. Metal Roof and Wall Panel Layout Drawings: Show layouts of panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, clip spacing, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
    - a. Show wall-mounted items including personnel doors, vehicular doors, windows, louvers, and lighting fixtures.
    - b. Show translucent panels.
  - 4. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
    - a. Flashing and trim.
    - b. Gutters.
    - c. Downspouts.
- C. Samples: For the following products:
- 1. Panels: Nominal 12 inches long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
  - 2. Flashing and Trim: Nominal 12 inches long. Include fasteners and other exposed accessories.
  - 3. Vapor-Retarder Facings: Nominal 6-inch-square Samples.
  - 4. Accessories: Nominal 12-inch-long Samples for each type of accessory.
- D. Delegated-Design Submittal: For metal building systems.
- 1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation.

## 1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For erector, manufacturer, and land surveyor.

- B. Welding certificates.
- C. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
  - 1. Name and location of Project.
  - 2. Order number.
  - 3. Name of manufacturer.
  - 4. Name of Contractor.
  - 5. Building dimensions including width, length, height, and roof slope.
  - 6. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
  - 7. Governing building code and year of edition.
  - 8. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
  - 9. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
  - 10. Building-Use Category: Indicate category of building use and its effect on load importance factors.
- D. Erector Certificates: For qualified erector, from manufacturer.
- E. Material Test Reports: For each of the following products:
  - 1. Structural steel including chemical and physical properties.
  - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
  - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
  - 4. Shop primers.
  - 5. Nonshrink grout.
- F. Source quality-control reports.
- G. Field quality-control reports.
- H. Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.
- I. Sample Warranties: For special warranties.

#### **1.07 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For metal panel finishes to include in maintenance manuals.

## 1.08 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer.
  - 1. Accreditation: Manufacturer's facility accredited according to the International Accreditation Service's AC472, "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems."
  - 2. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.
- B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."
- D. Land Surveyor Qualifications: A professional land surveyor who practices in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.
- E. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
  - 1. Build mockups for typical wall metal panel including accessories.
    - a. Size: 48 inches long by full height of wall.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

## 1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.



## 1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with panel installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

## 1.11 WARRANTY

- A. Special Warranty on Metal Panel Finishes: Manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  2. Finish Warranty Period: 20 years from date of Substantial Completion.
- B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.
1. Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. 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:
1. Alliance Steel, Inc.
  2. Butler Manufacturing Company; a division of BlueScope Buildings North America, Inc.
  3. Ceko Building Systems; an NCI company.
  4. Mesco Building Solutions; a division of NCI Building Systems, Inc.
  5. Mid-West Steel Building Company; an NCI company.
  6. Schulte Building Systems, LLP.
  7. Star Building Systems; a division of NCI Building Systems, Inc.
  8. Varco-Pruden Buildings; a division of BlueScope Buildings North America, Inc.
  9. Whirlwind Building Systems.
- B. Source Limitations: Obtain metal building system components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer.

## 2.02 SYSTEM DESCRIPTION

- A. Provide a complete, integrated set of mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.
- B. Primary-Frame Type:
  - 1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.
  - 2. Rigid Modular: Solid-member, structural-framing system with interior columns.
- C. End-Wall Framing: Manufacturer's standard, for buildings not required to be expandable, consisting of primary frame, capable of supporting one-half of a bay design load, and end-wall columns.
- D. Secondary-Frame Type: Manufacturer's standard purlins and joists and girts.
- E. Eave Height: Manufacturer's standard height, as indicated by nominal height on Drawings.
- F. Bay Spacing: As indicated on Drawings.
- G. Roof Slope: 2 inches per 12 inches.
- H. Roof System: Manufacturer's standard standing-seam, vertical-rib, metal roof panels.
- I. Exterior Wall System: Manufacturer's standard exposed-fastener, tapered-rib, metal wall panels.
  - 1. Liner Panels: Flush profile.

## 2.03 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal building system.
- B. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."
  - 1. Design Loads: As indicated on Drawings.
  - 2. Deflection and Drift Limits: Design metal building system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC Steel Design Guide No. 3 "Serviceability Design Considerations for Steel Buildings."
  - 3. Deflection and Drift Limits: No greater than the following:
    - a. Purlins and Rafters: Vertical deflection of 1/150 of the span.
    - b. Girts: Horizontal deflection of 1/120 of the span.

- c. Metal Roof Panels: Vertical deflection of 1/150 of the span.
  - d. Metal Wall Panels: Horizontal deflection of of the span.
  - e. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
  - f. Lateral Drift: Maximum of 1/60 of the building height.
- C. Seismic Performance: Metal building system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
- 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- E. Structural Performance for Metal Roof and Wall Panels: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
- 1. Wind Loads: As indicated on Drawings.
- F. Air Infiltration for Metal Roof Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 1680 at the following test-pressure difference:
- 1. Test-Pressure Difference: 1.57 lbf/sq. ft.
- G. Air Infiltration for Metal Wall Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:
- 1. Test-Pressure Difference: 1.57 lbf/sq. ft.
- H. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:
- 1. Test-Pressure Difference: 6.24 lbf/sq. ft.
- I. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
- 1. Test-Pressure Difference: 6.24 lbf/sq. ft.
- J. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
- 1. Uplift Rating: UL 90.

- K. Thermal Performance for Opaque Elements: Provide the following maximum U-factors and minimum R-values when tested according to ASTM C 1363 or ASTM C 518:
1. Roof:
    - a. U-Factor: <Insert value>.
    - b. R-Value: <Insert value>.
  2. Walls:
    - a. U-Factor: <Insert value>.
    - b. R-Value: <Insert value>.

## 2.04 STRUCTURAL-STEEL FRAMING

- A. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings."
- B. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- C. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.
- D. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafters, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
    - a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Architect.
  2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
  3. Frame Configuration: One-directional, sloped.
  4. Exterior Column: Uniform depth.
  5. Rafter: Uniform depth.
- E. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet.
  2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.

- F. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:
1. Purlins: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; minimum 2-1/2-inch-wide flanges.
    - a. Depth: As needed to comply with system performance requirements.
  2. Purlins: Steel joists of depths indicated on Drawings.
  3. Girts: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange, with minimum 2-1/2-inch-wide flanges.
    - a. Depth: As required to comply with system performance requirements.
  4. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
  5. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch-diameter, cold-formed structural tubing to stiffen primary-frame flanges.
  6. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
  7. Base or Sill Angles: Manufacturer's standard base angle, minimum 3-by-2-inch, fabricated from zinc-coated (galvanized) steel sheet.
  8. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
  9. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.
  10. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.
- G. Bracing: Provide adjustable wind bracing using any method as follows:
1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50; or ASTM A 529/A 529M, Grade 50; minimum 1/2-inch-diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
  2. Cable: ASTM A 475, minimum 1/4-inch-diameter, extra-high-strength grade, Class B, zinc-coated, seven-strand steel; with threaded end anchors.
  3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
  4. Rigid Portal Frames: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
  5. Fixed-Base Columns: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.

6. Diaphragm Action of Metal Panels: Design metal building to resist wind forces through diaphragm action of metal panels.
- H. Anchor Rods: Headed anchor rods as indicated in Anchor Rod Plan for attachment of metal building to foundation.
- I. Materials:
  1. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
  2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
  3. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
  4. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55, or High-Strength Low-Alloy Steel (HSLAS) or High-Strength Low-Alloy Steel with Improved Formability (HSLAS-F), Grades 45 through 70; or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80, or HSLAS, Grades 45 through 70.
  5. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G60 coating designation; mill phosphatized.
  6. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
    - a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G90 coating designation.
    - b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, SS, Grade 50 or 80; with Class AZ50 coating.
  7. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A, carbon-steel, hex-head bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.
    - a. Finish: Plain.
  8. High-Strength Bolts, Nuts, and Washers: ASTM F 3125/F 3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436/F 436M, Type 1, hardened carbon-steel washers.
    - a. Finish: Plain.
  9. High-Strength Bolts, Nuts, and Washers: ASTM F 3125/F 3125M, Grade A490, Type 1, heavy-hex steel structural bolts or Grade F2280 tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436/F 436M, Type 1, hardened carbon-steel washers; all with plain finish.
  10. Unheaded Anchor Rods: ASTM A 36/A 36M.

- a. Configuration: Straight.
  - b. Nuts: ASTM A 563 heavy-hex carbon steel.
  - c. Plate Washers: ASTM A 36/A 36M carbon steel.
  - d. Washers: ASTM F 436 hardened carbon steel.
  - e. Finish: Plain.
11. Headed Anchor Rods: ASTM F 1554, Grade 36.
- a. Configuration: Straight.
  - b. Nuts: ASTM A 563 heavy-hex carbon steel.
  - c. Plate Washers: ASTM A 36/A 36M carbon steel.
  - d. Washers: ASTM F 436 hardened carbon steel.
  - e. Finish: Plain.
12. Threaded Rods: ASTM A 36/A 36M.
- a. Nuts: ASTM A 563 heavy-hex carbon steel.
  - b. Washers: ASTM A 36/A 36M carbon steel.
  - c. Finish: Plain.
- J. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.
1. Clean and prepare in accordance with SSPC-SP2.
  2. Coat with manufacturer's standard primer. Apply primer to primary and secondary framing to a minimum dry film thickness of 1 mil.
    - a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil on each side.

## 2.05 METAL ROOF PANELS

- A. Standing-Seam, Vertical-Rib, Metal Roof Panels: Formed with vertical ribs at panel edges and flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.
1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
    - a. Exterior Finish: Two-coat fluoropolymer.
    - b. Color: As indicated by manufacturer's designations.
  2. Clips: One-piece fixed to accommodate thermal movement.
  3. Joint Type: Mechanically seamed.
  4. Panel Coverage: 16 inches.
  5. Panel Height: 2 inches.

B. Finishes:

1. Exposed Coil-Coated Finish: Two-coat fluoropolymer complying with AAMA 621 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

**2.06 METAL WALL PANELS**

A. Exposed-Fastener, Tapered-Rib, Metal Wall Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.

1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
  - a. Exterior Finish: Two-coat fluoropolymer.
  - b. Color: As indicated by manufacturer's designations.
2. Major-Rib Spacing: 12 inches o.c.
3. Panel Coverage: 36 inches.
4. Panel Height: 1.25 inches.

B. Finishes:

1. Exposed Coil-Coated Finish: Two-coat fluoropolymer complying with AAMA 621 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

**2.07 METAL LINER PANELS**

A. General: Provide factory-formed metal liner panels designed for interior side walls and field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for a complete installation.



- B. Metal Liner Panels: Solid panels formed with a flat pan between panel edges; with a flush joint between panels.
  - 1. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
    - a. Nominal Thickness: 0.028 inch.
- C. Finishes:
  - 1. Exposed Coil-Coated Finish: Two-coat fluoropolymer complying with AAMA 621 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

## 2.08 THERMAL INSULATION

- A. Faced Metal Building Insulation: ASTM C 991, Type II, glass-fiber-blanket insulation; 0.5-lb/cu. ft. density; 2-inch-wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.
- B. Unfaced Metal Building Insulation: ASTM C 991, Type I, or NAIMA 202, glass-fiber-blanket insulation; 0.5-lb/cu. ft. density; 2-inch-wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.
- C. Retainer Strips: For securing insulation between supports, 0.025-inch nominal-thickness, formed, metallic-coated steel or PVC retainer clips colored to match insulation facing.
- D. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

## 2.09 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
  - 1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

- B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
  2. Clips: Manufacturer's standard, formed from steel sheet, designed to withstand negative-load requirements.
  3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from steel sheet.
  4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
  6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1-inch standoff; fabricated from extruded polystyrene.
- C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
  2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- D. Flashing and Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match adjacent metal panels.
1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
  2. Opening Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.
- E. Gutters: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other

special pieces as required. Fabricate in minimum 96-inch-long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."

1. Gutter Supports: Fabricated from same material and finish as gutters.
  2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.
- F. Downspouts: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot-long sections, complete with formed elbows and offsets.
1. Mounting Straps: Fabricated from same material and finish as gutters.
- G. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.
- H. Materials:
1. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.
    - a. Fasteners for Metal Roof Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless-steel cap or zinc-aluminum-alloy head and EPDM sealing washer.
    - b. Fasteners for Metal Roof Panels: Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panels.
    - c. Fasteners for Metal Wall Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with EPDM sealing washers bearing on weather side of metal panels.
    - d. Fasteners for Metal Wall Panels: Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM sealing washers bearing on weather side of metal panels.
    - e. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
    - f. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
  2. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
  3. Metal Panel Sealants:
    - a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
    - b. Joint Sealant: ASTM C 920; one part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal

panels and remain weathertight; and as recommended by metal building system manufacturer.

## 2.10 FABRICATION

- A. General: Design components and field connections required for erection to permit easy assembly.
  - 1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
  - 2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.
- B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.
- C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
  - 1. Make shop connections by welding or by using high-strength bolts.
  - 2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
  - 3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
  - 4. Weld clips to frames for attaching secondary framing if applicable, or punch for bolts.
  - 5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.
- D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll forming or break forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
  - 1. Make shop connections by welding or by using non-high-strength bolts.
  - 2. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.
- E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
  - 1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

## 2.11 SOURCE QUALITY CONTROL

- A. Special Inspection: Owner will engage a qualified special inspector to perform source quality control inspections and to submit reports.
  - 1. Accredited Manufacturers: Special inspections will not be required if fabrication is performed by an IAS AC472-accredited manufacturer approved by authorities having jurisdiction to perform such Work without special inspection.
    - a. After fabrication, submit copy of certificate of compliance to authorities having jurisdiction, certifying that Work was performed according to Contract requirements.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.
  - 1. Engage land surveyor to perform surveying.
- C. Proceed with erection only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.
- B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

### 3.03 ERECTION OF STRUCTURAL FRAMING

- A. Erect metal building system according to manufacturer's written instructions and drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

- C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.
- F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.
  - 1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt type and joint type specified.
    - a. Joint Type: Snug tightened or pretensioned as required by manufacturer.
- G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
  - 1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
  - 2. Locate and space wall girts to suit openings such as doors and windows.
  - 3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.
- H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
  - 1. Tighten rod and cable bracing to avoid sag.
  - 2. Locate interior end-bay bracing only where indicated.
- I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

- J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

### 3.04 METAL PANEL INSTALLATION, GENERAL

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.
1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.
- C. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
    - a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.
  2. Install metal panels perpendicular to structural supports unless otherwise indicated.
  3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
  4. Locate and space fastenings in uniform vertical and horizontal alignment.
  5. Locate metal panel splices over structural supports with end laps in alignment.
  6. Lap metal flashing over metal panels to allow moisture to run over and off the material.
- D. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.
1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
- E. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

- F. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.
  - 1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
  - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

### 3.05 METAL ROOF PANEL INSTALLATION

- A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
  - 1. Install ridge caps as metal roof panel work proceeds.
  - 2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.
- B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.
  - 1. Install clips to supports with self-drilling or self-tapping fasteners.
  - 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
  - 3. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
  - 4. Rigidly fasten eave end of metal roof panels and allow ridge end free movement for thermal expansion and contraction. Predrill panels for fasteners.
  - 5. Provide metal closures at peaks, rake edges, rake walls, and each side of ridge and hip caps.
- C. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.
- D. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 feet on slope and location lines and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

### 3.06 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise



indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
  2. Shim or otherwise plumb substrates receiving metal wall panels.
  3. When two rows of metal panels are required, lap panels 4 inches minimum.
  4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
  5. Rigidly fasten base end of metal wall panels and allow eave end free movement for thermal expansion and contraction. Predrill panels.
  6. Flash and seal metal wall panels with weather closures at eaves and rakes, and at perimeter of all openings. Fasten with self-tapping screws.
  7. Install screw fasteners in predrilled holes.
  8. Install flashing and trim as metal wall panel work proceeds.
  9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated on Drawings; if not indicated, as necessary for waterproofing.
  10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
  11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
- B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.
- C. Metal Liner Panels: Install panels on interior side of girts with flush appearance on the inside.
- D. Installation Tolerances: Shim and align metal wall panels within installed tolerance of 1/4 inch in 20 feet, noncumulative; level, plumb, and on location lines; and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

### **3.07 THERMAL INSULATION INSTALLATION**

- A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.
1. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.
  2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.
  3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths, with both sets of facing tabs sealed, to provide a complete vapor retarder.
  4. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation, with both sets of facing tabs sealed, to provide a complete vapor retarder.

- B. Blanket Roof Insulation: Comply with the following installation method:
1. Two-Layers-between-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Install layer of filler insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.
    - a. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.
  2. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
- C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal wall panels fastened to secondary framing.
1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

### 3.08 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
  2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
  3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
  1. Tie downspouts to underground drainage system indicated.
- E. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

### **3.09 FIELD QUALITY CONTROL**

- A. Special Inspections: Owner will engage a qualified special inspector to perform field quality control special inspections and to submit reports.
- B. Product will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

### **3.10 CLEANING AND PROTECTION**

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.
- B. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.
  1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."
  2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- D. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as

recommended by metal panel manufacturer. Maintain in a clean condition during construction.

1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

**END OF SECTION**

## **SECTION 220000 - GENERAL PROVISIONS FOR PLUMBING WORK**

### **PART 1 - GENERAL**

#### **1.1 ALTERNATES**

- A. Take cognizance of any change required in this work which may be a direct result of any alternate bid item listed and include the price deemed necessary to meet the requirements of the respective alternate.

#### **1.2 BIDDING**

- A. The Contractor shall provide labor, materials, equipment, items, articles, operations and methods listed, shown, scheduled, or mentioned on the drawings, and/or specified, including all incidentals required for their completion.
- B. The Contractor shall refer to the General part of these specifications, such as Instructions to Bidders, Special Conditions and DIVISION 1 for restrictions covering time that work can be performed in certain areas, noisy and dusty operations, sequence of work, access to restricted areas and similar types of work and operations.

#### **1.3 SUBSTITUTIONS**

- A. Most items in this Division are eligible for substitution in accordance with the General Conditions and Supplements thereto. Where a proprietary specification is written for a particular item, then only that item may be used.
- B. When the Engineer deems it necessary, to assure satisfactory installation and compatibility with other equipment, piping, ductwork, electrical provisions and other appurtenances, the Contractor shall prepare scale drawings of the substitute item showing proposed location, connections, relation to other equipment and other pertinent data such as maintenance space requirements, electrical requirements, height and weight. Drawings must receive Engineer's approval before the substitution is made.
- C. It is the Contractor's responsibility that the substitute item shall fit into the space allocated and that the item can be installed and function as intended. Should changes in the work of any Contractor become necessary as a result of any substitute item under this Division, such changes shall be arranged and paid for by this Contractor.
- D. Capacities of substitute items shall not be less than that of the specified item.
- E. The performance of the factory representative and supplier on past work will be a consideration in the approval process of substitute items.
- F. The final decision as to acceptability rests with the Engineer.

#### **1.4 CODES, REGULATIONS AND PERMITS**

- A. All materials and equipment shall be new, approved by the governing authority, and be in new, undamaged condition when installed.
- B. Comply with the 2019 California Plumbing Code, the 2019 California Mechanical Code, the 2019 California Building Code, the 2019 California Fire Code, the 2019 California Green Building Standards Code, and the 2019 California Energy Code. Comply with

DIVISION 26 and all codes referenced therein for any and all electrical work accomplished under this Division or by this Contractor.

- C. Arrange for and obtain all permits and approvals required for the execution of the work.

### **1.5 INTENT OF DRAWINGS**

- A. Pipe or duct risers and other diagrams are schematic only and not to scale. They are intended only to indicate sizes or relative arrangement of pipe and equipment shown elsewhere in plan view.
- B. Some items defined in these specifications may not actually be required in this work scope. This fact does not render the remaining specifications null, nor does it relieve the contractor from complying with these specifications as they apply to the work defined in the project documents.

### **1.6 WORKMANSHIP**

- A. Work shall be accomplished by workmen skilled in the particular trade, in conformance with best practices and to meet all applicable codes.
- B. This Contractor shall replace materials or equipment not properly installed or finished, without increase in payment received.

### **1.7 RESPONSIBILITY**

- A. The Contractor is responsible for installation of a satisfactory and complete piece of work in accordance with true intent of the drawings and specifications.
- B. Consult all drawings for the project to predetermine that the work and equipment will fit as planned.
- C. The location of piping, ducts, equipment, etc., shall be checked to ensure clearance from openings, structural members, cabinets, lights, outlets, and equipment having fixed locations. This shall be accomplished prior to fabrication of pipe or ducts.
- D. If, at any time, and in any case, changes in location of piping, ducts, equipment, etc., becomes necessary due to existing obstacles or installation of other trades shown on any of the project drawings and such conflict could have been avoided by proper coordination between trades or proper pre-planning of work, such required changes shall be made by the Contractor at no extra cost. These changes are to be recorded on the record drawings.
- E. This Contractor is responsible to provide all incidental electrical interconnections, control wiring, etc., which are necessary for system completion and which are not specifically shown or otherwise indicated on the electrical drawings or specified in DIVISION 26.
- F. All electrical work incidental to or accomplished under this Division shall comply with all requirements of DIVISION 26.

### **1.8 WARRANTY**

- A. Contractor shall guarantee the installation under his scope of work free from defects of workmanship and materials for a period of one year after the date of substantial completion and promptly remedy any defects developing during this period without

charge. Contractor must assume responsibility for all expenses incurred to repair or replace his work as well as work of other trades that may be affected by this replacement.

- B. Under certain circumstances, phasing will require particular pieces of equipment to be started up prior to the Substantial Completion Date. Contractor to assume responsibility for operation of this equipment and be cognizant warranty to owner shall still be provided for the full one-year duration after Substantial Completion.

#### **1.9 DELIVERY AND STORAGE OF MATERIALS**

- A. Make provisions that are acceptable to the Owner and Engineer for delivery and storage of materials.
- B. All materials shall be protected from damage and from weather. Cover, enclose and protect all stored materials and preserve in new, clean condition. Keep all openings in pipe, ductwork and equipment closed with caps and covers. All materials shall be elevated above the ground or floor during storage.
- C. All materials and products installed shall be new and shall be in new and undamaged condition. Materials that are rusted, weathered or otherwise depleted in condition shall not be installed.

#### **1.10 MANUFACTURER'S DIRECTIONS**

- A. Manufactured materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer unless noted otherwise herein or on the drawings.
- B. Certain items of equipment, as noted herein, shall be checked out, started and put into service by factory representatives.

#### **1.11 CUTTING, PATCHING, REPAIRING**

- A. Cutting, patching and repairing required by the work of this Division shall be the responsibility of this Contractor.
- B. Work shall be performed in accordance with DIVISION 1 of these specifications.
- C. The performance of this work shall not weaken the structural integrity of the building.
- D. Any abrasion or disfigurement of the finished work or any portion of the building where any such abrasion or disfigurement is caused by the activities of the Contractor shall be repaired and neatly refinished to match the adjacent work.

#### **1.12 OPENINGS IN PIPES**

- A. Openings in pipes shall be kept closed during progress of work.
- B. The Contractor is required to clean new systems found dirty to the satisfaction of the Engineer at no additional cost.

#### **1.13 CLEANUP**

- A. Upon completion of work, remove materials, scraps, etc., relative to this work and leave the premises in a clean and orderly condition. This applies equally to finished, unfinished

and concealed spaces.

- B. Clean equipment of dirt and debris.

#### **1.14 SAMPLES**

- A. The Contractor shall submit actual production samples on any material or equipment requested if, in the Engineer's opinion, it is necessary in order to determine the quality, workmanship, operation, etc. of the item.
- B. Samples will be returned to the Contractor. Approved samples may be used on the job.
- C. Costs incurred in providing and returning samples will be the responsibility of the Contractor.

#### **1.15 TEMPORARY SERVICES**

- A. See DIVISION 1 - GENERAL REQUIREMENTS for Temporary Facilities.

#### **1.16 FIRE PROTECTION**

- A. Metallic pipe, duct and other penetrations of all fire partitions, walls and floors shall be effectively fire-stopped to equal the fire rating of the floor or partition using materials and methods UL approved and tested to meet all conditions of ASTM E119, UL 1479 and ASTM E 814 tests. One such material is Carborundum bulk "Fiberfrax" fiber packing for filling the annular space between pipe and sleeve or hole and Fiberfrax LDS moldable caulking for sealing in the fiber packing. Other acceptable materials are Dow Corning 3-6548 Silicon RTV foam firestop system, General Electric 'Pensil' 851 system or U.S.G. fire code compound and Thermafire.
- B. PVC pipe, duct penetrations to be fire stopped same as metallic penetrations with the addition of an intumescent wrap to effectively close the hole if PVC vaporizes.
- C. Construction of permanent bracing, framing, roof curbs and platforms or other structures which utilize wood construction shall be fabricated from fire resistant treated materials or shall be otherwise protected by approved fire resistant materials.

#### **1.17 ACCESS DOORS**

- A. Where access to valves, dampers, equipment, etc. is required, provide Inryco/Milcor Type "K", "DW", or "M" doors. Access doors required in fire-rated walls or ceilings shall be U.L. approved, similar and equal to Ruskin #APW1. Size of door shall be sufficient to provide proper access to item, if size is not listed on the drawings.

#### **1.18 COMPLETION AND TESTS**

- A. Complete and test each system as specified. Submit all reports and complete the Project Completion Checklist in PART 3 of this Section. Leave all systems in proper operation.
- B. At the time of finalizing the project, a demonstration of all systems shall be performed in the presence of the Owner's designated representative. The Contractor shall demonstrate that the systems perform in the manner described in the specifications and indicated on the drawings.

#### **1.19 OPERATING INSTRUCTIONS**



- A. The Contractor shall provide qualified personnel to instruct the Owner's maintenance personnel in the operation and maintenance of all the new systems and equipment. In general, the installer of the system may give these instructions. Some equipment or systems may require instruction be given by an authorized agent of the supplier or manufacturer. See the individual Sections of this Division for specific training requirements.
- B. Written operation and maintenance instructions, as produced by the manufacturer, shall be provided for all equipment. These instructions shall be bound and submitted as described in this Section.

## **1.21 RECORD DRAWINGS**

- A. A separate set of mechanical drawings shall be maintained at the job site at all times and shall be used as record drawings. This set shall be kept up to date with all changes and/or additions in the construction and/or mechanical systems, and shall be delivered to the Engineer at the completion of this job. This set of drawings shall be kept clean and protected at all times.

## **PART 2 SUBMITTALS AND BROCHURES OF EQUIPMENT**

### **2.1 GENERAL**

- A. The literature required to be submitted and approved in order to fulfill the requirements of this Division falls into two general categories. These are the "Brochures of Equipment" and "Submittals."
- B. "Submittals" is a general term for informational literature that must be supplied to and approved by the Contractor and the Engineer prior to installing, receiving, or in some instances, ordering equipment. The normal required types of submittals include shop drawings, manufacturer's literature, installation and operation instructions (from the manufacturer) and wiring diagrams. System reports, such as start-up reports or balancing reports, and the project completion checklist are two forms of submittals that are required after the equipment has been installed and is operational
- C. Brochures of Equipment are booklets assembled by the contractor that contain operation, maintenance and repair literature for all equipment installed under the requirements of the project. They will be used by the Owner's personnel as the primary source of information for operating and maintaining the installed systems. As such, they shall exhibit a professional quality, high degree of clarity and durability that will allow their use throughout the useful life of the installed system.

### **2.2 SUBMITTALS**

- A. The contractor shall procure all manufacturer's literature and produce or have produced, all drawings, calculations or other data as required by either the Submittal Schedule contained in this Section or as specifically called out in the individual Sections of this Division.
- B. Submittal materials shall be complete in every respect and shall clearly indicate equipment features, dimensions, weights, performance characteristics and capacities. Capacity and performance calculations shall be adjusted to indicate actual equipment performance at the project elevation. Literature or drawings that describe more than one model or size of equipment shall be marked with arrows or otherwise clearly inscribed to identify the actual

equipment that will be furnished. All options and special parts of features shall also be clearly identified. All submitted materials must be clear, complete and legible. Copies or duplications of poor quality will not be reviewed or accepted.

- C. Where specified or otherwise required, proof of equipment compliance with standards or listings by specific agencies (e.g. AGA, ASME, etc.) shall be included in submittal material.
- D. Submittals for all equipment shall be routed through and reviewed by the Contractor. The Contractor shall check all submittals for adequate identification, number of copies, correctness and compliance with contract drawings and specifications and apply his stamp of approval. Copies of ALL submittals, including those which are not required to be forwarded for the Engineer's approval, shall be included in the Brochures of Equipment.
- E. Submittals may be accepted or rejected by the Engineer in their entirety. Upon rejection of any entire submittal, the entire submittal package shall be resubmitted. No partial approval will be granted for any equipment that is a part of a submittal which has been rejected in its entirety.
- F. If the Engineer "Rejects" or asks for "Revise and Resubmit" for any individual item in a particular submittal, then just that individual item shall be re-submitted by the Contractor.
- G. Individual submittals may include data for more than one piece of equipment. However, submittal data for equipment specified in different sections of specifications shall not be included in the same submittal package.
- H. Acceptance of submittals by the Engineer shall not relieve the Contractor from responsibility for deviations from drawings or specifications, nor shall it relieve him from responsibility for errors in shop drawings or other submittal literature.

**2.3 SUBMITTAL SCHEDULE**

- A. The following is an index of the Sections of this Division and a schedule of the submittal data required for each Section. Items marked "c" under each heading for the various submittal forms shall be submitted to the Contractor for review and approval. Items marked "c" and "e" are to be forwarded to the Engineer for review and approval after the Contractor has affixed his approval. All marked items shall be included in the Brochures of Equipment whether or not they require initial forwarding to the Engineer. All submittal literature appearing in the Brochures of Equipment shall be stamped or marked as approved by the Contractor.
- B. All submittals required by the schedule shall be checked, revised as necessary, and approved by the Contractor. Submittals, which are required to be forwarded to the Engineer, shall first be reviewed and approved by the Contractor.
- C. Submit any additional materials, not found on the Submittal Schedule, as required by the contract drawings or individual Sections of this Division of contract specifications.

Section	Title	Shop Dwg.	Mfr. Lit.	Install Oper. Book	Wiring	Report Diag.
220500	COMMON WORK RESULTS FOR PLUMBING	ce	ce			
220700	PLUMBING INSULATION		ce			
221116	DOMESTIC WATER PIPING		c			
221316	SANITARY WASTE AND VENT PIPING		c			
	SCHED PLUMBING FIXTURES	ce	ce			

### **2.3 BROCHURES OF EQUIPMENT**

- A. The Contractor shall prepare and submit three complete Brochures of Equipment. Each shall contain all required submittal data for the construction materials and each piece of equipment (reference Submittal Schedule, 220000 2.3) installed under this project. The literature required for submittal purposes shall be expanded to include operation and maintenance literature for each piece of equipment. Maintenance information shall be complete in every respect and shall include parts lists and assembly drawings wherever applicable. Manuals, catalogs, etc., shall be new, as supplied by the factory, and not photocopied. The Brochures shall also include a copy of the SUBMITTAL SCHEDULE (SECTION 220000 2.3) and a final copy of the project COMPLETION CHECKLIST (SECTION 220000 3.1 B).
- B. All literature shall clearly indicate the equipment it represents and shall be labeled with the equipment identification abbreviation found on the drawings, e.g. EF-1, etc. All information which is not applicable to the particular model and size supplied shall be clearly and neatly crossed out. This includes dimensional drawings, maintenance information, parts lists, wiring diagrams, etc. Only the information applicable to the particular equipment supplied shall remain and it shall be easy to follow. Booklets not meeting these requirements shall be returned for correction.
- C. Binders shall be high quality telescoping post type with slide or lever release, metal hinges, and covered hardboard or rigid plastic covers.
- D. Dividers shall be used to separate the literature for equipment supplied under each of the various Sections of this Division. Divider headings shall read the same as the Section title e.g. "221429 SUMP PUMPS."
- E. Large size drawings or diagrams shall be folded and placed in heavyweight sheets with pockets.
- F. The format of the Brochure shall begin with the submittal requirement list at the front as an index sheet. The dividers for each section shall then progress sequentially and the project completion checklist shall be included at the back as the appendix.
- G. Authorization for final payment shall not be made prior to final acceptance of the Brochures of Equipment.

**PART III PROJECT CLOSEOUT**

**3.1 COMPLETION CHECKLIST**

- A. The following checklist shall be completed by contractor and submitted to A/E before final site visitation or job acceptance is made.
- B. Refer to each specific specification section listed for a more complete description of listed test requirements.

MECHANICAL:  
SPEC. ITEM  
SECTION

DATE CORRECTED OR  
COMPLETED BY  
(NAME OR INITIALS)

220000 Demonstrate to owner that all systems are functioning properly.	_____	_____
220000 Provide record drawings.	_____	_____
220000 Provide Brochures of Equipment.	_____	_____
221116 Test domestic water system.	_____	_____
221313 Test drain, waste & vent piping.	_____	_____
224000 Provide plumbing equipment instructions	_____	_____
to owner's personnel.		_____

Job Name: \_\_\_\_\_

Location: \_\_\_\_\_

DC Job#: \_\_\_\_\_

Contractor: \_\_\_\_\_

Submitted by: \_\_\_\_\_ Date \_\_\_\_\_  
Name Date

PART 4 – SUBSTITUTION REQUEST

4.1 SUBSTITUTION REQUEST FORM

- A. The following Substitution Request Form shall be completed by Contractor and submitted to A/E for review of equipment or materials prior to bid as defined in sub-section 1.3 of Section 220000.
- B. Review of the substitution request form is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for: dimensions which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of their work with that of all other trades, and the satisfactory performance of the work.

PROJECT:

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SPECIFIED ITEM: \_\_\_\_\_

The undersigned requests consideration of the following:

PROPOSED SUBSTITUTION:

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Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified. Attached data also includes a description of changes to Contract Documents that the proposed substitution will require for its proper installation.

The undersigned certifies that the following paragraphs, unless modified by attachments, are correct:

- 1. The proposed substitution does not affect dimensions shown on Drawings.
- 2. The undersigned will pay for changes to the project design, including engineering design, detailing and construction costs caused by the requested substitution.
- 3. The proposed substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.
- 4. Maintenance and service parts will be locally available for the proposed substitution.
- 5. The undersigned further certifies that the performance, capacity, function, appearance and quality of the proposed substitution are equivalent or superior to the specified item.

The undersigned agrees that, if this page is reproduced, the terms and conditions for substitutions found in the Bidding Documents apply to this request.

Submitted by:

---

\_\_\_\_\_  
Date

\_\_\_\_\_  
Telephone

**END SECTION 220000**

## **SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes the following:
  - 1. Piping materials and installation instructions common to most piping systems.
  - 2. Dielectric fittings.
  - 3. Mechanical sleeve seals.
  - 4. Sleeves.
  - 5. Escutcheons.
  - 6. Grout.
  - 7. Plumbing demolition.
  - 8. Equipment installation requirements common to equipment sections.
  - 9. Concrete bases.
  - 10. Supports and anchorages.

#### **1.2 DEFINITIONS**

- A. Finished Spaces: Spaces other than plumbing and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and plumbing 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 chases.
- 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.

#### **1.3 SUBMITTALS**

- A. Welding certificates.

#### **1.4 QUALITY ASSURANCE**

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
  2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

## **PART 2 - PRODUCTS**

### **2.1 PIPE, TUBE, AND FITTINGS**

- A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

### **2.2 JOINING MATERIALS**

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12.
- G. Solvent Cements for Joining Plastic Piping:
  1. ABS Piping: ASTM D 2235.
  2. CPVC Piping: ASTM F 493.
  3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  4. PVC to ABS Piping Transition: ASTM D 3138.

### **2.3 DIELECTRIC FITTINGS**

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
- E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- F. 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.

## **2.4 MECHANICAL SLEEVE SEALS**

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
- B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
- C. Pressure Plates: Carbon steel. Include two for each sealing element.
- D. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## **2.5 SLEEVES**

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  - 1. Underdeck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D 1785, Schedule 40.
- G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

## **2.6 ESCUTCHEONS**

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.



- C. One-Piece, Cast-Brass Type: With set screw.
  - 1. Finish: Polished chrome-plated.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
  - 1. Finish: Polished chrome-plated.

## **2.7 GROUT**

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
  - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.
  - 3. Packaging: Premixed and factory packaged.

## **PART 3 - EXECUTION**

### **3.1 PLUMBING DEMOLITION**

- A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.
  - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
  - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
  - 3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  - 4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  - 5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

### **3.2 PIPING SYSTEMS - COMMON REQUIREMENTS**

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

- 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 to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors.
- M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow 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 and larger in diameter.
  - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
  - 1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- Q. Verify final equipment locations for roughing-in.

- R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### **3.3 PIPING JOINT CONSTRUCTION**

- A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. 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.
- E. 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.
- F. 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.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
  - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
  - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
  - 4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
  - 5. PVC Nonpressure Piping: Join according to ASTM D 2855.
  - 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
- J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End Pipe and Fittings: Use butt fusion.
  2. Plain-End Pipe and Socket Fittings: Use socket fusion.
- M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

### **3.4 PIPING CONNECTIONS**

- A. Make connections according to the following, unless otherwise indicated:
1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
  2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
  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.

### **3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS**

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install plumbing 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.
- D. Install equipment to allow right of way for piping installed at required slope.

### **3.6 CONCRETE BASES**

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
  2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
  3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
  4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  5. Install anchor bolts to elevations required for proper attachment to supported equipment.
  6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
  7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete Miscellaneous Cast-in-Place Concrete."

### **3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES**

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

### **3.8 ERECTION OF WOOD SUPPORTS AND ANCHORAGES**

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor plumbing 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.

### **3.9 GROUTING**

- A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

**END OF SECTION 220500**

## **SECTION 220700 - PLUMBING INSULATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Insulation Materials:
    - a. Cellular glass
    - b. Flexible elastomeric.
    - c. Mineral fiber.
    - d. Polyolefin.
  - 2. Insulating cements.
  - 3. Adhesives.
  - 4. Mastics.
  - 5. Sealants.
  - 6. Factory-applied jackets.
  - 7. Field-applied fabric-reinforcing mesh.
  - 8. Field-applied jackets.
  - 9. Tapes.
  - 10. Securements.
  - 11. Corner angles.

#### **1.2 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
  - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
  - 2. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
  - 3. Detail removable insulation at piping specialties, equipment connections, and access panels.
- C. Field quality-control reports.

#### **1.3 QUALITY ASSURANCE**

- A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per 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 and inspecting 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.

## **PART 2 - PRODUCTS**

### **2.1 INSULATION MATERIALS**

- A. Comply with requirements in Part 3 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. 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, provide one of the following:
    - a. Cell-U-Foam Corporation; Ultra-CUF.
    - b. Pittsburgh Corning Corporation; Foamglas Super K.
    - c. Owens-Corning
    - d. Armstrong
    - e. Johns-Manville
    - f. Knauf
    - g. Certainteed
  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-SSL: Comply with ASTM C 552, Type II, Class 2.
  7. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
- G. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
  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. Aeroflex USA Inc.; Aerocel.
    - b. Armacell LLC; AP Armaflex.

- c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

H. Mineral-Fiber, Preformed Pipe Insulation:

- 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. Fibrex Insulations Inc.; Coreplus 1200.
  - b. Johns Manville; Micro-Lok.
  - c. Knauf Insulation; 1000 Pipe Insulation.
  - d. Manson Insulation Inc.; Alley-K.
  - e. Owens Corning; Fiberglas Pipe Insulation.
- 2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

I. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied ASJ 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. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. 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. 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.

J. 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, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Armacell LLC; Tubolit.
  - b. Nomaco Inc.; IMCOLOCK, IMCOSHEET, NOMALOCK, and NOMAPLY.
  - c. RBX Corporation; Therma-cell.

## 2.2 INSULATING CEMENTS

A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

- 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. Insulco, Division of MFS, Inc.; SmoothKote.
  - b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.
  - c. Rock Wool Manufacturing Company; Delta One Shot.



## 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. Cellular-Glass Polystyrene Adhesive: Solvent-based resin adhesive, with a service temperature range of **minus 75 to plus 300 deg F**.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Products, Division of ITW; CP-96.
    - b. Foster Products Corporation, H. B. Fuller Company; 81-33.
- C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
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. Aeroflex USA Inc.; Aero seal.
    - b. Armacell LCC; 520 Adhesive.
    - c. Foster Products Corporation, H. B. Fuller Company; 85-75.
    - d. RBX Corporation; Rubatex Contact Adhesive.
- D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
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 Products, Division of ITW; CP-82.
    - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
    - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
    - d. Marathon Industries, Inc.; 225.
    - e. Mon-Eco Industries, Inc.; 22-25.
- E. 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 Products, Division of ITW; CP-82.
    - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
    - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
    - d. Marathon Industries, Inc.; 225.
    - e. Mon-Eco Industries, Inc.; 22-25.
- F. PVC Jacket Adhesive: Compatible with PVC jacket.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Dow Chemical Company (The); 739, Dow Silicone.
    - b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
    - c. P.I.C. Plastics, Inc.; Welding Adhesive.
    - d. Red Devil, Inc.; Celulon Ultra Clear.
    - e. Speedline Corporation; Speedline Vinyl Adhesive.

## 2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
  - 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 Products, Division of ITW; CP-35.
    - b. Foster Products Corporation, H. B. Fuller Company; 30-90.
    - c. ITW TACC, Division of Illinois Tool Works; CB-50.
    - d. Marathon Industries, Inc.; 590.
    - e. Mon-Eco Industries, Inc.; 55-40.
    - f. Vimasco Corporation; 749.
  - 2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
  - 3. Service Temperature Range: Minus 20 to plus 180 deg F.
  - 4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
  - 5. Color: White.
- C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
  - 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 Products, Division of ITW; CP-10.
    - b. Foster Products Corporation, H. B. Fuller Company; 35-00.
    - c. ITW TACC, Division of Illinois Tool Works; CB-05/15.
    - d. Marathon Industries, Inc.; 550.
    - e. Mon-Eco Industries, Inc.; 55-50.
    - f. Vimasco Corporation; WC-1/WC-5.
  - 2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.
  - 3. Service Temperature Range: Minus 20 to plus 200 deg F.
  - 4. Solids Content: 63 percent by volume and 73 percent by weight.
  - 5. Color: White.

## 2.5 SEALANTS

- A. Joint Sealants:
  - 1. Joint Sealants for Cellular-Glass 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 Products, Division of ITW; CP-76.
    - b. Foster Products Corporation, H. B. Fuller Company; 30-45.
    - c. Marathon Industries, Inc.; 405.
    - d. Mon-Eco Industries, Inc.; 44-05.
    - e. Pittsburgh Corning Corporation; Pittseal 444.

- f. Vimasco Corporation; 750.
  - 2. Materials shall be compatible with insulation materials, jackets, and substrates.
  - 3. Permanently flexible, elastomeric sealant.
  - 4. Service Temperature Range: Minus 100 to plus 300 deg F.
  - 5. Color: White or gray.
- B. Color: White. FSK and Metal Jacket Flashing Sealants:
- 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Products, Division of ITW; CP-76-8.
    - b. Foster Products Corporation, H. B. Fuller Company; 95-44.
    - c. Marathon Industries, Inc.; 405.
    - d. Mon-Eco Industries, Inc.; 44-05.
    - e. Vimasco Corporation; 750.
  - 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.**
  - 5. Color: Aluminum.
- C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
- 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Products, Division of ITW; 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.**
  - 5. Color: White.

## 2.6 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. PVDC Jacket for Indoor Applications: 4-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perms when tested according to ASTM E 96 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.

5. PVDC Jacket for Outdoor Applications: 6-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perms when tested according to ASTM E 96 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.
6. 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.

## 2.7 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, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
    - b. Compac Corp.; 104 and 105.
    - c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
    - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
  2. Width: 3 inches.
  3. Thickness: 11.5 mils.
  4. Adhesion: 90 ounces force/inch in width.
  5. Elongation: 2 percent.
  6. Tensile Strength: 40 lbf/inch in width.
  7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. 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, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
    - b. Compac Corp.; 130.
    - c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
    - d. Venture Tape; 1506 CW NS.
  2. Width: 2 inches.
  3. Thickness: 6 mils.
  4. Adhesion: 64 ounces force/inch in width.

5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

C. PVDC Tape: 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 540 Vapor Retarder Tape.
2. Width: 3 inches.
3. Film Thickness: 4 mils.
4. Adhesive Thickness: 1.5 mils.
5. Elongation at Break: 145 percent.
6. Tensile Strength: 55 lbf/inch in width.

## **2.8 CORNER ANGLES**

- A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.
- B. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105 or 5005; Temper H-14.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

### **3.2 GENERAL INSTALLATION REQUIREMENTS**

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and 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- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
  - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap.
  - 4. Cover joints and seams with tape as recommended by insulation material manufacturer 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 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.

### **3.3 PENETRATIONS**

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- B. 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 Division 07 Section "Penetration Firestopping"irestopping and fire-resistive joint sealers.
- C. Insulation Installation at Floor Penetrations:
  1. Pipe: Install insulation continuously through floor penetrations.
  2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

### **3.4 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, vessels, and equipment. 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 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.

### **3.5 CELLULAR-GLASS INSULATION INSTALLATION**

- 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** o.c.
  4. For insulation with factory-applied jackets on below ambient services, do not staple longitudinal tabs but 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**, 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.

### **3.6 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION**

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.

### **3.7 MINERAL-FIBER INSULATION INSTALLATION**

#### **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 o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but 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, 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.

### **3.8 POLYOLEFIN INSULATION INSTALLATION**

#### **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.

### 3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. 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 for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

### 3.10 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.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

### 3.11 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Hot and Recirculated Hot Water: Insulation shall be a minimum thickness of one of the following:
  - 1. Owens-Corning Fiberglass 25 ASJ/SSL
    - a. 1-½" thick for pipe size 1-1/4" and under and 2" thick for 1-1/2" pipe size and above.
  - 2. Flexible Elastomeric
    - a. Thickness as required to meet or exceed thermal and mechanical protection as listed above.
  - 3. Mineral-Fiber, Preformed Pipe Insulation, Type I
    - a. Thickness as required to meet or exceed thermal and mechanical protection as listed above.
  - 4. Polyolefin
    - a. Thickness as required to meet or exceed thermal and mechanical protection as listed above.
  
- B. Domestic Cold Water: Insulation shall be:
  - 1. All sizes to be insulated with ½" fiberglass insulation with complete vapor barrier for condensation control.
  
- C. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities: Insulation shall be:
  - 1. Similar and equal to HandiLav-guard insulation kits as manufactured by Truebro, Inc. Color shall be white.

**END OF SECTION 220700**

## **SECTION 221116 - DOMESTIC WATER PIPING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Under-building slab and aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
  - 2. Specialty valves.
  - 3. Flexible connectors.
  - 4. Water meters furnished by utility company for installation by Contractor.
  - 5. Escutcheons.
  - 6. Sleeves and sleeve seals.

#### **1.2 PERFORMANCE REQUIREMENTS**

- A. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to SEI/ASCE 7.

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Field quality-control reports.

#### **1.4 QUALITY ASSURANCE**

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14 for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.
- C. Comply with NSF 61 for potable domestic water piping and components.

### **PART 2 - PRODUCTS**

#### **2.1 PIPING MATERIALS**

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

#### **2.2 COPPER TUBE AND FITTINGS**

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

1. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.
2. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
3. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
4. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

B. Soft Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L water tube, annealed temper.

1. Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

### **2.3 DUCTILE-IRON PIPE AND FITTINGS**

A. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.

1. Standard-Pattern, Push-on-Joint Fittings: AWWA C110, ductile or gray iron.
  - a. Gaskets: AWWA C111, rubber.
2. Compact-Pattern, Push-on-Joint Fittings: AWWA C153, ductile iron.
  - a. Gaskets: AWWA C111, rubber.

### **2.4 CPVC PIPING**

A. CPVC Tubing System: ASTM D 2846/D 2846M, SDR 11, tube and socket fittings.

### **2.5 PEX TUBE AND FITTINGS**

A. PEX Distribution System:

1. Fittings for PEX Tube: ASTM F 1807, metal-insert type with copper or stainless-steel crimp rings and matching PEX tube dimensions.
2. Manifold: Multiple-outlet, plastic or corrosion-resistant-metal assembly complying with ASTM F 877; with plastic or corrosion-resistant-metal valve for each outlet.
3. Tubing: ASTM F 877, SDR 9 tubing.

B. Manufacturers:

1. Uponor
2. Watts Radiant
3. Zurn

### **2.6 PVC PIPE AND FITTINGS**

A. PVC Pipe: ASTM D 1785, Schedule 40 and Schedule 80.

1. PVC Socket Fittings: ASTM D 2466 for Schedule 40 and ASTM D 2467 for Schedule 80.

## 2.7 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.
- B. Metal, Pipe-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 general-duty brazing unless otherwise indicated.
- E. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493.
- F. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

## 2.8 SPECIALTY VALVES

- A. Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.
- B. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.
- C. CPVC Union Ball Valves:
  - 1. Description:
    - a. Standard: MSS SP-122.
    - b. Pressure Rating: 125 psig at 73 deg F.
    - c. Body Material: CPVC.
    - d. Body Design: Union type.
    - e. End Connections for Valves NPS 2 and Smaller: Detachable, socket.
    - f. End Connections for Valves NPS 2-1/2 to NPS 4: Flanged.
    - g. Ball: CPVC; full port.
    - h. Seals: PTFE or EPDM-rubber O-rings.
    - i. Handle: Tee shaped.
- D. CPVC Ball Check Valves:
  - 1. Description:
    - a. Pressure Rating: 125 psig at 73 deg F.
    - b. Body Material: CPVC.
    - c. Body Design: Union-type ball check.
    - d. End Connections for Valves NPS 2 and Smaller: Detachable, socket.
    - e. End Connections for Valves NPS 2-1/2 to NPS 4: Flanged.
    - f. Ball: CPVC.
    - g. Seals: EPDM- or FKM-rubber O-rings.

## **2.9 TRANSITION FITTINGS**

- A. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
- B. Sleeve-Type Transition Coupling: AWWA C219.
- C. Plastic-to-Metal Transition Fittings:
  - 1. Description: CPVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert and one solvent-cement-socket or threaded end.
- D. Plastic-to-Metal Transition Unions:
  - 1. Description: CPVC four-part union. Include brass threaded end, solvent-cement-joint plastic end, rubber O-ring, and union nut.

## **2.10 DIELECTRIC FITTINGS**

- A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature. Includes:
  - 1. Dielectric Unions:
  - 2. Dielectric Flanges:
  - 3. Dielectric-Flange Kits:
  - 4. Dielectric Couplings:
  - 5. Dielectric Nipples:

## **2.11 FLEXIBLE CONNECTORS**

- A. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
  - 1. Working-Pressure Rating: Minimum 200 psig.
  - 2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
  - 3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.
- B. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
  - 1. Working-Pressure Rating: Minimum 200 psig.
  - 2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.
  - 3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

## **2.12 SLEEVES**

- A. Cast-Iron Wall Pipes: Fabricated of cast iron, and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.



- B. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc-coated, with plain ends.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  - 1. Underdeck Clamp: Clamping ring with setscrews.

### **2.13 SLEEVE SEALS**

- A. Description: Modular sealing element unit, designed for field assembly, used to fill annular space between pipe and sleeve.
  - 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
  - 2. Pressure Plates: Carbon steel.
  - 3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating of length required to secure pressure plates to sealing elements.

### **2.14 GROUT**

- A. Standard: ASTM C 1107, 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, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

## **PART 3 - EXECUTION**

### **3.1 EARTHWORK**

- A. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

### **3.2 PIPING INSTALLATION**

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

- C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.
- D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages and Division 22 Section "Domestic Water Piping Specialties" for drain valves and strainers.
- E. Install shutoff valve immediately upstream of each dielectric fitting.
- F. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for pressure-reducing valves.
- G. Install domestic water piping level without pitch and plumb.
- H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- I. Install seismic restraints on piping. Comply with requirements in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.
- J. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- K. 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.
- L. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- M. Install piping adjacent to equipment and specialties to allow service and maintenance.
- N. Install piping to permit valve servicing.
- O. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
- P. Install piping free of sags and bends.
- Q. Install fittings for changes in direction and branch connections.
- R. Install PEX piping with loop at each change of direction of more than 90 degrees.
- S. Pex piping from manifold to stop valves to be of continuous lengths.
- T. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- U. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages.

- V. Install thermostats in hot-water circulation piping. Comply with requirements in Division 22 Section "Domestic Water Pumps" for thermostats.
- W. Install thermometers on outlet piping from each water heater. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers.

### **3.3 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 pipes, tubes, and fittings before assembly.
- C. 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.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- D. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Braze Joints" Chapter.
- E. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- F. Pressure-Sealed Joints: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.
- G. Copper-Tubing, Push-on Joints: Clean end of tube. Measure insertion depth with manufacturer's depth gage. Join copper tube and push-on-joint fittings by inserting tube to measured depth.
- H. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
  - 2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
  - 3. PVC Piping: Join according to ASTM D 2855.
- J. PEX Piping Joints: Not allowed.
- K. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

### **3.4 VALVE INSTALLATION**

- A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.
- B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball valves for piping NPS 2 and smaller. Use butterfly valves for piping NPS 2-1/2 and larger.
- C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."
  - 1. Hose-End Drain Valves: At low points in water mains, risers, and branches.
  - 2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.
- D. Install balancing valve in each hot-water circulation return branch and discharge side of each pump and circulator. Set balancing valves partly open to restrict but not stop flow. Use ball valves for piping NPS 2 and smaller and butterfly valves for piping NPS 2-1/2 and larger. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves.

### **3.5 TRANSITION FITTING INSTALLATION**

- A. Install transition couplings at joints of dissimilar piping.
- B. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

### **3.6 DIELECTRIC FITTING INSTALLATION**

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings, couplings or nipples, or nipples unions.
- C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.
- D. Dielectric Fittings for NPS 5 to NPS 6: Use dielectric flange kits.

### **3.7 WATER METER INSTALLATION**

- A. Rough-in domestic water piping for water meter installation, and install water meters according to utility company's requirements.
- B. Water meters will be furnished by utility company.
- C. Install water meters according to AWWA M6, utility company's requirements, and the following:
- D. Install valve on water-meter outlet and valved bypass around meter unless prohibited by authorities having jurisdiction.

### 3.8 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.
- B. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.
  - 1. Vertical Piping: MSS Type 8 or 42, clamps.
  - 2. Individual, Straight, Horizontal Piping Runs:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
  - 3. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
  - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
  - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
  - 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
  - 5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
  - 6. NPS 6: 10 feet with 5/8-inch rod.
- F. Install supports for vertical copper tubing every 10 feet.
- G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
  - 2. NPS 1-1/2: 108 inches with 3/8-inch rod.
  - 3. NPS 2: 10 feet with 3/8-inch rod.
  - 4. NPS 2-1/2: 11 feet with 1/2-inch rod.
  - 5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
  - 6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
  - 7. NPS 6: 12 feet with 3/4-inch rod.
- H. Install supports for vertical steel piping every 15 feet.
- I. Install vinyl-coated hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1 and Smaller: 36 inches with 3/8-inch rod.
  - 2. NPS 1-1/4 to NPS 2: 48 inches with 3/8-inch rod.
- J. Install supports for vertical CPVC piping every 60 inches for NPS 1 and smaller, and every 72 inches for NPS 1-1/4 and larger.

- K. Install vinyl-coated hangers for PEX piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1 and Smaller: 32 inches with 3/8-inch rod.
- L. Install hangers for vertical PEX piping every 48 inches.
- M. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

### **3.9 CONNECTIONS**

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
  - 1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
  - 2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.
  - 3. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

### **3.10 ESCUTCHEON INSTALLATION**

- A. Install escutcheons for penetrations of walls, ceilings, and floors.
- B. Escutcheons for New Piping:
  - 1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
  - 2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.
  - 3. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.
  - 4. Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish.
  - 5. Bare Piping in Equipment Rooms: One piece, cast brass.
  - 6. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.
- C. Escutcheons for Existing Piping:
  - 1. Chrome-Plated Piping: Split casting, cast brass with chrome-plated finish.
  - 2. Insulated Piping: Split plate, stamped steel with concealed hinge and spring clips.

3. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish.
4. Bare Piping at Ceiling Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish.
5. Bare Piping in Unfinished Service Spaces: Split casting, cast brass with polished chrome-plated finish.
6. Bare Piping in Equipment Rooms: Split casting, cast brass.
7. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting floor plate.

### **3.11 SLEEVE INSTALLATION**

- A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
- B. Permanent sleeves are not required for holes formed by removable PE sleeves.
- C. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.
- D. Install sleeves in new partitions, slabs, and walls as they are built.
- E. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.
- F. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.
- G. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using sleeve seals specified in this Section.
- H. Seal space outside of sleeves in concrete slabs and walls with grout.
- I. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.
- J. Install sleeve materials according to the following applications:
  1. Sleeves for Piping Passing through Concrete Floor Slabs: Steel pipe.
  2. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Steel pipe.
    - a. Extend sleeves 2 inches above finished floor level.
    - b. For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
  3. Sleeves for Piping Passing through Gypsum-Board Partitions:
    - a. PVC pipe or Steel pipe sleeves for pipes smaller than NPS 6.
    - b. Galvanized-steel sheet sleeves for pipes NPS 6 and larger.

- c. Exception: Sleeves are not required for water supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
- 4. Sleeves for Piping Passing through Concrete Roof Slabs: Steel pipe.
- 5. Sleeves for Piping Passing through Exterior Concrete Walls:
  - a. Steel pipe sleeves for pipes smaller than NPS 6.
  - b. Cast-iron wall pipe sleeves for pipes NPS 6 and larger.
  - c. Install sleeves that are large enough to provide 1-inch annular clear space between sleeve and pipe or pipe insulation when sleeve seals are used.
- K. 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 in Division 07 Section "Penetration Firestopping" for firestop materials and installations.

### **3.12 SLEEVE SEAL INSTALLATION**

- A. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.
- B. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### **3.13 IDENTIFICATION**

- A. Identify system components.
- B. Label pressure piping with system operating pressure.

### **3.14 FIELD QUALITY CONTROL**

- A. Perform tests and inspections.
- B. Piping Inspections:
  - 1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
  - 2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
    - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
  - 3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
  - 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.



C. Piping Tests:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and for corrective action required.

D. Domestic water piping will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

### 3.15 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
  - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
  - b. Fill and isolate system according to either of the following:
    - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
    - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
  - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
  - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

### **3.16 PIPING SCHEDULE**

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Under-building-slab, domestic water, building service piping, NPS 3 and smaller, shall be one of the following:
  - 1. Soft copper tube, ASTM B 88, Type K; wrought-copper solder-joint fittings; and brazed joints.
  - 2. PVC, Schedule 80 pipe; PVC, Schedule 80 socket fittings; and solvent-cemented joints.
- D. Under-building-slab, domestic water piping, NPS 2 and smaller, shall be one of the following:
  - 1. Hard copper tube, ASTM B 88, Type L; wrought-copper solder-joint fittings; and brazed joints.
  - 2. PVC, Schedule 80 pipe; PVC, Schedule 80 socket fittings; and solvent-cemented joints.
- E. Aboveground domestic water piping, NPS 2 and smaller, shall be one of the following:
  - 1. Hard copper tube, ASTM B 88, Type L; cast- or wrought- copper solder-joint fittings; and soldered joints.
  - 2. Hard copper tube, ASTM B 88, Type L; copper pressure-seal-joint fittings; and pressure-sealed joints.
- F. Aboveground domestic water piping, NPS 2-1/2 to NPS 4, shall be one of the following:
  - 1. Hard copper tube, ASTM B 88, Type L; cast- or wrought- copper solder-joint fittings; and soldered joints.
  - 2. Hard copper tube, ASTM B 88, Type L; copper pressure-seal-joint fittings; and pressure-sealed joints.

### **3.17 VALVE SCHEDULE**

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  - 1. Shutoff Duty: Use ball valves for piping NPS 2 and smaller. Use butterfly, ball, valves with flanged ends for piping NPS 2-1/2 and larger.
  - 2. Throttling Duty: Use ball valves for piping NPS 2 and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 and larger.
  - 3. Hot-Water Circulation Piping, Balancing Duty: Memory-stop balancing valves.
  - 4. Drain Duty: Hose-end drain valves.
- B. Use check valves to maintain correct direction of domestic water flow to and from equipment.
- C. Iron grooved-end valves may be used with grooved-end piping.
- D. CPVC valves matching piping materials may be used.

**END OF SECTION 221116**

## **SECTION 221316 - SANITARY WASTE AND VENT PIPING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes the following soil and waste, sanitary drainage and vent piping inside the building:
  - 1. Pipe, tube, and fittings.
  - 2. Special pipe fittings.

#### **1.2 PERFORMANCE REQUIREMENTS**

- A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:
  - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

#### **1.3 SUBMITTALS**

- A. Field quality-control inspection and test reports.

#### **1.4 QUALITY ASSURANCE**

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; and "NSF-drain" for plastic drain piping.

### **PART 2 - PRODUCTS**

#### **2.1 PIPING MATERIALS**

- A. Hub-and-Spigot, Cast-Iron Pipe and Fittings: ASTM A 74, Service class.
  - 1. Gaskets: ASTM C 564, rubber.
- B. Hubless Cast-Iron Pipe and Fittings: ASTM A 888 or CISPI 301.
  - 1. Solvent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.
  - 2. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.

- a. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.
  - b. Heavy-Duty, Shielded, Stainless-Steel Couplings: With stainless-steel shield, stainless-steel bands and tightening devices, and ASTM C 564, rubber sleeve.
- C. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.
  - 1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought-copper, solder-joint fittings.
- D. Solid-Wall ABS Pipe: ASTM D 2661, Schedule 40, solid wall.
  - 1. ABS Socket Fittings: ASTM D 2661, made to ASTM D 3311, drain, waste, and vent patterns.
- E. Solid-Wall PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.
  - 1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.
- F. Trap Primer Water Supply Piping
  - 1. All lines identified as trap primer piping on plans, or required by the schedule, shall be ½" PEX tubing meeting ASTM 876 and 877. PEX tubing shall be rated for continuous operation at 100psi and 180°F and shall be dimensionally consistent with SDR-9 piping.
  - 2. Trap primer piping shall be continuous without splices and shall be sloped continuously towards the waste fitting connection. Provide support as required to prevent sagging and displacement during concrete operations.

## **PART 3 - EXECUTION**

### **3.1 PIPING APPLICATIONS**

- A. Special pipe fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.
- B. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.
- C. Aboveground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
  - 1. Service class, hub-and-spigot, cast-iron soil pipe and fittings; gaskets; and compression joints.
  - 2. Hubless cast-iron soil pipe and fittings and solvent stack fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.
  - 3. Copper DWV tube, copper drainage fittings, and soldered joints.
- D. Aboveground, soil, waste, and vent piping NPS 5 and larger shall be any of the following:
  - 1. Service class, cast-iron soil pipe and fittings; gaskets; and compression joints.
  - 2. Hubless cast-iron soil pipe and fittings and solvent stack fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.
  - 3. Steel pipe, drainage fittings, and threaded joints.

4. Copper DWV tube, copper drainage fittings, and soldered joints.
- E. Underground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
1. Service class, hub-and-spigot, cast-iron soil pipe and fittings; gaskets; and compression joints.
  2. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.
  3. Solid-wall ABS pipe, ABS socket fittings, and solvent-cemented joints.
  4. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
- F. Underground, soil and waste Piping NPS 5 and larger shall be any of the following:
1. Service class, cast-iron soil pipe and fittings; gaskets; and compression joints.
  2. Hubless cast-iron soil pipe and fittings; standard, heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
  3. ABS pipe, ABS socket fittings, and solvent-cemented joints.
  4. Solid-wall ABS pipe, ABS socket fittings, and solvent-cemented joints.
  5. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

### **3.2 PIPING INSTALLATION**

- A. Sanitary sewer piping outside the building is specified in Division 22 Section "Facility Sanitary Sewers."
- B. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- C. Install cleanouts at grade at building exit and extend to where building sanitary drains connect to building sanitary sewers. Coordinate with site contractor.
- D. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."
- E. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- F. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- G. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

- H. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
  - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
  - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
  - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- I. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- J. Install ABS soil and waste drainage and vent piping according to ASTM D 2661.
- K. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
- L. Install underground ABS and PVC soil and waste drainage piping according to ASTM D 2321.
- M. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

### **3.3 JOINT CONSTRUCTION**

- A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
  - 1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.
  - 2. Hubless Joints: Make with rubber gasket and sleeve or clamp.
- C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- D. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

### **3.4 VALVE INSTALLATION**

- A. Backwater Valves: Install backwater valves in piping subject to sewage backflow.
  - 1. Horizontal Piping: Horizontal backwater valves. Use normally closed type, unless otherwise indicated.
  - 2. Floor Drains: Drain outlet backwater valves, unless drain has integral backwater valve.
  - 3. Install backwater valves in accessible locations.
  - 4. Backwater valves are specified in Division 22 Section "Sanitary Waste Piping Specialties."

### **3.5 HANGER AND SUPPORT INSTALLATION**

- A. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."

- B. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:
1. Vertical Piping: MSS Type 8 or Type 42, clamps.
  2. Individual, Straight, Horizontal Piping Runs: According to the following:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    - c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
  3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
  4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
  2. NPS 3: 60 inches with 1/2-inch rod.
  3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
  4. NPS 6: 60 inches with 3/4-inch rod.
  5. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- G. Install supports for vertical cast-iron soil piping every 15 feet.
- H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/4: 84 inches with 3/8-inch rod.
  2. NPS 1-1/2: 108 inches with 3/8-inch rod.
  3. NPS 2: 10 feet with 3/8-inch rod.
  4. NPS 2-1/2: 11 feet with 1/2-inch rod.
  5. NPS 3: 12 feet with 1/2-inch rod.
  6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
  7. NPS 6: 12 feet with 3/4-inch rod.
- I. Install supports for vertical steel piping every 15 feet.
- J. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/4: 72 inches with 3/8-inch rod.
  2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
  3. NPS 2-1/2: 108 inches with 1/2-inch rod.
  4. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
  5. NPS 6: 10 feet with 5/8-inch rod.

- K. Install supports for vertical copper tubing every 10 feet.
- L. Install hangers for ABS and PVC piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
  - 2. NPS 3: 48 inches with 1/2-inch rod.
  - 3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
  - 4. NPS 6: 48 inches with 3/4-inch rod.
- M. Install supports for vertical ABS and PVC piping every 48 inches.
- N. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

### **3.6 CONNECTIONS**

- A. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- B. Connect drainage and vent piping to the following:
  - 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Sanitary Waste Piping Specialties."
  - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
  - 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Sanitary Waste Piping Specialties."
  - 4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

### **3.7 FIELD QUALITY CONTROL**

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
  - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
  - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.
  - 1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.



2. Prepare reports for tests and required corrective action.

### **3.8 CLEANING**

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

### **3.9 PROTECTION**

- A. Exposed ABS and PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

**END OF SECTION 221316**

## SECTION 223400 - FUEL-FIRED, DOMESTIC-WATER HEATERS

### 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. Commercial, gas-fired, high-efficiency, storage, domestic-water heaters.
  - 2. Domestic-water heater accessories.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings:
  - 1. Include diagrams for power, signal, and control wiring.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Equipment room drawing or BIM model, drawn to scale, on which the items described in this Section are shown and coordinated with all building trades.
- B. Seismic Qualification Data: Certificates, for fuel-fired, domestic-water heaters, accessories, and components, from manufacturer.
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Product Certificates: For each type of commercial, gas-fired domestic-water heater.
- D. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

## 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fuel-fired, domestic-water heaters to include in emergency, operation, and maintenance manuals.

## 1.6 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

## 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including storage tank and supports.
    - b. Faulty operation of controls.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
  - 2. Warranty Periods: From date of Substantial Completion.
    - a. Commercial, Gas-Fired, Storage, Domestic-Water Heaters:
      - 1) Storage Tank: five years.
      - 2) Controls and Other Components: 1 year.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and use.
- B. ASHRAE/IES Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IES 90.1.
- C. ASME Compliance:
  - 1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
  - 2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.

- D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 and NSF 372.

## 2.2 COMMERCIAL, GAS-FIRED, STORAGE, DOMESTIC-WATER HEATERS

### A. Commercial, Gas-Fired, High-Efficiency, Storage, Domestic-Water Heaters:

1. Standard: ANSI Z21.10.3/CSA 4.3.
2. Description: Manufacturer's proprietary design to provide at least **95** percent combustion efficiency at optimum operating conditions.
3. Storage-Tank Construction: ASME-code steel with **150-psig** minimum working-pressure rating.
  - a. Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
    - 1) **NPS 2** and Smaller: Threaded ends in accordance with ASME B1.20.1.
  - b. Interior Finish: Comply with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
  - c. Lining: Comply with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
4. Factory-Installed, Storage-Tank Appurtenances:
  - a. Anode Rod: Replaceable magnesium.
  - b. Dip Tube: Required unless cold-water inlet is near bottom of tank.
  - c. Drain Valve: Corrosion-resistant metal with hose-end connection.
  - d. Insulation: Comply with ASHRAE/IES 90.1. Surround entire storage tank except connections and controls.
  - e. Jacket: Steel with enameled finish.
  - f. Burner or Heat Exchanger: Comply with UL 795 or approved testing agency requirements for gas-fired, high-efficiency, domestic-water heaters and natural-gas fuel.
  - g. Temperature Control: Adjustable thermostat.
  - h. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
  - i. Combination Temperature-and-Pressure Relief Valves: ANSI Z21.22/CSA 4.4. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of domestic-water heater. Select one relief valve with sensing element that extends into storage tank.

## 2.3 DOMESTIC-WATER HEATER ACCESSORIES

### A. Domestic-Water Expansion Tanks:

1. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
2. Construction:
  - a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
  - b. Interior Finish: Comply with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
  - c. Air-Charging Valve: Factory installed.
- B. Drain Pans: Corrosion-resistant metal with raised edge. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than **NPS 3/4** with ASME B1.20.1 pipe threads.
- C. Piping-Type Heat Traps: Field-fabricated piping arrangement in accordance with ASHRAE/IES 90.1.
- D. Heat-Trap Fittings: ASHRAE 90.2.
- E. Comply with requirements for ball-, butterfly-, or gate-type shutoff valves specified in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."
  1. Comply with requirements for balancing valves specified in Section 221119 "Domestic Water Piping Specialties."
- F. Gas Shutoff Valves: ANSI Z21.15/CSA 9.1, manually operated. Furnish for installation in piping.
- G. Combination Temperature-and-Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of domestic-water heater. Select relief valves with sensing element that extends into storage tank.
  1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4.
- H. Pressure Relief Valves: Include pressure setting less than working-pressure rating of domestic-water heater.
  1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4.
- I. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.
- J. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Provide dimension that will support bottom of domestic-water heater minimum of **18 inches** above the floor.

## 2.4 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect assembled domestic-water heaters specified to be ASME-code construction, in accordance with ASME Boiler and Pressure Vessel Code.
- B. Hydrostatically test commercial domestic-water heaters and storage tanks to minimum of one and one-half times pressure rating before shipment.
- C. Domestic-water heaters will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 DOMESTIC-WATER HEATER INSTALLATION

- A. Commercial, Domestic-Water Heater Mounting: Install commercial domestic-water heaters on concrete base. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."
  - 1. Exception: Omit concrete bases for commercial domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
  - 2. Maintain manufacturer's recommended clearances.
  - 3. Arrange units so controls and devices that require servicing are accessible.
  - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
  - 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
  - 6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 7. Install anchor bolts to elevations required for proper attachment to supported equipment.
  - 8. Anchor domestic-water heaters to substrate.
- B. Install domestic-water heaters level and plumb, in accordance with layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
  - 1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."
- C. Install gas-fired, domestic-water heaters in accordance with NFPA 54.
  - 1. Install gas shutoff valves on gas supply piping to gas-fired, domestic-water heaters without shutoff valves.

2. Install gas pressure regulators on gas supplies to gas-fired, domestic-water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
  3. Install automatic gas valves on gas supplies to gas-fired, domestic-water heaters if required for operation of safety control.
  4. Comply with requirements for gas shutoff valves, gas pressure regulators, and automatic gas valves specified in Section 231123 "Facility Natural-Gas Piping."
- D. Install commercial domestic-water heaters with seismic-restraint devices.
  - E. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend domestic-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
  - F. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for domestic-water heaters that do not have tank drains.
  - G. Install thermometer on outlet piping of domestic-water heaters.
  - H. Install piping-type heat traps on inlet and outlet piping of domestic-water heater storage tanks without integral or fitting-type heat traps.
  - I. Fill domestic-water heaters with water.
  - J. Charge domestic-water expansion tanks with air to required system pressure.
  - K. Install dielectric fittings in all locations where piping of dissimilar metals is to be joined. The wetted surface of the dielectric fitting contacted by potable water shall contain less than 0.25 percent of lead by weight.

### 3.2 PIPING CONNECTIONS

- A. Comply with requirements for domestic-water piping specified in Section 221116 "Domestic Water Piping."
- B. Comply with requirements for fuel-oil piping specified in Section 231113 "Facility Fuel-Oil Piping."
- C. Comply with requirements for gas piping specified in Section 231123 "Facility Natural-Gas Piping."
- D. Drawings indicate general arrangement of piping, fittings, and specialties.
- E. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

### 3.3 IDENTIFICATION

- A. Identify system components.

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- D. Perform tests and inspections
- E. 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 operation.
  - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- F. Domestic-water heaters will be considered defective if they do not pass tests and inspections.
- G. Prepare test and inspection reports.

END OF SECTION 223400



## **SECTION 230000 - GENERAL PROVISIONS FOR MECHANICAL WORK**

### **PART 1 - GENERAL**

#### **1.1 ALTERNATES**

- A. Take cognizance of any change required in this work which may be a direct result of any alternate bid item listed and include the price deemed necessary to meet the requirements of the respective alternate.

#### **1.2 BIDDING**

- A. The Contractor shall provide labor, materials, equipment, items, articles, operations and methods listed, shown, scheduled, or mentioned on the drawings, and/or specified, including all incidentals required for their completion.
- B. The Contractor shall refer to the General part of these specifications, such as Instructions to Bidders, Special Conditions and DIVISION 1 for restrictions covering time that work can be performed in certain areas, noisy and dusty operations, sequence of work, access to restricted areas and similar types of work and operations.

#### **1.3 SUBSTITUTIONS**

- A. Most items in this Division are eligible for substitution in accordance with the General Conditions and Supplements thereto. Where a proprietary specification is written for a particular item, then only that item may be used.
- B. When the Engineer deems it necessary, to assure satisfactory installation and compatibility with other equipment, piping, ductwork, electrical provisions and other appurtenances, the Contractor shall prepare scale drawings of the substitute item showing proposed location, connections, relation to other equipment and other pertinent data such as maintenance space requirements, electrical requirements, height and weight. Drawings must receive Engineer's approval before the substitution is made.
- C. It is the Contractor's responsibility that the substitute item shall fit into the space allocated and that the item can be installed and function as intended. Should changes in the work of any Contractor become necessary as a result of any substitute item under this Division, such changes shall be arranged and paid for by this Contractor.
- D. Capacities of substitute items shall not be less than that of the specified item.
- E. The performance of the factory representative and supplier on past work will be a consideration in the approval process of substitute items.
- F. The final decision as to acceptability rests with the Engineer.

#### **1.4 CODES, REGULATIONS AND PERMITS**

- A. All materials and equipment shall be new, approved by the governing authority, and be in new, undamaged condition when installed.
- B. Comply with the 2019 California Plumbing Code, the 2019 California Mechanical Code, the 2019 California Building Code, the 2019 California Fire Code, and 2019 California Green Building Standards Code, and the 2019 California Energy Code. Comply with DIVISION 16 and all codes referenced therein for any and all electrical work

accomplished under this Division or by this Contractor.

- C. Arrange for and obtain all permits and approvals required for the execution of the work.

#### **1.5 INTENT OF DRAWINGS**

- A. Pipe or duct risers and other diagrams are schematic only and not to scale. They are intended only to indicate sizes or relative arrangement of pipe and equipment shown elsewhere in plan view.
- B. Some items defined in these specifications may not actually be required in this work scope. This fact does not render the remaining specifications null, nor does it relieve the contractor from complying with these specifications as they apply to the work defined in the project documents.

#### **1.6 WORKMANSHIP**

- A. Work shall be accomplished by workmen skilled in the particular trade, in conformance with best practices and to meet all applicable codes.
- B. This Contractor shall replace materials or equipment not properly installed or finished, without increase in payment received.

#### **1.7 RESPONSIBILITY**

- A. The Contractor is responsible for installation of a satisfactory and complete piece of work in accordance with true intent of the drawings and specifications.
- B. Consult all drawings for the project to predetermine that the work and equipment will fit as planned.
- C. The location of piping, ducts, equipment, etc., shall be checked to ensure clearance from openings, structural members, cabinets, lights, outlets, and equipment having fixed locations. This shall be accomplished prior to fabrication of pipe or ducts.
- D. If, at any time, and in any case, changes in location of piping, ducts, equipment, etc., becomes necessary due to existing obstacles or installation of other trades shown on any of the project drawings and such conflict could have been avoided by proper coordination between trades or proper pre-planning of work, such required changes shall be made by the Contractor at no extra cost. These changes are to be recorded on the record drawings.
- E. This Contractor is responsible to provide all incidental electrical interconnections, control wiring, etc., which are necessary for system completion and which are not specifically shown or otherwise indicated on the electrical drawings or specified in DIVISION 26.
- F. All electrical work incidental to or accomplished under this Division shall comply with all requirements of DIVISION 26.

#### **1.8 WARRANTY**

- A. Contractor shall guarantee the installation under his scope of work free from defects of workmanship and materials for a period of one year after the date of substantial completion and promptly remedy any defects developing during this period without

charge. Contractor must assume responsibility for all expenses incurred to repair or replace his work as well as work of other trades that may be affected by this replacement.

- B. Under certain circumstances, phasing will require particular pieces of equipment to be started up prior to the Substantial Completion Date. Contractor to assume responsibility for operation of this equipment and be cognizant warranty to owner shall still be provided for the full one-year duration after Substantial Completion.

## **1.9 DELIVERY AND STORAGE OF MATERIALS**

- A. Make provisions for introduction into the building of equipment furnished under this Division. Refer to DIVISION I for additional provisions to allow equipment passage into the building.
- B. All materials shall be protected from damage and from weather. Cover, enclose and protect all stored materials and preserve in new, clean condition. Keep all openings in pipe, ductwork and equipment closed with caps and covers. All materials shall be elevated above the ground or floor during storage.
- C. All materials and products installed shall be new and shall be in new and undamaged condition. Materials that are rusted, weathered or otherwise depleted in condition shall not be installed.

## **1.10 MANUFACTURER'S DIRECTIONS**

- A. Manufactured materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer unless noted otherwise herein or on the drawings.
- B. Certain items of equipment, as noted herein, shall be checked out, started and put into service by factory representatives.

## **1.11 CUTTING, PATCHING, REPAIRING**

- A. Cutting, patching and repairing required by the work of this Division shall be the responsibility of this Contractor.
- B. Work shall be performed in accordance with DIVISION 1 of these specifications.
- C. The performance of this work shall not weaken the structural integrity of the building.
- D. Any abrasion or disfigurement of the finished work or any portion of the building where any such abrasion or disfigurement is caused by the activities of the Contractor shall be repaired and neatly refinished to match the adjacent work.

## **1.12 OPENINGS IN DUCTS**

- A. Openings in ducts shall be kept closed during progress of work.
- B. The Contractor is required to clean new systems found dirty to the satisfaction of the Engineer at no additional cost.

## **1.13 CLEANUP**

- A. Upon completion of work, remove materials, scraps, etc., relative to this work and leave the premises in a clean and orderly condition. This applies equally to finished, unfinished and concealed spaces.
- B. Clean equipment of dirt and debris.

#### **1.14 SAMPLES**

- A. The Contractor shall submit actual production samples on any material or equipment requested if, in the Engineer's opinion, it is necessary in order to determine the quality, workmanship, operation, etc. of the item.
- B. Samples will be returned to the Contractor. Approved samples may be used on the job.
- C. Costs incurred in providing and returning samples will be the responsibility of the Contractor.

#### **1.15 TEMPORARY SERVICES**

- A. See DIVISION 1 - GENERAL REQUIREMENTS for Temporary Facilities.

#### **1.16 FIRE PROTECTION**

- A. Metallic pipe, duct and other penetrations of all fire partitions, walls and floors shall be effectively fire-stopped to equal the fire rating of the floor or partition using materials and methods UL approved and tested to meet all conditions of ASTM E119, UL 1479 and ASTM E 814 tests. One such material is Carborundum bulk "Fiberfrax" fiber packing for filling the annular space between pipe and sleeve or hole and Fiberfrax LDS moldable caulking for sealing in the fiber packing. Other acceptable materials are Dow Corning 3-6548 Silicon RTV foam firestop system, General Electric 'Pensil' 851 system or U.S.G. fire code compound and Thermafire.
- B. PVC pipe, duct penetrations to be fire stopped same as metallic penetrations with the addition of an intumescent wrap to effectively close the hole if PVC vaporizes.
- C. Construction of permanent bracing, framing, roof curbs and platforms or other structures which utilize wood construction shall be fabricated from fire resistant treated materials or shall be otherwise protected by approved fire resistant materials.

#### **1.17 ACCESS DOORS**

- A. Where access to valves, dampers, equipment, etc. is required, provide Inryco/Milcor Type "K", "DW", or "M" doors. Access doors required in fire-rated walls or ceilings shall be U.L. approved, similar and equal to Ruskin #APW1. Size of door shall be sufficient to provide proper access to item, if size is not listed on the drawings.

#### **1.18 COMPLETION AND TESTS**

- A. Complete and test each system as specified. Submit all reports and complete the Project Completion Checklist in PART 3 of this Section. Leave all systems in proper operation.
- B. At the time of finalizing the project, a demonstration of all systems shall be performed in the presence of the Owner's designated representative. The Contractor shall demonstrate that the systems perform in the manner described in the specifications and indicated on the drawings.

## **1.19 OPERATING INSTRUCTIONS**

- A. The Contractor shall provide qualified personnel to instruct the Owner's maintenance personnel in the operation and maintenance of all the new systems and equipment. In general, the installer of the system may give these instructions. However, some equipment or systems require instruction be given by an authorized agent of the supplier or manufacturer. See the individual Sections of this Division for specific training requirements.
- B. Written operation and maintenance instructions, as produced by the manufacturer, shall be provided for all equipment. These instructions shall be bound and submitted as described in this Section.

## **1.21 RECORD DRAWINGS**

- A. A separate set of mechanical drawings shall be maintained at the job site at all times and shall be used as record drawings. This set shall be kept up to date with all changes and/or additions in the construction and/or mechanical systems, and shall be delivered to the Engineer at the completion of this job. This set of drawings shall be kept clean and protected at all times.

## **PART 2 SUBMITTALS AND BROCHURES OF EQUIPMENT**

### **2.1 GENERAL**

- A. The literature required to be submitted and approved in order to fulfill the requirements of this Division falls into two general categories. These are the "Brochures of Equipment" and "Submittals."
- B. "Submittals" is a general term for informational literature that must be supplied to and approved by the Contractor and the Engineer prior to installing, receiving, or in some instances, even ordering equipment. The normal required types of submittals include shop drawings, manufacturer's literature, installation and operation instructions (from the manufacturer) and wiring diagrams. System reports, such as start-up reports or balancing reports, and the project completion checklist are two forms of submittals that are required after the equipment has been installed and is operational
- C. Brochures of Equipment are booklets assembled by the contractor that contain operation, maintenance and repair literature for all equipment installed under the requirements of the project. They will be used by the Owner's personnel as the primary source of information for operating and maintaining the installed systems. As such, they shall exhibit a professional quality, high degree of clarity and durability that will allow their use throughout the useful life of the installed system.

### **2.2 SUBMITTALS**

- A. The contractor shall procure all manufacturer's literature and produce or have produced, all drawings, calculations or other data as required by either the Submittal Schedule contained in this Section or as specifically called out in the individual Sections of this Division.
- B. Submittal materials shall be complete in every respect and shall clearly indicate equipment features, dimensions, weights, performance characteristics and capacities. Capacity and performance calculations shall be adjusted to indicate actual equipment performance at

the project elevation. Literature or drawings that describe more than one model or size of equipment shall be marked with arrows or otherwise clearly inscribed to identify the actual equipment that will be furnished. All options and special parts of features shall also be clearly identified. All submitted materials must be clear, complete and legible. Copies or duplications of poor quality will not be reviewed or accepted.

- C. Where specified or otherwise required, proof of equipment compliance with standards or listings by specific agencies (e.g. AGA, ASME, etc.) shall be included in submittal material.
- D. Submittals for all equipment shall be routed through and reviewed by the Contractor. The Contractor shall check all submittals for adequate identification, number of copies, correctness and compliance with contract drawings and specifications and apply his stamp of approval.
- E. Submittals may be accepted or rejected by the Engineer in their entirety. Upon rejection of any entire submittal, the entire submittal package shall be resubmitted. No partial approval will be granted for any equipment that is a part of a submittal which has been rejected in its entirety.
- F. If the Engineer "Rejects" or asks for "Revise and Resubmit" for any individual item in a particular submittal, then just that individual item shall be re-submitted by the Contractor.
- G. Individual submittals may include data for more than one piece of equipment. However, submittal data for equipment specified in different sections of specifications shall not be included in the same submittal package. For example, submittal data for plumbing fixtures specified in Section 224000 shall not be included in the same submittal package as data for pipe hangers as specified in Section 220529.
- H. Submittals shall be electronic pdf format.
- I. Approval of submittals by the Engineer shall not relieve the Contractor from responsibility for deviations from drawings or specifications, nor shall it relieve him from responsibility for errors in shop drawings or other submittal literature.

**2.3 SUBMITTAL SCHEDULE**

- A. The following is an index of the Sections of this Division and a schedule of the submittal data required for each Section. Items marked "c" under each heading for the various submittal forms shall be submitted to the Contractor for review and approval. Items marked "c" and "e" are to be forwarded to the Engineer for review and approval after the Contractor has affixed his approval. All marked items shall be included in the Brochures of Equipment whether or not they require initial forwarding to the Engineer. All submittal literature appearing in the Brochures of Equipment shall be stamped or marked as approved by the Contractor.
- B. All submittals required by the schedule shall be checked, revised as necessary, and approved by the Contractor. Submittals, which are required to be forwarded to the Engineer, shall first be reviewed and approved by the Contractor.
- C. Submit any additional materials, not found on the Submittal Schedule, as required by the contract drawings or individual Sections of this Division of contract specifications.

Section	Title	Shop Dwg.	Mfr. Lit.	Install Oper. Book	Wiring Diag.
230593	TESTING, ADJUSTING, AND BALANCING FOR HVAC		ce		

230700	HVAC INSULATION					ce
230993	SEQUENCE OF OPERATIONS FOR HVAC CONTROLS				c	
232113	HYDRONIC PIPING	ce	ce	c		ce ce ce
233113	METAL DUCTS	ce	ce			
233300	AIR DUCT ACCESSORIES	ce	ce	c		ce ce
233423	HVAC POWER VENTILATORS	ce	ce	c		ce ce
233600	AIR TERMINAL UNITS	ce	ce	c		ce
233713	DIFFUSERS, REGISTERS, AND GRILLES	ce	ce			
238323	RADIANT-HEATING ELECTRIC PANELS	ce	ce	c		ce

**2.4 BROCHURES OF EQUIPMENT**

- A. The Contractor shall electronically prepare and submit complete Brochures of Equipment. Each shall contain all required submittal data for the construction materials and each piece of equipment installed under this project. The literature required for submittal purposes shall be expanded to include operation and maintenance literature for each piece of equipment. Maintenance information shall be complete in every respect and shall include parts lists and assembly drawings wherever applicable.
- B. Authorization for final payment shall not be made prior to final acceptance of the Brochures of Equipment.

**PART III PROJECT CLOSEOUT**

**3.1 COMPLETION CHECKLIST**

- A. The following checklist shall be completed by contractor and submitted to A/E before final site visitation or job acceptance is made.
- B. Refer to each specific specification section listed for a more complete description of listed test requirements.

**MECHANICAL:**

SPEC. ITEM SECTION	DATE	CORRECTED OR COMPLETED BY (NAME OR INITIALS)
230000 Demonstrate to owner that all systems are functioning properly.	_____	_____
230000 Provide record drawings.	_____	_____
230000 Provide Brochures of Equipment.	_____	_____
230593 Provide air balance test report.	_____	_____
230593 Provide water balance test report.	_____	_____
230900 Test temperature controls and instruct owner's personnel.	_____	_____
233113 Test, balance & clean low pressure duct.	_____	_____
233113 Test, balance & clean medium & high pressure duct system.	_____	_____
233600 Test & balance air terminal units. owner's personnel.	_____	_____

Job Name: \_\_\_\_\_

Location: \_\_\_\_\_

DC Job#: \_\_\_\_\_

Contractor: \_\_\_\_\_

Submitted by: \_\_\_\_\_  
Name Date





**PART 4 – SUBSTITUTION REQUEST**

**4.1 SUBSTITUTION REQUEST FORM**

- A. The following Substitution Request Form shall be completed by Contractor and submitted to A/E for review of equipment or materials prior to bid as defined in sub-section 1.3 of Section 230000.
- B. Review of the substitution request form is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for: dimensions which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of their work with that of all other trades, and the satisfactory performance of the work.

PROJECT: \_\_\_\_\_

SPECIFIED ITEM: \_\_\_\_\_

PROPOSED SUBSTITUTION: \_\_\_\_\_

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified. Attached data also includes a description of changes to Contract Documents that the proposed substitution will require for its proper installation.

The undersigned certifies that the following paragraphs, unless modified by attachments, are correct:

- 1. The proposed substitution does not affect dimensions shown on Drawings.
- 2. The undersigned will pay for changes to the project design, including engineering design, detailing and construction costs caused by the requested substitution.
- 3. The proposed substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.
- 4. Maintenance and service parts will be locally available for the proposed substitution.
- 5. The undersigned further certifies that the performance, capacity, function, appearance and quality of the proposed substitution are equivalent or superior to the specified item.

The undersigned agrees that, if this page is reproduced, the terms and conditions for substitutions found in the Bidding Documents apply to this request.

Submitted by:

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Firm Name

\_\_\_\_\_  
Address

\_\_\_\_\_  
City, State, Zip

\_\_\_\_\_  
Date

\_\_\_\_\_  
Telephone                      Fax

\_\_\_\_\_  
General Contractor (if after award of contract)

For use by the A/E	
<input type="checkbox"/> No Exception Taken	<input type="checkbox"/> Exception Taken, Revise as noted.
<input type="checkbox"/> Request Denied	<input type="checkbox"/> Document not submitted per the Contract Documents
By _____	
Date _____	
Remarks _____	

**END OF SECTION 230000**

## **SECTION 230500 - COMMON WORK RESULTS FOR HVAC**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes the following:
  - 1. Piping materials and installation instructions common to most piping systems.
  - 2. Dielectric fittings.
  - 3. Mechanical sleeve seals.
  - 4. Sleeves.
  - 5. Escutcheons.
  - 6. Grout.
  - 7. HVAC demolition.
  - 8. Equipment installation requirements common to equipment sections.
  - 9. Concrete bases.
  - 10. Supports and anchorages.

#### **1.2 DEFINITIONS**

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, 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 chases.
- 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.

#### **1.3 SUBMITTALS**

- A. Welding certificates.

#### **1.4 QUALITY ASSURANCE**

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
  2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

## **PART 2 - PRODUCTS**

### **2.1 PIPE, TUBE, AND FITTINGS**

- A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

### **2.2 JOINING MATERIALS**

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12.
- G. Solvent Cements for Joining Plastic Piping:
  1. CPVC Piping: ASTM F 493.
  2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

### **2.3 DIELECTRIC FITTINGS**

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F

- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035) minimum working pressure as required to suit system pressures.
- E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F (107 deg C).
- F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F.

## **2.4 MECHANICAL SLEEVE SEALS**

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
- B. Sealing Elements: EDPM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
- C. Pressure Plates: Stainless Steel. Include two for each sealing element.
- D. Connecting Bolts and Nuts: Stainless Steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## **2.5 SLEEVES**

- A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  - 1. Underdeck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D 1785, Schedule 40.
- G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

## **2.6 ESCUTCHEONS**

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
  - 1. Finish: Polish chrome-plated.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
  - 1. Finish: Polished chrome-plated.

## **2.7 GROUT**

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
  - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi 28-day compressive strength.
  - 3. Packaging: Premixed and factory packaged.

## **PART 3 - EXECUTION**

### **3.1 HVAC DEMOLITION**

- A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove HVAC systems, equipment, and components indicated to be removed.
  - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
  - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
  - 3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
  - 4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
  - 5. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  - 6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  - 7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

### 3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- 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 to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors.
- M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow 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 and larger in diameter.
  - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
  - 1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble

mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

- P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- Q. Verify final equipment locations for roughing-in.
- R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### **3.3 PIPING JOINT CONSTRUCTION**

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. 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.
- E. 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.
- F. 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.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
  - 2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
  - 3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.



- 4. PVC Nonpressure Piping: Join according to ASTM D 2855.
- J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
  - 1. Plain-End Pipe and Fittings: Use butt fusion.
  - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.
- M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

### **3.4 PIPING CONNECTIONS**

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
  - 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.

### **3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS**

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install HVAC 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.
- D. Install equipment to allow right of way for piping installed at required slope.

### **3.6 CONCRETE BASES**

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
  - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
  - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of the base.

3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Miscellaneous Cast-in-Place Concrete."

### **3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES**

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

### **3.8 ERECTION OF WOOD SUPPORTS AND ANCHORAGES**

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor HVAC 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.

### **3.9 GROUTING**

- A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

**END OF SECTION 230500**

## SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Balancing Air Systems:
    - a. Constant-volume air systems.

#### 1.2 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An independent entity meeting qualifications to perform TAB work.
- F. TDH: Total dynamic head.

#### 1.3 ACTION SUBMITTALS

- A. TAB Report: Documentation indicating that Work complies with ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Strategies and Procedures Plan: Within 90 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- B. Certified TAB reports.

#### 1.5 QUALITY ASSURANCE

- A. TAB Specialists Qualifications: Certified by NEBB. Submit alternate certifications to engineer of record for approval prior to bid.
  - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by NEBB.
  - 2. TAB Technician: Employee of the TAB specialist and certified by NEBB as a TAB technician.

- B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."
- C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

## 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 system pumps to ensure absence of entrained air in the suction piping.

- K. Examine operating safety interlocks and controls on HVAC equipment.
- L. 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 strategies and step-by-step procedures for balancing the systems.
- 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. Duct systems are complete with terminals installed.
    - b. Volume, smoke, and fire dampers are open and functional.
    - c. Clean filters are installed.
    - d. Fans are operating, free of vibration, and rotating in correct direction.
    - e. Variable-frequency controllers' startup is complete and safeties are verified.
    - f. Automatic temperature-control systems are operational.
    - g. Ceilings are installed.
    - h. Windows and doors are installed.
    - i. Suitable access to balancing devices and equipment is provided.

### 3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in 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 main Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses, close to the fan and prior to any outlets, to obtain total airflow.
    - c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
  - 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 engineer of record or 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.

### 3.6 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.
- B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

### 3.7 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, and bore.
  - i. Center-to-center dimensions of sheave and amount of adjustments in inches.
  - 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, and bore.
  - f. Center-to-center dimensions of sheave and amount of adjustments in inches.
3. Test Data (Indicated and Actual Values):
- a. Total airflow rate in cfm.
  - b. Total system static pressure in inches wg.
  - c. Fan rpm.
  - d. Discharge static pressure in inches wg.
  - e. Filter static-pressure differential in inches wg.
  - f. Preheat-coil static-pressure differential in inches wg.
  - g. Cooling-coil static-pressure differential in inches wg.
  - h. Heating-coil static-pressure differential in inches wg.
  - i. Outdoor airflow in cfm.
  - j. Return airflow in cfm.
  - k. Outdoor-air damper position.
  - l. Return-air damper position.
  - m. Vortex damper position.

F. Gas-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.
  - 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, and bore.
  - n. Center-to-center dimensions of sheave and amount of adjustments in inches.
2. Test Data (Indicated and Actual Values):
- a. Total airflow rate in cfm.
  - b. Entering-air temperature in deg F.
  - c. Leaving-air temperature in deg F.
  - d. Air temperature differential in deg F.
  - e. Entering-air static pressure in inches wg.
  - f. Leaving-air static pressure in inches wg.
  - g. Air static-pressure differential in inches wg.
  - h. Low-fire fuel input in Btu/h.
  - i. High-fire fuel input in Btu/h.
  - j. Manifold pressure in psig.
  - k. High-temperature-limit setting in deg F.
  - l. Operating set point in Btu/h.
  - m. Motor voltage at each connection.
  - n. Motor amperage for each phase.
  - o. Heating value of fuel in Btu/h.
- G. 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.
  - e. Number of stages.
  - f. Connected volts, phase, and hertz.
  - g. Rated amperage.
  - h. Airflow rate in cfm.
  - i. Face area in sq. ft..
  - j. Minimum face velocity in fpm.
2. Test Data (Indicated and Actual Values):
- a. Heat output in Btu/h.
  - b. Airflow rate in cfm.
  - c. Air velocity in fpm.
  - d. Entering-air temperature in deg F.
  - e. Leaving-air temperature in deg F.
  - f. Voltage at each connection.
  - g. Amperage for each phase.
- H. 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, and bore.
  - h. Center-to-center dimensions of sheave and amount of adjustments in inches.
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, and bore.
  - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
  - g. Number, make, and size of belts.
3. Test Data (Indicated and Actual Values):
- a. Total airflow rate in cfm.
  - b. Total system static pressure in inches wg.
  - c. Fan rpm.
  - d. Discharge static pressure in inches wg.
  - e. Suction static pressure in inches wg.
- I. Round, 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.
  - d. Duct static pressure in inches wg.
  - e. Duct size in inches.
  - f. Duct area in sq. ft..
  - g. Indicated airflow rate in cfm.
  - h. Indicated velocity in fpm.
  - i. Actual airflow rate in cfm.
  - j. Actual average velocity in fpm.
  - k. Barometric pressure in psig.
- J. 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..

2. Test Data (Indicated and Actual Values):
  - a. Airflow rate in cfm.
  - b. Air velocity in fpm.
  - c. Preliminary airflow rate as needed in cfm.
  - d. Preliminary velocity as needed in fpm.
  - e. Final airflow rate in cfm.
  - f. Final velocity in fpm.
  - g. Space temperature in deg F.

K. Instrument Calibration Reports:

1. Report Data:
  - a. Instrument type and make.
  - b. Serial number.
  - c. Application.
  - d. Dates of use.
  - e. Dates of calibration.

### 3.8 VERIFICATION OF TAB REPORT

- A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Construction Manager or commissioning authority.
- B. Construction Manager or 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.
- F. Prepare test and inspection reports.

### 3.9 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 230713 - DUCT INSULATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes insulating the following duct services:
  - 1. Indoor, concealed supply and outdoor air.
  - 2. Indoor, exposed supply and outdoor air.
  - 3. Indoor, concealed return located in unconditioned space.
  - 4. Indoor, exposed return located in unconditioned space.
  - 5. Outdoor, concealed supply and return.
  - 6. Outdoor, exposed supply and return.

#### **1.2 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- 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 insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
  - 3. Detail application of field-applied jackets.
  - 4. Detail application at linkages of control devices.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Field quality-control reports.

#### **1.4 QUALITY ASSURANCE**

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E84, by a testing 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.

## PART 2 - PRODUCTS

### 2.1 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum 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 C871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C553, Type II and ASTM C1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. CertainTeed Corporation.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Knauf Insulation.
    - d. Manson Insulation Inc.
    - e. Owens Corning.
- G. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. CertainTeed Corporation.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Knauf Insulation.
    - d. Manson Insulation Inc.
    - e. Owens Corning.

### 2.2 FIRE-RATED INSULATION SYSTEMS

- A. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 1 or 2-hour (as required) fire rating by an NRTL acceptable to authorities having jurisdiction.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. 3M.
  - b. Johns Manville; a Berkshire Hathaway company.

## 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. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Childers Brand; H. B. Fuller Construction Products.
    - b. Foster Brand; H. B. Fuller Construction Products.
    - c. Mon-Eco Industries, Inc.
  2. Verify adhesive complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Childers Brand; H. B. Fuller Construction Products.
    - b. Eagle Bridges - Marathon Industries.
    - c. Foster Brand; H. B. Fuller Construction Products.
    - d. Mon-Eco Industries, Inc.
  2. Verify adhesive complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. PVC Jacket Adhesive: Compatible with PVC jacket.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Johns Manville; a Berkshire Hathaway company.
    - b. The Dow Chemical Company.
  2. Verify adhesive complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."



## 2.4 MASTICS AND COATINGS

- A. Materials shall be compatible with insulation materials, jackets, and substrates.
- B. Vapor-Retarder Mastic: Water based; suitable for indoor use on below ambient services.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Childers Brand; H. B. Fuller Construction Products.
    - b. Foster Brand; H. B. Fuller Construction Products.
    - c. Knauf Insulation.
  - 2. Water-Vapor Permeance: Comply with ASTM C755, Section 7.2.2, Table 2, for insulation type and service conditions.
  - 3. Service Temperature Range: Minus 20 to plus 180 deg F.
  - 4. Comply with MIL-PRF-19565C, Type II, for permeance requirements.
  - 5. Color: White.
- C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Childers Brand; H. B. Fuller Construction Products.
    - b. Foster Brand; H. B. Fuller Construction Products.
    - c. Knauf Insulation.
    - d. Mon-Eco Industries, Inc.
  - 2. Water-Vapor Permeance: ASTM E96, greater than 1.0 perm at manufacturer's recommended dry film thickness.
  - 3. Service Temperature Range: Minus 20 to plus 180 deg F.
  - 4. Color: White.

## 2.5 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Childers Brand; H. B. Fuller Construction Products.
    - b. Foster Brand; H. B. Fuller Construction Products.
    - c. Mon-Eco Industries, Inc.
  - 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.
  - 5. Color: Aluminum.
- B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Childers Brand; H. B. Fuller Construction Products.
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.
5. Color: White.

## 2.6 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 C1136, Type I.
  2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.
  3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II.

## 2.7 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C921, 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 D1784, 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Johns Manville; a Berkshire Hathaway company.
    - b. P.I.C. Plastics, Inc.
    - c. Proto Corporation.
    - d. Speedline Corporation.
  2. Adhesive: As recommended by jacket material manufacturer.
  3. Color: White.
- D. Aluminum Jacket: Comply with ASTM B209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
  1. Sheet and roll stock ready for shop or field sizing or factory cut and rolled to size.
  2. Finish and thickness are indicated in field-applied jacket schedules.
  3. Moisture Barrier for Indoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper or 2.5-mil-thick polysurlyn.
  4. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper or 2.5-mil-thick polysurlyn.

- E. Self-Adhesive Outdoor Jacket: 60-mil-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 aluminum-foil facing.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Polyguard Products, Inc.

## 2.8 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Avery Dennison Corporation, Specialty Tapes Division.
    - b. Compac Corporation.
    - c. Ideal Tape Co., Inc., an American Biltrite Company.
    - d. Venture Tape.
  - 2. Width: 3 inches.
  - 3. Thickness: 11.5 mils.
  - 4. Adhesion: 90 ounces force/inch in width.
  - 5. Elongation: 2 percent.
  - 6. Tensile Strength: 40 lbf/inch 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 C1136.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Avery Dennison Corporation, Specialty Tapes Division.
    - b. Compac Corporation.
    - c. Ideal Tape Co., Inc., an American Biltrite Company.
    - d. Venture Tape.
  - 2. Width: 3 inches.
  - 3. Thickness: 6.5 mils.
  - 4. Adhesion: 90 ounces force/inch in width.
  - 5. Elongation: 2 percent.
  - 6. Tensile Strength: 40 lbf/inch 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Compac Corporation.
    - b. Ideal Tape Co., Inc., an American Biltrite Company.
    - c. Venture Tape.
  - 2. Width: 2 inches.
  - 3. Thickness: 6 mils.
  - 4. Adhesion: 64 ounces force/inch in width.
  - 5. Elongation: 500 percent.
  - 6. Tensile Strength: 18 lbf/inch in width.
- D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Avery Dennison Corporation, Specialty Tapes Division.
    - b. Compac Corporation.
    - c. Ideal Tape Co., Inc., an American Biltrite Company.
    - d. Venture Tape.
  - 2. Width: 2 inches.
  - 3. Thickness: 3.7 mils.
  - 4. Adhesion: 100 ounces force/inch in width.
  - 5. Elongation: 5 percent.
  - 6. Tensile Strength: 34 lbf/inch in width.

## 2.9 SECUREMENTS

- A. Aluminum Bands: ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch, 3/4 inch wide with wing seal or closed seal.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ITW Insulation Systems; Illinois Tool Works, Inc.
    - b. RPR Products, Inc.
- B. Insulation Pins and Hangers:
- 1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Gemco.
      - 2) Midwest Fasteners, Inc.
    - b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.

- c. Spindle: Copper- or zinc-coated, low-carbon steel, Aluminum or Stainless steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
  - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
  
- 2. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
  - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Gemco.
    - 2) Midwest Fasteners, Inc.
  - b. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
  - c. Spindle: Nylon, 0.106-inch-diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
  - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
  
- 3. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick, galvanized-steel, aluminum or stainless-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
  - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) AGM Industries, Inc.
    - 2) Gemco.
    - 3) Midwest Fasteners, Inc.
    - 4) Nelson Stud Welding.
  - b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
  
- C. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.
- D. Wire: 0.080-inch nickel-copper alloy, 0.062-inch soft-annealed, stainless steel or 0.062-inch soft-annealed, galvanized steel.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. C & F Wire.

## 2.10 CORNER ANGLES

- A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D1784, Class 16354-C. White or color-coded to match adjacent surface.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

### 3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct 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. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. 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.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
  2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
  3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches 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 duct flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

### 3.3 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 below top of roof flashing.
  4. Seal jacket to roof flashing with flashing sealant.
- B. 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.
  4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

- D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
  - 1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- E. Insulation Installation at Floor Penetrations:
  - 1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
  - 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

### 3.4 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
  - 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
  - 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
  - 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
    - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    - b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    - d. Do not overcompress insulation during installation.
    - e. Impale insulation over pins and attach speed washers.
    - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
  - 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
    - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface.



Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
  6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
  7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.
- B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
  2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
  3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
    - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    - b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    - d. Do not overcompress insulation during installation.
    - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
  4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
    - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
  5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.

6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

### 3.5 FIELD-APPLIED JACKET INSTALLATION

- A. 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 laps at longitudinal seams and 3-inch-wide joint strips at end joints.
  5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
- B. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. 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.
- C. Where metal jackets are indicated, install with 2-inch 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 o.c. and at end joints.

### 3.6 FIRE-RATED INSULATION SYSTEM INSTALLATION

- A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.
- B. Insulate duct access panels and doors to achieve same fire rating as duct.
- C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section 078413 "Penetration Firestopping."

### 3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
  1. Inspect ductwork, 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 one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

### 3.8 DUCT INSULATION SCHEDULE, GENERAL

#### A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Outdoor, concealed supply and return.
6. Outdoor, exposed supply and return.

#### B. Items Not Insulated:

1. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
2. Factory-insulated flexible ducts.
3. Factory-insulated plenums and casings.
4. Flexible connectors.
5. Vibration-control devices.
6. Factory-insulated access panels and doors.

### 3.9 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

#### A. Concealed, Supply-Air Duct and Plenum Insulation:

1. Mineral-fiber Blanket : R-6 minimum per Energy Code.

#### B. Concealed, Return-Air Duct and Plenum Insulation:

1. Mineral-fiber Blanket : R-6 minimum per Energy Code.

#### C. Concealed, Outdoor-Air Duct and Plenum Insulation:

1. Mineral-fiber Blanket : R-6 minimum per Energy Code.

#### D. Exposed, Supply-Air Duct and Plenum Insulation:

1. Mineral-fiber Blanket : R-6 minimum per Energy Code.

#### E. Exposed, Return-Air Duct and Plenum Insulation:

1. Mineral-fiber Blanket : R-6 minimum per Energy Code.

#### F. Exposed, Outdoor-Air Duct and Plenum Insulation:

1. Mineral-fiber Blanket : R-6 minimum per Energy Code.

### 3.10 ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Insulation materials and thicknesses are identified below. If more than one material is listed for a duct system, selection from materials listed is Contractor's option.

- B. Concealed, Supply-Air Duct and Plenum Insulation:
  1. Mineral-fiber Blanket – R-8 minimum per Energy Code
  2. Mineral-fiber Board – R-8 minimum per Energy Code
- C. Concealed, Return-Air Duct and Plenum Insulation:
  1. Mineral-fiber Blanket – R-8 minimum per Energy Code
  2. Mineral-fiber Board – R-8 minimum per Energy Code
- D. Concealed, Outdoor-Air Duct and Plenum Insulation:
  1. Mineral-fiber Blanket – R-8 minimum per Energy Code
  2. Mineral-fiber Board – R-8 minimum per Energy Code
- E. Exposed, Supply-Air Duct and Plenum Insulation:
  1. Mineral-fiber Blanket – R-8 minimum per Energy Code with weather proof metal jacket
  2. Mineral-fiber Board – R-8 minimum per Energy Code with weather proof metal jacket
- F. Exposed, Return-Air Duct and Plenum Insulation:
  1. Mineral-fiber Blanket – R-8 minimum per Energy Code with weather proof metal jacket
  2. Mineral-fiber Board – R-8 minimum per Energy Code with weather proof metal jacket

### 3.11 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. Ducts and Plenums, Concealed:
  1. None.
- D. Ducts and Plenums, Exposed:
  1. Aluminum, Smooth: 0.016 inch thick.

### 3.12 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. Ducts and Plenums, Concealed:
  1. None.

- D. Ducts and Plenums, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches:
  - 1. Aluminum, Smooth: 0.016 inch thick.

END SECTION 230713

## SECTION 231123 - FACILITY NATURAL-GAS 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. Pipes, tubes, and fittings.
  - 2. Piping specialties.
  - 3. Piping and tubing joining materials.
  - 4. Manual gas shutoff valves.
  - 5. Earthquake valves.
  - 6. Pressure regulators.
  - 7. Dielectric fittings.

#### 1.3 DEFINITIONS

- A. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. 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, crawlspaces, and tunnels.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of the following:
  - 1. Piping specialties.
  - 2. Corrugated, stainless-steel tubing with associated components.
  - 3. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
  - 4. Pressure regulators. Indicate pressure ratings and capacities.
  - 5. Dielectric fittings.

- B. Delegated-Design Submittal: For natural-gas piping and equipment 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 seismic restraints.
  - 2. Design Calculations: Calculate requirements for selecting seismic restraints.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans and details, drawn to scale, on which natural-gas piping is shown and coordinated with other installations, using input from installers of the items involved.
- B. Site Survey: Plans, drawn to scale, on which natural-gas piping is shown and coordinated with other services and utilities.
- C. Qualification Data: For qualified professional engineer.
- D. Field quality-control reports.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For pressure regulators to include in emergency, operation, and maintenance manuals.

#### 1.7 QUALITY ASSURANCE

- A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.
- B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.
- D. Protect stored PE pipes and valves from direct sunlight.

## 1.9 PROJECT CONDITIONS

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

## 1.10 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.
- B. Coordinate requirements for access panels and doors for valves installed concealed behind finished surfaces. Comply with requirements in Section 083113 "Access Doors and Frames."

## PART 2 - PRODUCTS

### 2.1 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A53/A53M, black steel, Schedule 40, Type E or S, Grade B.
  - 1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
  - 2. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
  - 3. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
    - a. Material Group: 1.1.
    - b. End Connections: Threaded or butt welding to match pipe.
    - c. Lapped Face: Not permitted underground.
    - d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
    - e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.
  - 4. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
    - a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.
- B. Corrugated, Stainless-Steel Tubing: Comply with ANSI/IAS LC 1.
  - 1. Tubing: ASTM A240/A240M, corrugated, Series 300 stainless steel.
  - 2. Coating: PE with flame retardant.
    - a. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
      - 1) Flame-Spread Index: **25** or less.
      - 2) Smoke-Developed Index: **50** or less.



3. Fittings: Copper-alloy mechanical fittings with ends made to fit and listed for use with corrugated stainless-steel tubing and capable of metal-to-metal seal without gaskets. Include brazing socket or threaded ends complying with ASME B1.20.1.
4. Striker Plates: Steel, designed to protect tubing from penetrations.
5. Manifolds: Malleable iron or steel with factory-applied protective coating. Threaded connections shall comply with ASME B1.20.1 for pipe inlet and corrugated tubing outlets.

## 2.2 PIPING SPECIALTIES

### A. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
4. Corrugated stainless-steel tubing with polymer coating.
5. Operating-Pressure Rating: **0.5 psig**.
6. End Fittings: Zinc-coated steel.
7. Threaded Ends: Comply with ASME B1.20.1.
8. Maximum Length: **72 inches**

### B. Quick-Disconnect Devices: Comply with ANSI Z21.41.

1. Copper-alloy convenience outlet and matching plug connector.
2. Nitrile seals.
3. Hand operated with automatic shutoff when disconnected.
4. For indoor or outdoor applications.
5. Adjustable, retractable restraining cable.

### C. Y-Pattern Strainers:

1. Body: ASTM A126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for **NPS 2 (DN 50)** and smaller;
3. Strainer Screen: mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: **125 psig**

### D. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

## 2.3 JOINING MATERIALS

### A. Joint Compound and Tape: Suitable for natural gas.

## 2.4 MANUAL GAS SHUTOFF VALVES

### A. General Requirements for Metallic Valves, **NPS 2** and Smaller: Comply with ASME B16.33.

1. CWP Rating: **125 psig**
  2. Threaded Ends: Comply with ASME B1.20.1.
  3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
  4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
  5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves **1 inch** and smaller.
  6. Service Mark: Valves **1-1/4 inches** to **NPS 2** shall have initials "WOG" permanently marked on valve body.
- B. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.
1. Body: Bronze, complying with ASTM B584.
  2. Ball: Chrome-plated brass.
  3. Stem: Bronze; blowout proof.
  4. Seats: Reinforced TFE; blowout proof.
  5. Packing: Separate packnut with adjustable-stem packing threaded ends.
  6. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
  7. CWP Rating: **600 psig**.
  8. Listing: Valves **NPS 1** and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
  9. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- C. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.
1. Body: Bronze, complying with ASTM B584.
  2. Ball: Chrome-plated bronze.
  3. Stem: Bronze; blowout proof.
  4. Seats: Reinforced TFE; blowout proof.
  5. Packing: Threaded-body packnut design with adjustable-stem packing.
  6. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
  7. CWP Rating: **600 psig**.
  8. Listing: Valves **NPS 1** and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
  9. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- D. Valve Boxes:
1. Cast-iron, two-section box.
  2. Top section with cover with "GAS" lettering.
  3. Bottom section with base to fit over valve and barrel a minimum of **5 inches** in diameter.
  4. Adjustable cast-iron extensions of length required for depth of bury.
  5. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head, and with stem of length required to operate valve.

## 2.5 EARTHQUAKE VALVES

- A. Earthquake Valves, Maximum Operating Pressure of **5 psig**: Comply with ASCE 25.
1. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction.

2. Maximum Operating Pressure: **5 psig**.
3. Cast-aluminum body with nickel-plated chrome steel internal parts.
4. Nitrile-rubber valve washer.
5. Sight windows for visual indication of valve position.
6. Threaded end connections complying with ASME B1.20.1.
7. Wall mounting bracket with bubble level indicator.

## 2.6 PRESSURE REGULATORS

### A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators **NPS 2** and smaller;

### B. Line Pressure Regulators: Comply with ANSI Z21.80.

1. Body and Diaphragm Case: Cast iron or die-cast aluminum.
2. Springs: Zinc-plated steel; interchangeable.
3. Diaphragm Plate: Zinc-plated steel.
4. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
5. Orifice: Aluminum; interchangeable.
6. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
7. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
8. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
9. Overpressure Protection Device: Factory mounted on pressure regulator.
10. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
11. Maximum Inlet Pressure: **2 psig**

### C. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

## 2.7 LABELING AND IDENTIFYING

- A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of **6 inches** wide and **4 mils** thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to **30 inches** deep; colored yellow.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Close equipment shutoff valves before turning off natural gas to premises or piping section.
- B. Inspect natural-gas piping according to the International Fuel Gas Code to determine that natural-gas utilization devices are turned off in piping section affected.
- C. Comply with the International Fuel Gas Code requirements for prevention of accidental ignition.

### 3.3 OUTDOOR PIPING INSTALLATION

- A. Comply with **the International Fuel Gas Code** for installation and purging of natural-gas piping.
- B. Steel Piping with Protective Coating:
  - 1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
  - 2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
  - 3. Replace pipe having damaged PE coating with new pipe.
- C. Copper Tubing with Protective Coating:
  - 1. Apply joint cover kits over tubing to cover, seal, and protect joints.
  - 2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
- D. Install fittings for changes in direction and branch connections.
- E. Install pressure gage downstream from each service regulator.

### 3.4 INDOOR PIPING INSTALLATION

- A. Comply with the International Fuel Gas Code for installation and purging of natural-gas piping.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss,

expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

- C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
- D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- G. Locate valves for easy access.
- H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.
- I. Install piping free of sags and bends.
- J. Install fittings for changes in direction and branch connections.
- K. Verify final equipment locations for roughing-in.
- L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.
- M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.
  - 1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches (75 mm) long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.
- N. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
- O. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.
- P. Concealed Location Installations: Except as specified below, install concealed natural-gas piping and piping installed under the building in containment conduit constructed of steel pipe with welded joints as described in Part 2. Install a vent pipe from containment conduit to outdoors and terminate with weatherproof vent cap.
  - 1. Above Accessible Ceilings: Natural-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.

2. In Floors: Install natural-gas piping with welded or brazed joints and protective coating in cast-in-place concrete floors. Cover piping to be cast in concrete slabs with minimum of **1-1/2 inches** of concrete. Piping may not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.
3. In Floor Channels: Install natural-gas piping in floor channels. Channels must have cover and be open to space above cover for ventilation.
4. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.
  - a. Exception: Tubing passing through partitions or walls does not require striker barriers.
5. Prohibited Locations:
  - a. Do not install natural-gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
  - b. Do not install natural-gas piping in solid walls or partitions.

- Q. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- R. Connect branch piping from top or side of horizontal piping.
- S. Install unions in pipes **NPS 2** and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.
- T. Do not use natural-gas piping as grounding electrode.
- U. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.
- V. Install pressure gage downstream from each line regulator.
- W. Install sleeves for piping penetrations of walls, ceilings, and floors.
- X. Install sleeve seals for piping penetrations of concrete walls and slabs.
- Y. Install escutcheons for piping penetrations of walls, ceilings, and floors.

### 3.5 VALVE INSTALLATION

- A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.
- B. Install underground valves with valve boxes.
- C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

- D. Install earthquake valves aboveground outside buildings according to listing.
- E. Install anode for metallic valves in underground PE piping.

### 3.6 PIPING JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints:
  - 1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
  - 2. Cut threads full and clean using sharp dies.
  - 3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
  - 4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
  - 5. 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.
- D. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.
- E. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.
- F. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D2657.
  - 1. Plain-End Pipe and Fittings: Use butt fusion.
  - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.

### 3.7 HANGER AND SUPPORT INSTALLATION

- A. Install hangers for steel piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- B. Install hangers for corrugated stainless-steel tubing, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- C. Support horizontal piping within **12 inches** of each fitting.
- D. Support vertical runs of steel piping to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

- E. Support vertical runs of corrugated stainless-steel tubing to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

### 3.8 CONNECTIONS

- A. Connect to utility's gas main according to utility's procedures and requirements.
- B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.
- C. Install piping adjacent to appliances to allow service and maintenance of appliances.
- D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within **72 inches** of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.
- E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

### 3.9 LABELING AND IDENTIFYING

- A. Install detectable warning tape directly above gas piping, **12 inches** below finished grade, except **6 inches** below subgrade under pavements and slabs.

### 3.10 PAINTING

- A. Comply with requirements in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" for painting interior and exterior natural-gas piping.
- B. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.
  - 1. Alkyd System: MPI EXT 5.1D.
    - a. Prime Coat: Alkyd anticorrosive metal primer.
    - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
    - c. Topcoat: Exterior alkyd enamel.
- C. Paint exposed, interior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.
  - 1. Latex Over Alkyd Primer System: MPI INT 5.1Q.
    - a. Prime Coat: metal primer.
    - b. Intermediate Coat: Interior latex matching topcoat.
    - c. Topcoat: Interior latex



2. Alkyd System: MPI INT 5.1E.

- a. Prime Coat: metal primer.
- b. Intermediate Coat: Interior alkyd matching topcoat.
- c. Topcoat: Interior alkyd

D. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

### 3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

- 1. Test, inspect, and purge natural gas according to the International Fuel Gas Code and authorities having jurisdiction.

C. Natural-gas piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

### 3.12 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain earthquake valves.

### 3.13 OUTDOOR PIPING SCHEDULE

A. Aboveground natural-gas piping shall be the following:

- 1. Steel pipe with malleable-iron fittings and threaded joints.

B. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

### 3.14 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG

A. Aboveground, branch piping **NPS 1** and smaller shall be one of the following:

- 1. Corrugated stainless-steel tubing with mechanical fittings having socket or threaded ends to match adjacent piping.
- 2. Annealed-temper, tin-lined copper tube with flared joints and fittings.
- 3. Annealed-temper, copper tube with wrought-copper fittings and joints.
- 4. Aluminum tube with flared fittings and joints.
- 5. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
- C. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.
- D. Containment Conduit Vent Piping: Steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.
- 3.15 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 0.5 PSIG AND LESS THAN 5 PSIG
- A. Aboveground, branch piping NPS 1 and smaller shall be one of the following:
1. Corrugated stainless-steel tubing with mechanical fittings having socket or threaded ends to match adjacent piping.
  2. Annealed-temper, tin-lined copper tube with flared joints and fittings.
  3. Annealed-temper, copper tube with wrought-copper fittings and joints.
  4. Aluminum tube with flared fittings and joints.
  5. Steel pipe with malleable-iron fittings and threaded joints.
- B. Aboveground, distribution piping shall be the following:
1. Steel pipe with malleable-iron fittings and threaded joints.
- C. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat underground pipe and fittings with protective coating for steel piping.
- D. Containment Conduit Vent Piping: Steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.
- 3.16 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE
- A. Distribution piping valves for pipe sizes NPS 2 and smaller shall be one of the following:
1. One-piece, bronze ball valve with bronze trim.
  2. Two-piece, full-port, bronze ball valves with bronze trim.
  3. Bronze plug valve.
- B. Valves in branch piping for single appliance shall be one of the following:
1. One-piece, bronze ball valve with bronze trim.
  2. Two-piece, full-port, bronze ball valves with bronze trim.
  3. Bronze plug valve.

END OF SECTION 231123

## **SECTION 233113 - METAL DUCTS**

### **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. Single-wall rectangular ducts and fittings.
  - 2. Single-wall round ducts and fittings.
  - 3. Sheet metal materials.
  - 4. Duct liner.
  - 5. Sealants and gaskets.
  - 6. Hangers and supports.
  - 7. Seismic-restraint devices.

#### **1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of the following products:
  - 1. Liners and adhesives.
  - 2. Sealants and gaskets.
  - 3. Seismic-restraint devices.
- B. Delegated-Design Submittal:
  - 1. Sheet metal thicknesses.
  - 2. Joint and seam construction and sealing.
  - 3. Reinforcement details and spacing.
  - 4. Materials, fabrication, assembly, and spacing of hangers and supports.
  - 5. Design Calculations: Calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation for selecting hangers and supports and seismic restraints.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: A single set of plans or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.
- B. Welding certificates.
- C. Field quality-control reports.

## 1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
  - 2. AWS D9.1/D9.1M, "Sheet Metal Welding Code," for duct joint and seam welding.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and with performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7. Seismically brace duct hangers and supports in accordance with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."
  - 1. Seismic Hazard Level (SHL): Refer to structural plans for seismic information .
  - 2. Importance Factor: Refer to structural plans for seismic information .
- C. Airstream Surfaces: Surfaces in contact with airstream shall comply with requirements in ASHRAE 62.1.
- D. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment," and Section 7 - "Construction and System Startup."
- E. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."
- F. Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on Drawings are inside clear dimensions and do not include insulation or duct wall thickness.

### 2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
  - 1. Construct ducts of galvanized sheet steel unless otherwise indicated.
  - 2. For ducts exposed to weather, construct of Type 316 stainless steel indicated by manufacturer to be suitable for outdoor installation.
- B. Transverse Joints: Fabricate joints in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. For ducts with longest side less than 36 inches, select joint types in accordance with Figure 2-1.
  2. For ducts with longest side 36 inches or greater, use flange joint connector Type T-22, T-24, T-24A, T-25a, or T-25b. Factory-fabricated flanged duct connection system may be used if submitted and approved by engineer of record.
- C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." All longitudinal seams shall be Pittsburgh lock seams unless otherwise specified for specific application.
1. Where specified for specific applications, all joints shall be welded.
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Refer to figures 3-4 and 3-5
1. Bull nose T-fittings or otherwise are not allowed.
  2. Provide high efficiency lateral branches or conical take off's

## 2.3 DOUBLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. McGill AirFlow LLC.
  2. MKT Metal Manufacturing.
  3. Sheet Metal Connectors, Inc.
- B. Rectangular Ducts: Fabricate ducts with indicated dimensions for clear internal dimensions of the inner duct.
- C. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
1. Construct ducts of galvanized sheet steel unless otherwise indicated.
  2. For ducts exposed to weather, construct outer duct of Type 316 stainless steel indicated by manufacturer to be suitable for outdoor installation.
- D. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
1. For ducts with longest side less than 36 inches, select joint types in accordance with Figure 2-1.
  2. For ducts with longest side 36 inches or greater, use flange joint connector Type T-22, T-24, T-24A, T-25a, or T-25b. Factory-fabricated flanged duct connection system may be used if submitted and approved by engineer of record.

3. Where specified for specific applications, all joints shall be welded.
- E. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." All longitudinal seams shall be Pittsburgh lock seams unless otherwise specified for specific application.
1. Where specified for specific applications, all joints shall be welded.
- F. Interstitial Insulation: Fibrous-glass liner complying with ASTM C1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature. Equivalent to R-8 insulation system per Energy Code.
  2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
  3. Coat insulation with antimicrobial coating.
  4. Cover insulation with polyester film complying with UL 181, Class 1.
- G. Interstitial Insulation: Flexible elastomeric duct liner complying with ASTM C534/C534M, Type II for sheet materials, and with NFPA 90A or NFPA 90B.
1. Maximum Thermal Conductivity: 0.25 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature. Equivalent to R-8 insulation system per Energy Code.
- H. Inner Duct: Minimum 24-gauge solid galvanized sheet steel.

## 2.4 SINGLE-WALL ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
1. Construct ducts of galvanized sheet steel unless otherwise indicated.
  2. For ducts exposed to weather, construct of Type 316 stainless steel indicated by manufacturer to be suitable for outdoor installation.
  3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. McGill AirFlow LLC.
    - b. Sheet Metal Connectors, Inc.
    - c. Lindab Inc.
    - d. Spiral Manufacturing Co., Inc.
- B. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.

- C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
  - 1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
- D. Tees and Laterals: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Refer to figures 3-4 and 3-5
  - 1. Bull nose T-fittings or otherwise are not allowed.
  - 2. Provide high efficiency lateral branches or conical take off's

## 2.5 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A653/A653M.
  - 1. Galvanized Coating Designation: G90.
  - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Carbon-Steel Sheets: Comply with ASTM A1008/A1008M, with oiled, matte finish for exposed ducts.
- D. Stainless-Steel Sheets: Comply with ASTM A480/A480M, Type 304 or 316, as indicated in "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in "Duct Schedule" Article.
- E. Aluminum Sheets: Comply with ASTM B209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
- F. Reinforcement Shapes and Plates: ASTM A36/A36M, steel plates, shapes, and bars; black and galvanized.
  - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- G. Tie Rods: No internal duct tie rods are allowed. All duct to be externally braced.

## 2.6 DUCT LINER (Provide duct liner on all supply and return ducts within 15 feet of equipment)

- A. Fibrous-Glass Duct Liner: Comply with ASTM C1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. CertainTeed Insulation.
  - b. Johns Manville; a Berkshire Hathaway company.
  - c. Owens Corning.
  
2. Maximum Thermal Conductivity:
  - a. Type I, Flexible: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
  - b. Type II, Rigid: 0.23 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
  
3. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C916.
  - a. Adhesive shall have a VOC content of 80 g/L or less.
  - b. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
  
- B. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C534/C534M, Type II, Grade 1; and with NFPA 90A or NFPA 90B.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Aeroflex USA.
    - b. Armacell LLC.
    - c. Ductmate Industries, Inc.
  
  2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.
  
  3. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
    - a. Adhesive shall have a VOC content of 80 g/L or less.
  
- C. Insulation Pins and Washers:
  1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
  2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized steel, aluminum or stainless steel; with beveled edge sized as required to hold insulation securely in place, but not less than 1-1/2 inches in diameter.
  
- D. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."
  1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.



2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm or greater.
7. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
  - a. Fan discharges.
  - b. Intervals of lined duct preceding unlined duct.
  - c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm or where indicated.
9. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.
  - a. Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 percent.
10. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

## 2.7 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
  1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
  2. Tape Width: 4 inches.
  3. Sealant: Modified styrene acrylic.
  4. Water resistant.
  5. Mold and mildew resistant.
  6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
  7. Service: Indoor and outdoor.
  8. Service Temperature: Minus 40 to plus 200 deg F.
  9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
  10. Sealant shall have a VOC content of 420 g/L or less.

11. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
10. Sealant shall have a VOC content of 420 g/L or less.
11. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
12. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
13. Service: Indoor or outdoor.
14. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. Sealant shall have a VOC content of 420 g/L or less.
7. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

## 2.8 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Galvanized-steel rods and nuts.

- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A492.
- F. Steel Cable End Connections: Galvanized-steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
  - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
  - 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
  - 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

## 2.9 SEISMIC-RESTRAINT DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Ductmate Industries, Inc.
  - 2. Eaton (B-line).
  - 3. Kinetics Noise Control, Inc.
  - 4. Mason Industries, Inc.
- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of the ICC Evaluation Service or an agency acceptable to authorities having jurisdiction.
  - 1. 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 will be subjected.
- C. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.
- D. Restraint Cables: ASTM A603, galvanized or ASTM A492, stainless-steel cables with end connections made of galvanized-steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.
- E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or reinforcing steel angle clamped to hanger rod.

- F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested in accordance with ASTM E488/E488M.

## PART 3 - EXECUTION

### 3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and coordination drawings.
- B. Install ducts in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install ducts in maximum practical lengths with fewest possible joints.
- D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- G. Install ducts with a clearance of 2inch, plus allowance for insulation thickness.
- H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- J. Install fire, combination fire/smoke, and smoke dampers where indicated on Drawings and as required by code, and by local authorities having jurisdiction. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers and specific installation requirements of the damper UL listing.
- K. Install heating coils, cooling coils, air filters, dampers, and all other duct-mounted accessories in air ducts where indicated on Drawings.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials both before and after installation. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines." Duct cleanliness shall be maintained at SMACNA Level B – Intermediate, for this project type.
- M. Elbows: Use long-radius elbows wherever they fit.

1. Fabricate 90-degree rectangular mitered elbows to include turning vanes.
  2. Fabricate 90-degree round elbows with a minimum of three segments for 12 inches and smaller and a minimum of five segments for 14 inches and larger.
- N. Branch Connections: Use lateral or conical branch connections.
1. Bull nose T-fittings or otherwise are not allowed..
  2. Installed with high efficiency lateral branches or conical take off's

### 3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged. Repair and seal and damaged surfaces
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

### 3.3 DUCTWORK EXPOSED TO WEATHER

- A. All external joints are to be welded or have secure watertight mechanical connections. Seal all openings to provide weatherproof construction.
- B. Construct ductwork to resist external loads of wind, snow, ice, and other effects of weather. Provide necessary supporting structures.
- C. Double Wall, Insulated R-8 minimum:
  1. Ductwork shall be Type 316 stainless steel.
  2. Ductwork shall be galvanized steel.
  3. Where ducts have external insulation, provide weatherproof aluminum jacket or ducts of double wall construction. See Section 230713 "Duct Insulation."
- D. All roof mounted duct to be supported with Mirro Industries duct support system or equivalent.

### 3.4 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts at a minimum to the following seal classes in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class C.
4. Outdoor, Return-Air Ducts: Seal Class C.
5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class C.
8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class C.

### 3.5 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
  1. Where practical, install concrete inserts before placing concrete.
  2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
  3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
  4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
  5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

### 3.6 SEISMIC-RESTRAINT-DEVICE INSTALLATION

- A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems." And/or ASCE/SEI 7.

1. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
  2. Brace a change of direction longer than 12 feet.
- B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
- C. Install cables so they do not bend across edges of adjacent equipment or building structure.
- D. Install cable restraints on ducts that are suspended with vibration isolators.
- E. Install seismic-restraint devices using methods approved by an evaluation service member of the ICC Evaluation Service or an agency acceptable to authorities having jurisdiction.
- F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.
- G. Drilling for and Setting Anchors:
1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify Architect 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. Set anchors to manufacturer's recommended torque, using a torque wrench.
  5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

### 3.7 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

### 3.8 PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

### 3.9 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:
  - a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections, selected by Engineer from sections installed, totaling no less than 25 percent of total installed duct area for each designated pressure class.
  - b. Supply Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Engineer from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
  - c. Return Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Engineer from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
  - d. Exhaust Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Engineer from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
  - e. Outdoor-Air Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Engineer from sections installed, totaling no less than 100 percent of total installed duct area for each designated pressure class.
3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Testing of each duct section is to be performed with access doors, coils, filters, dampers, and other duct-mounted devices in place as designed. No devices are to be removed or blanked off so as to reduce or prevent additional leakage.
5. Test for leaks before applying external insulation.
6. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
7. Give seven days' advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness in accordance with "Description of Method 3 - NADCA Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
  - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.10 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.



- B. For cleaning of existing ductwork, see Section 230130.52 "Existing HVAC Air Distribution System Cleaning."
- C. Use duct cleaning methodology as indicated in NADCA ACR.
- D. Use service openings for entry and inspection.
  - 1. Provide openings with access panels appropriate for duct static-pressure and leakage class at dampers, coils, and any other locations where required for inspection and cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
  - 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
  - 3. Remove and reinstall ceiling to gain access during the cleaning process.
- E. Particulate Collection and Odor Control:
  - 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
  - 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- F. Clean the following components by removing surface contaminants and deposits:
  - 1. Air outlets and inlets (registers, grilles, and diffusers).
  - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
  - 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
  - 4. Coils and related components.
  - 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
  - 6. Supply-air ducts, dampers, actuators, and turning vanes.
  - 7. Dedicated exhaust and ventilation components and makeup air systems.
- G. Mechanical Cleaning Methodology:
  - 1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
  - 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
  - 3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
  - 4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
  - 5. Clean coils and coil drain pans in accordance with NADCA ACR. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
  - 6. Provide drainage and cleanup for wash-down procedures.

3.11 STARTUP

- A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.12 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

- 1. Fabricate all ducts to achieve SMACNA pressure class, seal class, and leakage class as indicated below.

- B. Supply Ducts:

- 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Recovery Units, Rooftop Units, and Terminal Units:

- a. Pressure Class: Positive 2-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 2.
- d. SMACNA Leakage Class for Round: 2.

- 2. Ducts Connected to Constant-Volume Air-Handling Units Insert equipment:

- a. Pressure Class: Positive 4-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 2.
- d. SMACNA Leakage Class for Round and Flat Oval: 2.

- 3. Ducts Connected to Equipment Not Listed Above:

- a. Pressure Class: Positive 2-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 2.
- d. SMACNA Leakage Class for Round and Flat Oval: 2.

- C. Return Ducts:

- 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Recovery Units, Rooftop Units, and Terminal Units:

- a. Pressure Class: Positive or negative 2-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 2.
- d. SMACNA Leakage Class for Round and Flat Oval: 2.

- 2. Ducts Connected to Air-Handling Units:

- a. Pressure Class: Positive or negative 2-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 2.
- d. SMACNA Leakage Class for Round and Flat Oval: 2.

- 3. Ducts Connected to Equipment Not Listed above:

- a. Pressure Class: Positive or negative 2-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 2.
- d. SMACNA Leakage Class for Round and Flat Oval: 2.

D. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

- a. Pressure Class: Negative 2-inch wg.
- b. Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure.
- c. SMACNA Leakage Class for Rectangular: 2.
- d. SMACNA Leakage Class for Round and Flat Oval: 2.

E. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Recovery Units, Unit Ventilators, and Terminal Units:

- a. Pressure Class: Positive or negative 2-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 8.
- d. SMACNA Leakage Class for Round and Flat Oval: 8.

2. Ducts Connected to Air-Handling Units:

- a. Pressure Class: Positive or negative 2-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 2.
- d. SMACNA Leakage Class for Round and Flat Oval: 2.

F. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel or carbon steel coated with zinc-chromate primer.

2. Stainless-Steel Ducts:

- a. Exposed to Airstream: Match duct material.

3. Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

G. Liner (Provide duct liner on all supply and return ducts within 15 feet of equipment) :

- 1. Supply-Air Ducts: Fibrous glass, Type I or Flexible elastomeric, 1-1/2 inches thick.
- 2. Return-Air Ducts: Fibrous glass, Type I or Flexible elastomeric, 1-1/2 inches thick.
- 3. Supply Fan Plenums: Fibrous glass, Type II , 1-1/2 inches thick.
- 4. Return- and Exhaust-Fan Plenums: Fibrous glass, 1-1/2 inches thick.

H. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

- a. Velocity 1000 fpm or Lower:

- 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.

- 2) Mitered Type RE 4 without vanes.
  - b. Velocity 1000 to 1500 fpm:
    - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
    - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
    - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
- a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
  - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
  - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
- a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
    - 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
    - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
    - 3) Radius-to Diameter Ratio: 1.5.
  - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
  - c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam or Welded.
- I. Branch Configuration:
- 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
    - a. Rectangular Main to Rectangular Branch: 45-degree entry.
    - b. Rectangular Main to Round Branch: Conical spin in.
  - 2. Round: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
    - a. Velocity 1000 fpm or Lower: 90-degree tap.
    - b. Velocity 1000 to 1500 fpm: Conical tap.

END SECTION 23113

## SECTION 260519 - LOW VOLTAGE ELECTRICAL POWER CONDUCTORS & CABLES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Building wires and cables rated 600 V and less.
  - 2. Connectors, splices, and terminations rated 600 V and less.
  - 3. Sleeves and sleeve seals for cables.
- B. Related Sections include the following:
  - 1. Division 26 Section "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 2001 to 35,000 V.
  - 2. Division 26 Section "Undercarpet Electrical Power Cables" for flat cables for undercarpet installations.
  - 3. Division 27 Section "Communications Horizontal Cabling" for cabling used for voice and data circuits.

#### 1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency.
- C. Field quality-control test reports.

#### 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
  - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- 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 NFPA 70.

## 1.6 COORDINATION

- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

## PART 2 - PRODUCTS

### 2.1 CONDUCTORS AND CABLES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Alcan Products Corporation; Alcan Cable Division.
  - 2. American Insulated Wire Corp.; a Leviton Company.
  - 3. General Cable Corporation.
  - 4. Senator Wire & Cable Company.
  - 5. Southwire Company.
- C. Copper Conductors: Comply with NEMA WC 70.
- D. Conductor Insulation: Comply with NEMA WC 70 for Types THW, THHN-THWN, XHHW, UF, USE and SO.

### 2.2 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AFC Cable Systems, Inc.
  - 2. Hubbell Power Systems, Inc.
  - 3. O-Z/Gedney; EGS Electrical Group LLC.
  - 4. 3M; Electrical Products Division.
  - 5. Tyco Electronics Corp.
- C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

### 2.3 SLEEVES FOR CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch thickness as indicated and of length to suit application.

- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

## 2.4 SLEEVE SEALS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - 1. Advance Products & Systems, Inc.
  - 2. Calpico, Inc.
  - 3. Metraflex Co.
  - 4. Pipeline Seal and Insulator, Inc.
- D. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
  - 1. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
  - 2. Pressure Plates: Plastic, Carbon steel, or Stainless steel. Include two for each sealing element.
  - 3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating or Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## PART 3 - EXECUTION

### 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper for feeders smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger. Solid for No. 14 AWG and smaller; stranded for No. 12 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 14 AWG and smaller; stranded for No. 12 AWG and larger.

### 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-THWN or XHHW for single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway or Metal-clad cable, Type MC.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.

- E. Feeders Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway or Metal-clad cable, Type MC.
- F. Feeders in Cable Tray: Type THHN-THWN, single conductors in raceway.
- G. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway or Metal-clad cable, Type MC.
- H. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway or Metal-clad cable, Type MC.
- I. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- J. Branch Circuits Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway or Metal-clad cable, Type MC.
- K. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- L. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- M. Class 2 Control Circuits: Type THHN-THWN, in raceway, Power-limited cable, concealed in building finishes, or Power-limited tray cable, in cable tray.

### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

### 3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
  - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.



- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

### 3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Rectangular Sleeve Minimum Metal Thickness:
  - 1. For sleeve rectangle perimeter less than 50 inches (1270 mm) and no side greater than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
  - 2. For sleeve rectangle perimeter equal to, or greater than, 50 inches (1270 mm) and 1 or more sides equal to, or greater than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).
- E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- F. Cut sleeves to length for mounting flush with both wall surfaces.
- G. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
- H. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
- I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and cable, using joint sealant appropriate for size, depth, and location of joint according to Division 07 Section "Joint Sealants."
- K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations. Install sleeves and seal with firestop materials according to Division 07 Section "Penetration Firestopping."
- L. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.
- M. Aboveground Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- N. Underground Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between cable and sleeve for installing mechanical sleeve seals.

### 3.6 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground exterior-wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for cable material and size. Position cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### 3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

### 3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform tests and inspections and prepare test reports.
- C. Tests and Inspections:
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding the following critical equipment and services for compliance with requirements.
  - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
    - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
    - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- D. Test Reports: Prepare a written report to record the following:
  - 1. Test procedures used.
  - 2. Test results that comply with requirements.
  - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- E. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION

## SECTION 260523 - CONTROL VOLTAGE ELECTRICAL POWER CABLES

### 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. UTP cabling.
2. 50/125 or 62.5/125-micrometer, multimode optical fiber cabling.
3. RS-232 cabling.
4. RS-485 cabling.
5. Low-voltage control cabling.
6. Control-circuit conductors.
7. Identification products.

#### 1.3 DEFINITIONS

- A. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.
- B. Channel Cable Tray: A fabricated structure consisting of a one-piece, ventilated-bottom or solid-bottom channel section.
- C. EMI: Electromagnetic interference.
- D. IDC: Insulation displacement connector.
- E. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
- F. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- G. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).
- H. RCDD: Registered Communications Distribution Designer.
- I. Solid-Bottom or Nonventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal side rails, and a bottom without ventilation openings.
- J. Trough or Ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal rails and a bottom having openings sufficient for the passage of air and using 75 percent or less of the plan area of the surface to support cables.
- K. UTP: Unshielded twisted pair.

#### 1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
  - B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    1. Flame-Spread Index: 25 or less.
    2. Smoke-Developed Index: 50 or less.
  - C. 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.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Test cables upon receipt at Project site.
    1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical fiber flashlight or optical loss test set.
    2. Test optical fiber cable on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; include the loss value of each. Retain test data and include the record in maintenance data.
    3. Test each pair of UTP cable for open and short circuits.
- 1.6 PROJECT CONDITIONS
- A. Environmental Limitations: Do not deliver or install UTP and optical fiber cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

## PART 2 - PRODUCTS

### 2.1 PATHWAYS

- A. Support of Open Cabling: NRTL labeled for support of Category 5e cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
  1. Support brackets with cable tie slots for fastening cable ties to brackets.
  2. Lacing bars, spools, J-hooks, and D-rings.
  3. Straps and other devices.
- B. Cable Trays:
  1. 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]:
    - a. Cable Management Solutions, Inc.
    - b. Cablofil Inc.
    - c. Cooper B-Line, Inc.
    - d. Cope - Tyco/Allied Tube & Conduit.
    - e. GS Metals Corp.

2. Cable Tray Materials: Metal, suitable for indoors and protected against corrosion by hot-dip galvanizing, complying with ASTM A 123/A 123M, Grade 0.55, not less than 0.002165 inch (0.055 mm) thick.
    - a. Basket Cable Trays: 6 inches (150 mm) wide and 2 inches (50 mm) deep. Wire mesh spacing shall not exceed 2 by 4 inches (50 by 100 mm).
    - b. Trough or Ventilated Cable Trays: Nominally 6 inches (150 mm) wide.
    - c. Ladder Cable Trays: Nominally 18 inches (455 mm) wide, and a rung spacing of 12 inches (305 mm).
    - d. Channel Cable Trays: One-piece construction, nominally 4 inches (100 mm) wide. Slot spacing shall not exceed 4-1/2 inches (115 mm) o.c.
    - e. Solid-Bottom or Nonventilated Cable Trays: One-piece construction, nominally 12 inches (305 mm) wide. Provide with solid covers.
- C. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." Flexible metal conduit shall not be used.
1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

## 2.2 BACKBOARDS

- A. Description: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements for plywood backing panels in Division 06 Section "Rough Carpentry."

## 2.3 UTP CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Belden CDT Inc.; Electronics Division.
  2. Berk-Tek; a Nexans company.
  3. CommScope, Inc.
  4. Draka USA.
  5. Genesis Cable Products; Honeywell International, Inc.
  6. KRONE Incorporated.
  7. Mohawk; a division of Belden CDT.
  8. Nordex/CDT; a subsidiary of Cable Design Technologies.
  9. Superior Essex Inc.
  10. SYSTIMAX Solutions; a CommScope, Inc. brand.
  11. 3M.
  12. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
- B. Description: 100-ohm, four-pair UTP, formed into 25-pair binder groups covered with a blue thermoplastic jacket.
  1. Comply with ICEA S-90-661 for mechanical properties.
  2. Comply with TIA/EIA-568-B.1 for performance specifications.
  3. Comply with TIA/EIA-568-B.2, Category 5e.
  4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
    - a. Communications, General Purpose: Type CM or Type CMG; or Type MPP, Type CMP, Type MPR, Type CMR, Type MP, or Type MPG.

- b. Communications, Plenum Rated: Type CMP or Type MPP, complying with NFPA 262.
- c. Communications, Riser Rated: Type CMR; or Type MPP, Type CMP, or Type MPR; complying with UL 1666.
- d. Communications, Limited Purpose: Type CMX; or Type MPP, Type CMP, Type MPR, Type CMR, Type MP, Type MPG, Type CM, or Type CMG.
- e. Multipurpose: Type MP or Type MPG; or Type MPP or Type MPR.
- f. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
- g. Multipurpose, Riser Rated: Type MPR or Type MPP, complying with UL 1666.

## 2.4 UTP CABLE HARDWARE

- 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]:
  - 1. American Technology Systems Industries, Inc.
  - 2. Dynacom Corporation.
  - 3. Hubbell Premise Wiring.
  - 4. KRONE Incorporated.
  - 5. Leviton Voice & Data Division.
  - 6. Molex Premise Networks; a division of Molex, Inc.
  - 7. Nordex/CDT; a subsidiary of Cable Design Technologies.
  - 8. Panduit Corp.
  - 9. Simon Co. (The).
  - 10. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
- B. UTP Cable Connecting Hardware: IDC type, using modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of the same category or higher.
- C. Connecting Blocks: 110 style for Category 5e. Provide blocks for the number of cables terminated on the block, plus 25 percent spare; integral with connector bodies, including plugs and jacks where indicated.

## 2.5 OPTICAL FIBER CABLE

- 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]:
  - 1. Berk-Tek; a Nexans company.
  - 2. CommScope, Inc.
  - 3. Corning Cable Systems.
  - 4. General Cable Technologies Corporation.
  - 5. Mohawk; a division of Belden CDT.
  - 6. Nordex/CDT; a subsidiary of Cable Design Technologies.
  - 7. Optical Connectivity Solutions Division; Emerson Network Power.
  - 8. Superior Essex Inc.
  - 9. SYSTIMAX Solutions; a CommScope, Inc. brand.
  - 10. 3M.
  - 11. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
- B. Description: Multimode, 50/125-micrometer, 24 fiber, nonconductive, tight buffer, optical fiber cable.

1. Comply with ICEA S-83-596 for mechanical properties.
2. Comply with TIA/EIA-568-B.3 for performance specifications.
3. Comply with TIA/EIA-492AAAA-B TIA/EIA-492AAAA-A for detailed specifications.
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
  - a. General Purpose, Nonconductive: Type OFN or OFNG, or Type OFNR or Type OFNP.
  - b. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262.
  - c. Riser Rated, Nonconductive: Type OFNR or Type OFNP, complying with UL 1666.
  - d. General Purpose, Conductive: Type OFC or Type OFCG; or Type OFNG, Type OFN, Type OFCR, Type OFNR, Type OFCP, or Type OFNP.
  - e. Plenum Rated, Conductive: Type OFCP or Type OFNP, complying with NFPA 262.
  - f. Riser Rated, Conductive: Type OFCR; or Type OFNR, Type OFCP, or Type OFNP; complying with UL 1666.
5. Conductive cable shall be aluminum-armored type.
6. Maximum Attenuation: 3.5 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
7. Minimum Modal Bandwidth: 160 MHz-km at 850 nm; 500 MHz-km at 1300 nm.

C. Jacket:

1. Jacket Color: Aqua for 50/125 Orange for 62.5/125-micrometer cable.
2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA/EIA-598-B.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

## 2.6 OPTICAL FIBER CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, but are not limited to, the following:

1. ADC.
2. American Technology Systems Industries, Inc.
3. Berk-Tek; a Nexans company.
4. Corning Cable Systems.
5. Dynacom Corporation.
6. Hubbell Premise Wiring.
7. Molex Premise Networks; a division of Molex, Inc.
8. Nordex/CDT; a subsidiary of Cable Design Technologies.
9. Optical Connectivity Solutions Division; Emerson Network Power.
10. Siemon Co. (The).

B. Cable Connecting Hardware: Comply with the Fiber Optic Connector Intermateability Standards (FOCIS) specifications of TIA/EIA-604-2, TIA/EIA-604-3-A, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.

1. Quick-connect, simplex and duplex, Type SC Type ST Type LC Type MT-RJ connectors. Insertion loss not more than 0.75 dB.
2. Type SFF connectors may be used in termination racks, panels, and equipment packages.

## 2.7 RS-232 CABLE

### A. Standard Cable: NFPA 70, Type CM.

1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
2. Polypropylene insulation.
3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
4. PVC jacket.
5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned-copper drain wire.
6. Flame Resistance: Comply with UL 1581.

### B. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
2. Plastic insulation.
3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
4. Plastic jacket.
5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned-copper drain wire.
6. Flame Resistance: Comply with NFPA 262.

## 2.8 RS-485 CABLE

### A. Standard Cable: NFPA 70, Type CM or Type CMG.

1. Paired, two pairs, twisted, No. 22 AWG, stranded (7x30) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

### B. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: NFPA 262, Flame Test.

## 2.9 LOW-VOLTAGE CONTROL CABLE

### A. Paired Cable: NFPA 70, Type CMG.

1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

### B. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.



4. PVC jacket.
5. Flame Resistance: Comply with NFPA 262.

C. Paired Cable: NFPA 70, Type CMG.

1. One pair, twisted, No. 18 AWG, stranded (19x30) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

D. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 18 AWG, stranded (19x30) tinned-copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Plastic jacket.
5. Flame Resistance: NFPA 262, Flame Test.

## 2.10 CONTROL-CIRCUIT CONDUCTORS

- A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, Type XHHN, in raceway, complying with UL 83, UL 44.
- B. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, in raceway, Type XHHN, in raceway power-limited cable, concealed in building finishes power-limited tray cable, in cable tray, complying with UL 83, UL 44.
- C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or Type TF, complying with UL 83.

## 2.11 IDENTIFICATION PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Brady Corporation.
  2. HellermannTyton.
  3. Kroy LLC.
  4. Panduit Corp.
- B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- C. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

## 2.12 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.
- C. Factory test UTP cables according to TIA/EIA-568-B.2.
- D. Factory test multimode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-B.3.

- E. Cable will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION OF PATHWAYS

- A. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
- B. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
- C. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.
- D. Install manufactured conduit sweeps and long-radius elbows if possible.
- E. Pathway Installation in Equipment Rooms:
  - 1. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed or in the corner of room if multiple sheets of plywood are installed around perimeter walls of room.
  - 2. Install cable trays to route cables if conduits cannot be located in these positions.
  - 3. Secure conduits to backboard if entering room from overhead.
  - 4. Extend conduits 3 inches (75 mm) above finished floor.
  - 5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- F. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly and form smooth gap-free corners and joints.

#### 3.2 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
  - 1. Comply with TIA/EIA-568-B.1.
  - 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
  - 3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
  - 4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
  - 5. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
  - 6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
  - 7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
  - 8. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

- C. UTP Cable Installation:
1. Comply with TIA/EIA-568-B.2.
  2. Install 110-style IDC termination hardware unless otherwise indicated.
  3. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.
- D. Installation of Control-Circuit Conductors:
1. Install wiring in raceways. Comply with requirements specified in Division 26 Section "Raceway and Boxes for Electrical Systems."
- E. Optical Fiber Cable Installation:
1. Comply with TIA/EIA-568-B.3.
  2. Cable shall be terminated on connecting hardware that is rack or cabinet mounted.
- F. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
  2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1525 mm) apart.
  3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- G. Installation of Cable Routed Exposed under Raised Floors:
1. Install plenum-rated cable only.
  2. Install cabling after the flooring system has been installed in raised floor areas.
  3. Coil cable 72 inches (1830 mm) long shall be neatly coiled not less than 12 inches (305 mm) in diameter below each feed point.
- H. Separation from EMI Sources:
1. Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
  2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
    - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
    - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (305 mm).
    - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (600 mm).
  3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
    - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
    - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
    - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (305 mm).

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (75 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

### 3.3 REMOVAL OF CONDUCTORS AND CABLES

- A. Remove abandoned conductors and cables.

### 3.4 CONTROL-CIRCUIT CONDUCTORS

- A. Minimum Conductor Sizes:
  1. Class 1 remote-control and signal circuits, No 14 AWG.
  2. Class 2 low-energy, remote-control, and signal circuits, No. 16 Insert wire size AWG.
  3. Class 3 low-energy, remote-control, alarm, and signal circuits, No 12 AWG.

### 3.5 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."
- B. Comply with TIA/EIA-569-A, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

### 3.6 GROUNDING

- A. For data communication wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

### 3.7 IDENTIFICATION

- A. Identify system components, wiring, and cabling according to TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

### 3.8 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. Visually inspect UTP and optical fiber cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-B.1.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test UTP cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not after cross connection.
  - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
4. Optical Fiber Cable Tests:
  - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
  - b. Link End-to-End Attenuation Tests:
    - 1) Multimode Link Measurements: Test at 850 or 1300 nm in one direction according to TIA/EIA-526-14-A, Method B, One Reference Jumper.
    - 2) Attenuation test results for links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.
- D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION

## SECTION 260526 - GROUNDING & BONDING FOR ELECTRICAL SYSTEMS

### 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 methods and materials for grounding systems and equipment.
  - 1. Overhead-lines grounding.
  - 2. Underground distribution grounding.
  - 3. Common ground bonding with lightning protection system.

#### 1.3 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
  - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association to supervise on-site testing specified in Part 3.
- 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 UL 467 for grounding and bonding materials and equipment.

### PART 2 - PRODUCTS

#### 2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Stranded Conductors: ASTM B 8.
  - 3. Tinned Conductors: ASTM B 33.
  - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
  - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  - 6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
  - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
- C. Bare Grounding Conductor and Conductor Protector for Wood Poles:

1. No. 4 AWG minimum, soft-drawn copper.
  2. Conductor Protector: Half-round PVC or wood molding. If wood, use pressure-treated fir or cypress or cedar.
- D. Grounding Bus: Rectangular bars of annealed copper, 1/4 by 2 inches (6 by 50 mm) in cross section, unless otherwise indicated; with insulators.

## 2.2 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

## 2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad; 3/4 inch by 10 feet.
- B. Chemical-Enhanced Grounding Electrodes: Copper tube, straight or L-shaped, charged with nonhazardous electrolytic chemical salts.
1. Termination: Factory-attached No. 4/0 AWG bare conductor at least 48 inches (1200 mm) long.
  2. Backfill Material: Electrode manufacturer's recommended material.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
1. Bury at least 24 inches (600 mm) below grade.
  2. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
1. Install bus on insulated spacers 1 inch (25 mm), minimum, from wall 6 inches (150 mm) above finished floor, unless otherwise indicated.

2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, down to specified height above floor, and connect to horizontal bus.

E. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

### 3.2 GROUNDING OVERHEAD LINES

- A. Comply with IEEE C2 grounding requirements.
- B. Install 2 parallel ground rods if resistance to ground by a single, ground-rod electrode exceeds 25 ohms.
- C. Drive ground rods until tops are 12 inches (300 mm) below finished grade in undisturbed earth.
- D. Ground-Rod Connections: Install bolted connectors for underground connections and connections to rods.
- E. Lightning Arrester Grounding Conductors: Separate from other grounding conductors.
- F. Secondary Neutral and Transformer Enclosure: Interconnect and connect to grounding conductor.
- G. Protect grounding conductors running on surface of wood poles with molding extended from grade level up to and through communication service and transformer spaces.

### 3.3 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches (50 mm) above to 6 inches (150 mm) below concrete. Seal floor opening with waterproof, nonshrink grout.
- C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields as recommended by manufacturer of splicing and termination kits.
- D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches (150 mm) from the foundation.



### 3.4 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
  - 1. Feeders and branch circuits.
  - 2. Lighting circuits.
  - 3. Receptacle circuits.
  - 4. Single-phase motor and appliance branch circuits.
  - 5. Three-phase motor and appliance branch circuits.
  - 6. Flexible raceway runs.
  - 7. Armored and metal-clad cable runs.
  - 8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
  - 9. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
  - 10. X-Ray Equipment Circuits: Install insulated equipment grounding conductor in circuits supplying x-ray equipment.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- D. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- E. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.
- F. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.
- G. Signal and Communication Equipment: For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
  - 1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch (6-by-50-by-300-mm) grounding bus.
  - 2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

- H. Metal and Wood Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

### 3.5 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Common Ground Bonding with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- C. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.
  - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
  - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Division 26 Section "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches (300 mm) deep, with cover.
  - 1. Test Wells: Install at least one test well for each service, unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
  - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
  - 3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.
- F. Grounding and Bonding for Piping:
  - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
  - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.

3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- G. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.
- H. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.
- I. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of building.
  1. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.
  2. Bury ground ring not less than 24 inches (600 mm) from building foundation.
- J. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70, using a minimum of 20 feet (6 m) of bare copper conductor not smaller than No. 4 AWG.
  1. If concrete foundation is less than 20 feet (6 m) long, coil excess conductor within base of foundation.
  2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building grounding grid or to grounding electrode external to concrete.

### 3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:
- C. Perform the following tests and inspections and prepare test reports:
  1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
  2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
    - a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    - b. Perform tests by fall-of-potential method according to IEEE 81.
  3. Prepare dimensioned drawings locating each test well, ground rod and ground rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

- D. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity 500 kVA and Less: 10 ohms.
  2. Power and Lighting Equipment or System with Capacity 500 to 1000 kVA: 5 ohms.
  3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
  4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm.
  5. Substations and Pad-Mounted Equipment: 5 ohms.
  6. Manhole Grounds: 10 ohms.
- E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION

## SECTION 260529 - HANGERS & SUPPORTS FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Hangers and supports for electrical equipment and systems.
  - 2. Construction requirements for concrete bases.
- B. Related Sections include the following:
  - 1. Division 26 Section "Vibration And Seismic Controls For Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

#### 1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

#### 1.5 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

## 1.6 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

## PART 2 - PRODUCTS

### 2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
  - 1. 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:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit.
    - b. Cooper B-Line, Inc.; a division of Cooper Industries.
    - c. ERICO International Corporation.
    - d. GS Metals Corp.
    - e. Thomas & Betts Corporation.
    - f. Unistrut; Tyco International, Ltd.
    - g. Wesanco, Inc.
  - 3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  - 4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  - 5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
  - 6. Channel Dimensions: Selected for applicable load criteria.
- B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch- (14-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c., in at least 1 surface.
  - 1. 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:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit.
    - b. Cooper B-Line, Inc.; a division of Cooper Industries.
    - c. Fabco Plastics Wholesale Limited.
    - d. Seasafe, Inc.
  - 3. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.

4. Fitting and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
  5. Rated Strength: Selected to suit applicable load criteria.
- C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- D. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
    - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Hilti Inc.
      - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      - 3) MKT Fastening, LLC.
      - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
  2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated, or stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
    - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
      - 2) Empire Tool and Manufacturing Co., Inc.
      - 3) Hilti Inc.
      - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      - 5) MKT Fastening, LLC.
  3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.

4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

## 2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
  1. Secure raceways and cables to these supports with two-bolt conduit clamps, single-bolt conduit clamps, or single-bolt conduit clamps using spring friction action for retention in support channel.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

### 3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  1. To Wood: Fasten with lag screws or through bolts.



2. To New Concrete: Bolt to concrete inserts.
  3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  4. To Existing Concrete: Expansion anchor fasteners.
  5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
  6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts, Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69 or Spring-tension clamps.
  7. To Light Steel: Sheet metal screws.
  8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

### 3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

### 3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete.."
- C. Anchor equipment to concrete base.
  1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  2. Install anchor bolts to elevations required for proper attachment to supported equipment.
  3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

### 3.5 PAINTING

- A. Touchup: 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 (0.05 mm).
- B. Touchup: Comply with requirements in Division 09 painting Sections, Section "High-Performance Coatings" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

## SECTION 260533 - RACEWAY & BOXES FOR ELECTRICAL SYSTEMS

### 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 raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
  - 1. Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.

#### 1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. EPDM: Ethylene-propylene-diene terpolymer rubber.
- D. FMC: Flexible metal conduit.
- E. IMC: Intermediate metal conduit.
- F. LFMC: Liquidtight flexible metal conduit.
- G. LFNC: Liquidtight flexible nonmetallic conduit.
- H. NBR: Acrylonitrile-butadiene rubber.
- I. RNC: Rigid nonmetallic conduit.

#### 1.4 QUALITY ASSURANCE

- A. 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.
- B. Comply with NFPA 70.

### PART 2 - PRODUCTS

#### 2.1 METAL CONDUIT AND TUBING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AFC Cable Systems, Inc.
  2. Alflex Inc.
  3. Allied Tube & Conduit; a Tyco International Ltd. Co.
  4. Anamet Electrical, Inc.; Anaconda Metal Hose.
  5. Electri-Flex Co.
  6. Manhattan/CDT/Cole-Flex.
  7. Maverick Tube Corporation.
  8. O-Z Gedney; a unit of General Signal.
  9. Wheatland Tube Company.
- C. Rigid Steel Conduit: ANSI C80.1.
- D. Aluminum Rigid Conduit: ANSI C80.5.
- E. IMC: ANSI C80.6.
- F. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit or IMC.
1. Comply with NEMA RN 1.
  2. Coating Thickness: 0.040 inch (1 mm), minimum.
- G. EMT: ANSI C80.3.
- H. FMC: Zinc-coated steel or aluminum.
- I. LFMC: Flexible steel conduit with PVC jacket.
- J. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
  2. Fittings for EMT: Steel, set-screw in concealed spaces and compression in shop and wash down areas.
  3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
- K. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

## 2.2 NONMETALLIC CONDUIT AND TUBING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AFC Cable Systems, Inc.
  2. Anamet Electrical, Inc.; Anaconda Metal Hose.
  3. Arnco Corporation.

4. CANTEX Inc.
5. CertainTeed Corp.; Pipe & Plastics Group.
6. Condux International, Inc.
7. ElecSYS, Inc.
8. Electri-Flex Co.
9. Lamson & Sessions; Carlon Electrical Products.
10. Manhattan/CDT/Cole-Flex.
11. RACO; a Hubbell Company.
12. Thomas & Betts Corporation.
13. <Insert manufacturer's name.>

C. ENT: NEMA TC 13.

D. RNC: NEMA TC 2, Type EPC-40-PVC unless otherwise indicated.

E. LFNC: UL 1660.

F. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.

G. Fittings for LFNC: UL 514B.

### 2.3 OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY AND FITTINGS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Arnco Corporation.
2. Endot Industries Inc.
3. IPEX Inc.
4. Lamson & Sessions; Carlon Electrical Products.

C. Description: Comply with UL 2024; flexible type, approved for general-use installation.

### 2.4 METAL WIREWAYS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.
2. Hoffman.
3. Square D; Schneider Electric.

C. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type appropriate for location to comply with NEC.

D. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

- E. Wireway Covers: As indicated.
- F. Finish: Manufacturer's standard enamel finish.

## 2.5 NONMETALLIC WIREWAYS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Hoffman.
  - 2. Lamson & Sessions; Carlon Electrical Products.
- C. Description: Fiberglass polyester, extruded and fabricated to size and shape indicated, with no holes or knockouts. Cover is gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections are flanged, with stainless-steel screws and oil-resistant gaskets.
- D. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.
- E. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

## 2.6 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish.
  - 1. 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:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Thomas & Betts Corporation.
    - b. Walker Systems, Inc.; Wiremold Company (The).
    - c. Wiremold Company (The); Electrical Sales Division.
- B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture and color, Manufacturer's standard enamel finish.
  - 1. 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:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Butler Manufacturing Company; Walker Division.
    - b. Enduro Systems, Inc.; Composite Products Division.
    - c. Hubbell Incorporated; Wiring Device-Kellems Division.
    - d. Lamson & Sessions; Carlon Electrical Products.

- e. Panduit Corp.
- f. Walker Systems, Inc.; Wiremold Company (The).
- g. Wiremold Company (The); Electrical Sales Division.

## 2.7 BOXES, ENCLOSURES, AND CABINETS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
  - 2. EGS/Appleton Electric.
  - 3. Erickson Electrical Equipment Company.
  - 4. Hoffman.
  - 5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
  - 6. O-Z/Gedney; a unit of General Signal.
  - 7. RACO; a Hubbell Company.
  - 8. Robroy Industries, Inc.; Enclosure Division.
  - 9. Scott Fetzer Co.; Adalet Division.
  - 10. Spring City Electrical Manufacturing Company.
  - 11. Thomas & Betts Corporation.
  - 12. Walker Systems, Inc.; Wiremold Company (The).
  - 13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- C. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- D. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
- F. Metal Floor Boxes: Cast or sheet metal, fully adjustable, rectangular.
- G. Nonmetallic Floor Boxes: Nonadjustable, round.
- H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- I. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum, galvanized, cast iron with gasketed cover.
- J. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
  - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
  - 2. Nonmetallic Enclosures: Plastic.
- K. Cabinets:
  - 1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
  - 2. Hinged door in front cover with flush latch and concealed hinge.
  - 3. Key latch to match panelboards.
  - 4. Metal barriers to separate wiring of different systems and voltage.
  - 5. Accessory feet where required for freestanding equipment.

## 2.8 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. Description: Comply with SCTE 77.
1. Color of Frame and Cover: Gray or Green.
  2. Configuration: Units shall be designed for flush burial and have open bottom, unless otherwise indicated.
  3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
  4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
  5. Cover Legend: Molded lettering, "ELECTRIC." "TELEPHONE." as indicated for each service.
  6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
  7. Handholes 12 inches wide by 24 inches long (300 mm wide by 600 mm long) unless noted otherwise and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or a combination of the two.
1. 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:
  2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings, or a comparable product by one of the following:
    - a. Armorcast Products Company.
    - b. Carson Industries LLC.
    - c. CDR Systems Corporation.
    - d. NewBasis.
- C. Fiberglass Handholes and Boxes with Polymer-Concrete Frame and Cover: Sheet-molded, fiberglass-reinforced, polyester-resin enclosure joined to polymer-concrete top ring or frame.
1. 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:
  2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
    - a. Armorcast Products Company.
    - b. Carson Industries LLC.
    - c. Christy Concrete Products.
    - d. Synertech Moulded Products, Inc.; a division of Oldcastle Precast.
- D. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with covers of polymer concrete, reinforced concrete, cast iron, hot-dip galvanized-steel diamond plate or fiberglass appropriate for the application.



1. 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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. Carson Industries LLC.
  - b. Christy Concrete Products.
  - c. Nordic Fiberglass, Inc.

## 2.9 SLEEVES FOR RACEWAYS

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch (1.3- or 3.5-mm) thickness as indicated and of length to suit application.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

## 2.10 SLEEVE SEALS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  1. Advance Products & Systems, Inc.
  2. Calpico, Inc.
  3. Metraflex Co.
  4. Pipeline Seal and Insulator, Inc.
- D. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
  1. Sealing Elements: EPDM, NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
  2. Pressure Plates: Plastic, Carbon steel, Stainless steel. Include two for each sealing element.
  3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating, Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## 2.11 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

- A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
1. Tests of materials shall be performed by a independent testing agency.
  2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
  3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

## PART 3 - EXECUTION

### 3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
1. Exposed Conduit: Rigid steel conduit, IMC, RNC, Type EPC-40-PVC, RNC, Type EPC-80-PVC.
  2. Concealed Conduit, Aboveground: Rigid steel conduit, IMC, EMT, RNC, Type EPC-40-PVC.
  3. Underground Conduit: RNC, Type EPC-40 80-PVC, direct buried.
  4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC, LFNC.
  5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R, 4.
  6. Application of Handholes and Boxes for Underground Wiring:
    - a. Handholes and Pull Boxes in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Polymer concrete, Fiberglass enclosures with polymer-concrete frame and cover, Fiberglass-reinforced polyester resin, SCTE 77, Tier 15 structural load rating.
    - b. Handholes and Pull Boxes in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Polymer-concrete units, Heavy-duty fiberglass units with polymer-concrete frame and cover, SCTE 77, Tier 8 structural load rating.
    - c. Handholes and Pull Boxes Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin, structurally tested according to SCTE 77 with 3000-lbf (13 345-N) vertical loading.
- B. Comply with the following indoor applications, unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT, ENT, or RNC.
  2. Exposed, Not Subject to Severe Physical Damage: EMT, RNC identified for such use.
  3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit, IMC. Includes raceways in the following locations:
    - a. Loading dock.
    - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    - c. Mechanical rooms.
  4. Concealed in Ceilings and Interior Walls and Partitions: EMT, ENT or RNC, Type EPC-40-PVC.

5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
  6. Damp or Wet Locations: Rigid steel conduit, IMC.
  7. Raceways for Optical Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical fiber/communications cable raceway, EMT.
  8. Raceways for Optical Fiber or Communications Cable Risers in Vertical Shafts: Riser-type, optical fiber/communications cable raceway, EMT.
  9. Raceways for Concealed General Purpose Distribution of Optical Fiber or Communications Cable: General-use, optical fiber/communications cable raceway, Riser-type, optical fiber/communications cable raceway, Plenum-type, optical fiber/communications cable raceway, EMT.
  10. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel, nonmetallic in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
  2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.
- E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.
- F. Do not install aluminum conduits in contact with concrete.

### 3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
  1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.

2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
  3. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
  - J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
  - K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.
  - L. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
    1. 3/4-Inch (19-mm) Trade Size and Smaller: Install raceways in maximum lengths of 50 feet (15 m).
    2. 1-Inch (25-mm) Trade Size and Larger: Install raceways in maximum lengths of 75 feet (23 m).
    3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
  - M. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
    1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
    2. Where otherwise required by NFPA 70.
  - N. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F (17 deg C), and that has straight-run length that exceeds 25 feet (7.6 m).
    1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
      - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
      - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
      - c. Indoor Spaces: Connected with the Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
      - d. Attics: 135 deg F (75 deg C) temperature change.
    2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change.

3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.
- O. Flexible Conduit Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
  2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- P. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
- Q. Set metal floor boxes level and flush with finished floor surface.
- R. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

### 3.3 INSTALLATION OF UNDERGROUND CONDUIT

#### A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
2. Install backfill as specified in Division 31 Section "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
  - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete.
  - b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
6. Warning Planks: Bury warning planks approximately 12 inches (300 mm) above direct-buried conduits, placing them 24 inches (600 mm) o.c. Align planks along the width and along the centerline of conduit.

### 3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25 mm) above finished grade.
- D. Install handholes and boxes with bottom below the frost line.
- E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.
- F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

### 3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Rectangular Sleeve Minimum Metal Thickness:
  - 1. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side greater than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
  - 2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches (1270 mm) and 1 or more sides equal to, or greater than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).
- E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- F. Cut sleeves to length for mounting flush with both surfaces of walls.
- G. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
- H. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway unless sleeve seal is to be installed.
- I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

- K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 07 Section "Penetration Firestopping."
- L. Roof-Penetration Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.
- M. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- N. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway and sleeve for installing mechanical sleeve seals.

### 3.6 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground, exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### 3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

### 3.8 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

## SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

### 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. Identification for raceways.
  - 2. Identification of power and control cables.
  - 3. Identification for conductors.
  - 4. Underground-line warning tape.
  - 5. Warning labels and signs.
  - 6. Instruction signs.
  - 7. Equipment identification labels.
  - 8. Miscellaneous identification products.

#### 1.3 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and IEEE C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

#### 1.4 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.



## PART 2 - PRODUCTS

### 2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
  - 1. Black letters on an orange field.
  - 2. Legend: Indicate voltage and system or service type.
- C. Colors for Raceways Carrying Circuits at More Than 600 V:
  - 1. Black letters on an orange field.
  - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- (75-mm-) high letters on 20-inch (500-mm) centers.
- D. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- E. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- G. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers diagonally over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stop stripes at legends.
- H. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.
- I. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) or 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
  - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
  - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

### 2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Colors for Raceways Carrying Circuits at 600 V and Less:
  - 1. Black letters on an orange field.
  - 2. Legend: Indicate voltage and system or service type.

- C. Colors for Raceways Carrying Circuits at More Than 600 V:
  - 1. Black letters on an orange field.
  - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- (75-mm-) high letters on 20-inch (500-mm) centers.
- D. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- E. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.

### 2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.
- D. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) or 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
  - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
  - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
- E. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

### 2.4 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

- D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- F. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) or 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
  - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
  - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

## 2.5 FLOOR MARKING TAPE

- A. 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

## 2.6 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
  - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
  - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
  - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
  - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
  - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
  - 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.
- C. Tag: Type I:
  - 1. Pigmented polyolefin, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
  - 2. Thickness: 4 mils (0.1 mm).
  - 3. Weight: 18.5 lb/1000 sq. ft. (9.0 kg/100 sq. m).
  - 4. 3-Inch (75-mm) Tensile According to ASTM D 882: 30 lbf (133.4 N), and 2500 psi (17.2 MPa).
- D. Tag: Type II:
  - 1. Multilayer laminate consisting of high-density polyethylene scrim coated with pigmented polyolefin, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
  - 2. Thickness: 12 mils (0.3 mm).
  - 3. Weight: 36.1 lb/1000 sq. ft. (17.6 kg/100 sq. m).
  - 4. 3-Inch (75-mm) Tensile According to ASTM D 882: 400 lbf (1780 N), and 11,500 psi (79.2 MPa).

E. Tag: Type ID

1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
2. Overall Thickness: 5 mils (0.125 mm).
3. Foil Core Thickness: 0.35 mil (0.00889 mm).
4. Weight: 28 lb/1000 sq. ft. (13.7 kg/100 sq. m).
5. 3-Inch (75-mm) Tensile According to ASTM D 882: 70 lbf (311.3 N), and 4600 psi (31.7 MPa).

F. Tag: Type IID:

1. Reinforced, detectable three-layer laminate, consisting of a printed pigmented woven scrim, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
2. Overall Thickness: 8 mils (0.2 mm).
3. Foil Core Thickness: 0.35 mil (0.00889 mm).
4. Weight: 34 lb/1000 sq. ft. (16.6 kg/100 sq. m).
5. 3-Inch (75-mm) Tensile According to ASTM D 882: 300 lbf (1334 N), and 12,500 psi (86.1 MPa).

## 2.7 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 7 by 10 inches (180 by 250 mm).

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 10 by 14 inches (250 by 360 mm).

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

## 2.8 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
  - 1. Engraved legend with black letters on white face.
  - 2. Punched or drilled for mechanical fasteners.
  - 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
- B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

## 2.9 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.
- C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).
- D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).
- E. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch (25 mm).

## 2.10 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.
  - 1. Minimum Width: 3/16 inch (5 mm).
  - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
  - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
  - 4. Color: Black except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.
  - 1. Minimum Width: 3/16 inch (5 mm).
  - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
  - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
  - 4. Color: Black.

- C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
  - 1. Minimum Width: 3/16 inch (5 mm).
  - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi (48.2 MPa).
  - 3. UL 94 Flame Rating: 94V-0.
  - 4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
  - 5. Color: Black.

## 2.11 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
- G. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- H. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
  - 1. Outdoors: UV-stabilized nylon.
  - 2. In Spaces Handling Environmental Air: Plenum rated.
- I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench [or concrete envelope ]exceeds 16 inches (400 mm) overall.

- J. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

### 3.2 IDENTIFICATION SCHEDULE

- A. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- (75-mm-) high black letters on 20-inch (500-mm) centers. Stop stripes at legends. Apply to the following finished surfaces:
  - 1. Floor surface directly above conduits running beneath and within 12 inches (300 mm) of a floor that is in contact with earth or is framed above unexcavated space.
  - 2. Wall surfaces directly external to raceways concealed within wall.
  - 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- B. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Self-adhesive vinyl, Snap-around labels. Install labels at 30-foot (10-m) maximum intervals.
- C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A, and 120V to ground: Identify with self-adhesive vinyl label, self-adhesive vinyl tape applied in bands. Install labels at 30-foot (10-m) maximum intervals.
- D. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
  - 1. Emergency Power.
  - 2. Power.
  - 3. UPS.
- E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
  - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
    - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
    - b. Colors for 208/120-V Circuits:
      - 1) Phase A: Black.
      - 2) Phase B: Red.
      - 3) Phase C: Blue.
    - c. Colors for 480/277-V Circuits:
      - 1) Phase A: Brown.
      - 2) Phase B: Orange.
      - 3) Phase C: Yellow.
    - d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where

splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

- F. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags, nonmetallic plastic tag holder with adhesive-backed phase tags, and a separate tag with the circuit designation.
- G. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- H. Conductors to Be Extended in the Future: Attach write-on tags, marker tape to conductors and list source.
- I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
  - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
  - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
  - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- J. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
  - 1. Limit use of underground-line warning tape to direct-buried cables.
  - 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- K. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- L. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels, Baked-enamel warning signs, or Metal-backed, butyrate warning signs.
  - 1. Comply with 29 CFR 1910.145.
  - 2. Identify system voltage with black letters on an orange background.
  - 3. Apply to exterior of door, cover, or other access.
  - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
    - a. Power transfer switches.
    - b. Controls with external control power connections.
    - c. <Insert items>.
- M. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- N. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer and load shedding.



- O. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

- a. Indoor Equipment: Adhesive film label, Adhesive film label with clear protective overlay, Self-adhesive, engraved, laminated acrylic or melamine label, Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
- b. Outdoor Equipment: Engraved, laminated acrylic or melamine label, Stenciled legend 4 inches (100 mm) high.
- c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
- d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

- a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive engraved, engraved laminated acrylic or melamine label.
- b. Enclosures and electrical cabinets.
- c. Access doors and panels for concealed electrical items.
- d. Switchgear.
- e. Switchboards.
- f. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
- g. Substations.
- h. Emergency system boxes and enclosures.
- i. Motor-control centers.
- j. Enclosed switches.
- k. Enclosed circuit breakers.
- l. Enclosed controllers.
- m. Variable-speed controllers.
- n. Push-button stations.
- o. Power transfer equipment.
- p. Contactors.
- q. Remote-controlled switches, dimmer modules, and control devices.
- r. Battery-inverter units.
- s. Battery racks.
- t. Power-generating units.
- u. Monitoring and control equipment.
- v. UPS equipment.

END OF SECTION

## SECTION 260923 - LIGHTING CONTROL DEVICES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following lighting control devices:
  - 1. Time switches.  
Photoelectric switches.
  - 2. Indoor occupancy sensors.
  - 3. Outdoor motion sensors.
  - 4. Lighting contactors.
  - 5. Emergency shunt relays.
- B. Related Sections include the following:
  - 1. Division 26 Sections "Central Dimming Controls, Modular Dimming Controls" for architectural dimming system equipment.
  - 2. Division 26 Section "Network Lighting Controls" for low-voltage, manual and programmable lighting control systems.
  - 3. Division 26 Section "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.
  - 4. Division 26 Section "Theatrical Lighting" for theatrical lighting controls.

#### 1.3 DEFINITIONS

- A. LED: Light-emitting diode.
- B. PIR: Passive infrared.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show installation details for occupancy and light-level sensors.
  - 1. Interconnection diagrams showing field-installed wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For each type of product 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, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

## 1.6 COORDINATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression system, and partition assemblies.

## PART 2 - PRODUCTS

### 2.1 TIME SWITCHES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - 1. Area Lighting Research, Inc.; Tyco Electronics.
  - 2. Grasslin Controls Corporation; a GE Industrial Systems Company.
  - 3. Intermatic, Inc.
  - 4. Leviton Mfg. Company Inc.
  - 5. Lightolier Controls; a Genlyte Company.
  - 6. Lithonia Lighting; Acuity Lighting Group, Inc.
  - 7. Paragon Electric Co.; Invensys Climate Controls.
  - 8. Square D; Schneider Electric.
  - 9. TORK.
  - 10. Touch-Plate, Inc.
  - 11. Watt Stopper (The).
- D. Electronic Time Switches: Electronic, solid-state programmable units with alphanumeric display; complying with UL 917.
  - 1. Contact Configuration: SPST, DPST, DPDT.
  - 2. Contact Rating: 30-A inductive or resistive, 240-V ac, 20-A ballast load, 120/240-V ac.
  - 3. Program: 8 on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
  - 4. Program: 2 on-off set points on a 24-hour schedule, allowing different set points for each day of the week and an annual holiday schedule that overrides the weekly operation on holidays.
  - 5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
  - 6. Astronomic Time: All channels.
  - 7. Battery Backup: For schedules and time clock.
- E. Electromechanical-Dial Time Switches: Type complying with UL 917.
  - 1. Contact Configuration: SPST, DPST, SPDT, DPDT.

2. Contact Rating: 30-A inductive or resistive, 240-V ac, 20-A ballast load, 120/240-V ac.
3. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.
4. Astronomic time dial.
5. Eight-Day Program: Uniquely programmable for each weekday and holidays.
6. Skip-a-day mode.
7. Wound-spring reserve carryover mechanism to keep time during power failures, minimum of 16 hours.

## 2.2 OUTDOOR PHOTOELECTRIC SWITCHES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  1. Area Lighting Research, Inc.; Tyco Electronics.
  2. Grasslin Controls Corporation; a GE Industrial Systems Company.
  3. Intermatic, Inc.
  4. Lithonia Lighting; Acuity Lighting Group, Inc.
  5. Novitas, Inc.
  6. Paragon Electric Co.; Invensys Climate Controls.
  7. Square D; Schneider Electric.
  8. TORK.
  9. Touch-Plate, Inc.
  10. Watt Stopper (The).
- D. Description: Solid state, with SPST, DPST dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.
  1. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lx), with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of photocell to prevent fixed light sources from causing turn-off.
  2. Time Delay: 15-second minimum, to prevent false operation.
  3. Surge Protection: Metal-oxide varistor, complying with IEEE C62.41.1, IEEE C62.41.2, and IEEE 62.45 for Category A1 locations.
  4. Mounting: Twist lock complying with IEEE C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.
- E. Description: Solid state, with SPST, DPST dry contacts rated for 1800 VA to operate connected load, relay, or contactor coils; complying with UL 773.
  1. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lx), with an adjustment for turn-on and turn-off levels within that range.
  2. Time Delay: 30-second minimum, to prevent false operation.
  3. Lightning Arrester: Air-gap type.
  4. Mounting: Twist lock complying with IEEE C136.10, with base.

## 2.3 INDOOR PHOTOELECTRIC SWITCHES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Allen-Bradley/Rockwell Automation.
  2. Area Lighting Research, Inc.; Tyco Electronics.
  3. Eaton Electrical Inc; Cutler-Hammer Products.
  4. Grasslin Controls Corporation; a GE Industrial Systems Company.
  5. Intermatic, Inc.
  6. Lithonia Lighting; Acuity Lighting Group, Inc.
  7. MicroLite Lighting Control Systems.
  8. Novitas, Inc.
  9. Paragon Electric Co.; Invensys Climate Controls.
  10. Square D; Schneider Electric.
  11. TORK.
  12. Touch-Plate, Inc.
  13. Watt Stopper (The).
- D. Ceiling-Mounted Photoelectric Switch: Solid-state, light-level sensor unit, with separate relay unit mounted on luminaire, to detect changes in lighting levels that are perceived by the eye. Cadmium sulfide photoresistors are not acceptable.
1. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.
  2. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
  3. Light-Level Monitoring Range: 10 to 200 fc (108 to 2152 lx) or 100 to 1000 fc (1080 to 10 800 lx), with an adjustment for turn-on and turn-off levels within that range as applicable.
  4. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling, with deadband adjustment.
  5. Indicator: Two LEDs to indicate the beginning of on-off cycles.
- E. Skylight Photoelectric Sensors: Solid-state, light-level sensor; housed in a threaded, plastic fitting for mounting under skylight, facing up at skylight; with separate relay unit to detect changes in lighting levels that are perceived by the eye. Cadmium sulfide photoresistors are not acceptable.
1. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.
  2. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for [1] <Insert value> hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
  3. Light-Level Monitoring Range: 1000 to 10,000 fc (10 800 to 108 000 lx), with an adjustment for turn-on and turn-off levels within that range.
  4. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling, with deadband adjustment.

5. Indicator: Two LEDs to indicate the beginning of on-off cycles.

## 2.4 INDOOR OCCUPANCY SENSORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  1. Hubbell Lighting.
  2. Leviton Mfg. Company Inc.
  3. Lithonia Lighting; Acuity Lighting Group, Inc.
  4. Novitas, Inc.
  5. RAB Lighting, Inc.
  6. Sensor Switch, Inc.
  7. TORK.
  8. Watt Stopper (The).
- D. General Description: Wall- or ceiling-mounting, solid-state units with a separate relay unit.
  1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
  2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
  3. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
  4. Mounting:
    - a. Sensor: Suitable for mounting in any position on a standard outlet box.
    - b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
    - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
  5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
  6. Bypass Switch: Override the on function in case of sensor failure.
  7. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc (21.5 to 2152 lx); keep lighting off when selected lighting level is present.
- E. PIR Type: Ceiling mounting; detect occupancy by sensing a combination of heat and movement in area of coverage.
  1. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm).
  2. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

3. Detection Coverage (Corridor): Detect occupancy within 90 feet (27.4 m) when mounted on a 10-foot- (3-m-) high ceiling.
- F. Ultrasonic Type: Ceiling mounting; detect occupancy by sensing a change in pattern of reflected ultrasonic energy in area of coverage.
1. Detector Sensitivity: Detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
  2. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of 600 sq. ft. (56 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
  3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
  4. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2000 sq. ft. (186 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
  5. Detection Coverage (Corridor): Detect occupancy anywhere within 90 feet (27.4 m) when mounted on a 10-foot- (3-m-) high ceiling in a corridor not wider than 14 feet (4.3 m).
- G. Dual-Technology Type: Ceiling mounting; detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or combination of technologies that controls on-off functions shall be selectable in the field by operating controls on unit.
1. Sensitivity Adjustment: Separate for each sensing technology.
  2. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm), and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
  3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

## 2.5 OUTDOOR MOTION SENSORS (PIR)

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Bryant Electric; a Hubbell Company.
  2. Hubbell Lighting.
  3. Lithonia Lighting; Acuity Lighting Group, Inc.
  4. Paragon Electric Co.; Invensys Climate Controls.
  5. RAB Lighting, Inc.
  6. TORK.
  7. Watt Stopper (The).
- D. Performance Requirements: Suitable for operation in ambient temperatures ranging from minus 40 to plus 130 deg F (minus 40 to plus 54 deg C), rated as raintight according to UL 773A.

1. Operation: Turn lights on when sensing infrared energy changes between background and moving body in area of coverage; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
  2. Mounting:
    - a. Sensor: Suitable for mounting in any position on a standard outdoor junction box.
    - b. Relay: Internally mounted in a standard weatherproof electrical enclosure.
    - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
  3. Bypass Switch: Override the on function in case of sensor failure.
  4. Automatic Light-Level Sensor: Adjustable from 1 to 20 fc (11 to 215 lx); keep lighting off during daylight hours.
- E. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm).
- F. Detection Coverage: Up to 35 feet (11 m), with a field of view of 90 degrees, Up to 100 feet (30 m), with a field of view of 60 degrees, Up to 35 feet (11 m), with a field of view of 180 degrees, Up to 52.5 feet (16 m), with a field of view of 270 degrees.
- G. Lighting Fixture Mounted Sensor: Suitable for switching 300 W of tungsten load at 120- or 277-V ac.
- H. Individually Mounted Sensor: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
1. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
  2. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.

## 2.6 LIGHTING CONTACTORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  1. Allen-Bradley/Rockwell Automation.
  2. ASCO Power Technologies, LP; a division of Emerson Electric Co.
  3. Eaton Electrical Inc.; Cutler-Hammer Products.
  4. GE Industrial Systems; Total Lighting Control.
  5. Grasslin Controls Corporation; a GE Industrial Systems Company.
  6. Hubbell Lighting.
  7. Lithonia Lighting; Acuity Lighting Group, Inc.
  8. MicroLite Lighting Control Systems.
  9. Square D; Schneider Electric.
  10. TORK.
  11. Touch-Plate, Inc.



12. Watt Stopper (The).

- D. Description: Electrically operated and mechanically or electrically held, combination type with fusible switch or nonfused disconnect as required by NFPA70, complying with NEMA ICS 2 and UL 508.
1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
  2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
  3. Enclosure: Comply with NEMA 250.
  4. Provide with control and pilot devices as indicated on Drawings or schedules, matching the NEMA type specified for the enclosure.
- E. BAS Interface: Provide hardware interface to enable the BAS to monitor and control lighting contactors.
1. Monitoring: On-off status.
  2. Control: On-off operation.

2.7 EMERGENCY SHUNT RELAY

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Lighting Control and Design, Inc.
- D. Description: Normally closed, electrically held relay, arranged for wiring in parallel with manual or automatic switching contacts; complying with UL 924.
1. Coil Rating: 120 or 277 V depending on available source.

2.8 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

## PART 3 - EXECUTION

### 3.1 SENSOR INSTALLATION

- A. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

### 3.2 CONTACTOR INSTALLATION

- A. Mount electrically held lighting contactors with elastomeric isolator pads, to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

### 3.3 WIRING INSTALLATION

- A. Wiring Method: Comply with Division 26 Section "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size shall be 1/2 inch (13 mm).
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

### 3.4 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26 Section "Identification for Electrical Systems."
  - 1. Identify controlled circuits in lighting contactors.
  - 2. Identify circuits or luminaries controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

### 3.5 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
  - 2. Operational Test: Verify operation of each lighting control device, and adjust time delays.
- B. Lighting control devices that fail tests and inspections are defective work.

### 3.6 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.7 DEMONSTRATION

- A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control system specified in Division 26 Section "Network Lighting Controls."
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION

## SECTION 262416 - PANELBOARDS

### 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. Distribution panelboards.
  - 2. Lighting and appliance branch-circuit panelboards.
  - 3. Load centers.
  - 4. Electronic-grade panelboards.

#### 1.3 DEFINITIONS

- A. SVR: Suppressed voltage rating.
- B. TVSS: Transient voltage surge suppressor.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
  - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

#### 1.5 SUBMITTALS

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
  - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
  - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
  - 3. Detail bus configuration, current, and voltage ratings.
  - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
  - 5. Include evidence of NRTL listing for series rating of installed devices.
  - 6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
  - 7. Include wiring diagrams for power, signal, and control wiring.

8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graph paper; include selectable ranges for each type of overcurrent protective device.

C. Qualification Data: For qualified testing agency.

D. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

E. Field Quality-Control Reports:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

F. Panelboard Schedules: For installation in panelboards.

G. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

## 1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. 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.

E. Comply with NEMA PB 1.

F. Comply with NFPA 70.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.
- B. Handle and prepare panelboards for installation according to NECA 407 and NEMA PB 1.

## 1.8 PROJECT CONDITIONS

### A. Environmental Limitations:

- 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
  - a. Ambient Temperature: Not exceeding minus 22 deg F (minus 30 deg C) 23 deg F (minus 5 deg C) to plus 104 deg F (plus 40 deg C).
  - b. Altitude: Not exceeding 6600 feet (2000 m).

### B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

- 1. Ambient temperatures within limits specified.
- 2. Altitude not exceeding 6600 feet (2000 m).

### C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

- 1. Notify Architect, Construction Manager and Owner no fewer than 14 days in advance of proposed interruption of electric service.
- 2. Do not proceed with interruption of electric service without Architect's, Construction Manager's and Owner's written permission.
- 3. Comply with NFPA 70E.

## 1.9 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

## 1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

#### 1.11 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. Keys: Two spares for each type of panelboard cabinet lock.
  2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP) Types: Two spares for each panelboard.
  3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
  4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

### PART 2 - PRODUCTS

#### 2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
- B. Enclosures: Flush- and surface-mounted cabinets.
  1. Rated for environmental conditions at installed location.
    - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
    - b. Outdoor Locations: NEMA 250, Type 3R.
    - c. Kitchen Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
    - d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
    - e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
  2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
  3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
  4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
  5. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
  6. Finishes:
    - a. Panels and Trim: Steel and galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
    - b. Back Boxes: Galvanized steel.
    - c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.
  7. Directory Card: Inside panelboard door, mounted in transparent card holder.
- C. Incoming Mains Location: Top and bottom.
- D. Phase, Neutral, and Ground Buses:

1. Material: Tin-plated aluminum or Hard-drawn copper, 98 percent conductivity per drawings.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
3. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
4. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.
5. Split Bus: Vertical buses divided into individual vertical sections.

E. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Tin-plated aluminum, Hard-drawn copper, 98 percent conductivity per drawings.
2. Main and Neutral Lugs: Compression or Mechanical type.
3. Ground Lugs and Bus-Configured Terminators: Compression or Mechanical type.
4. Feed-Through Lugs: Compression or Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
5. Subfeed (Double) Lugs: Compression or Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
6. Gutter-Tap Lugs: Compression or Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
7. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.

F. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.

G. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

H. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices, listed and labeled for series-connected short-circuit rating by an NRTL.

I. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

## 2.2 DISTRIBUTION PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

C. Panelboards: NEMA PB 1, power and feeder distribution type.

D. Doors: Secured with vault-type latch with tumbler lock; keyed alike.



1. For doors more than 36 inches (914 mm) high, provide two latches, keyed alike.
- E. Mains: Circuit breaker or Fused switch or Lugs only per drawings.
- F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
- G. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
- H. Branch Overcurrent Protective Devices: Fused switches.
- I. Contactors in Main Bus: NEMA ICS 2, Class A, electrically or mechanically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
  1. Internal Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.
  2. External Control-Power Source: per manufacturer.

### 2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  3. Siemens Energy & Automation, Inc.
  4. Square D; a brand of Schneider Electric.
- C. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- D. Mains: Circuit breaker or lugs only per drawings.
- E. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- F. Contactors in Main Bus: NEMA ICS 2, Class A, electrically or mechanically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
  1. Internal Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.
  2. External Control-Power Source: per manufacturer.
- G. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.
- H. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

## 2.4 LOAD CENTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square D; a brand of Schneider Electric.
- C. Load Centers: Comply with UL 67.
- D. Mains: Circuit breaker or Lugs only per drawings.
- E. Branch Overcurrent Protective Devices: Plug-in circuit breakers, replaceable without disturbing adjacent units.
- F. Conductor Connectors: Mechanical type for main, neutral, and ground lugs and buses.

## 2.5 ELECTRONIC-GRADE PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - 1. Current Technology; a subsidiary of Danahar Corporation.
  - 2. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  - 3. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  - 4. Liebert Corporation.
  - 5. Siemens Energy & Automation, Inc.
  - 6. Square D; a brand of Schneider Electric.
- C. Panelboards: NEMA PB 1; with factory-installed, integral TVSS; labeled by an NRTL for compliance with UL 67 after installing TVSS.
- D. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
- E. Main Overcurrent Protective Devices: Bolt-on thermal-magnetic circuit breakers.
- F. Branch Overcurrent Protective Devices: Bolt-on thermal-magnetic circuit breakers.
- G. Buses:
  - 1. Copper phase and neutral buses; 200 percent capacity neutral bus and lugs.
  - 2. Copper equipment and isolated ground buses.
- H. Surge Protection Device: IEEE C62.41-compliant, integrally mounted, plug-in or wired-in, solid-state, parallel-connected, modular (with field-replaceable modules) type, with sine-wave tracking suppression and filtering modules, short-circuit current rating complying with UL 1449,

second edition, and matching or exceeding the panelboard short-circuit rating, redundant suppression circuits, with individually fused metal-oxide varistors.

1. Accessories:
  - a. Fuses rated at 200-kA interrupting capacity.
  - b. Fabrication using bolted compression lugs for internal wiring.
  - c. Integral disconnect switch.
  - d. Redundant suppression circuits.
  - e. Redundant replaceable modules.
  - f. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
  - g. LED indicator lights for power and protection status.
  - h. Audible alarm, with silencing switch, to indicate when protection has failed.
  - i. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of system operation. Contacts shall reverse position on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
  - j. Four-digit, transient-event counter set to totalize transient surges.
2. Peak Single-Impulse Surge Current Rating: 160 kA per mode/320 kA per phase.
3. Minimum single-impulse current ratings, using 8-by-20-mic.sec. waveform described in IEEE C62.41.2.
  - a. Line to Neutral: 70,000A.
  - b. Line to Ground: 70,000A.
  - c. Neutral to Ground: 50,000A.
4. Withstand Capabilities: 12,000 IEEE C62.41, Category C3 (10 kA), 8-by-20-mic.sec. surges with less than 5 percent change in clamping voltage.
5. Protection modes and UL 1449 SVR for grounded wye circuits with 480Y/277, 208Y/120, 600Y/347-V, three-phase, four-wire circuits shall be as follows:
  - a. Line to Neutral: 800 V for 480Y/277, 400 V for 208Y/120, 1200 V for 600Y/347.
  - b. Line to Ground: 800 V for 480Y/277, 400 V for 208Y/120, 1200 V for 600Y/347.
  - c. Neutral to Ground: 800 V for 480Y/277, 400 V for 208Y/120, 1200 V for 600Y/347.
6. Protection modes and UL 1449 SVR for 240/120-V, single-phase, three-wire circuits shall be as follows:
  - a. Line to Neutral: 400 V.
  - b. Line to Ground: 400 V.
  - c. Neutral to Ground: 400 V.
7. Protection modes and UL 1449 SVR for 240/120-V, three-phase, four-wire circuits with high leg shall be as follows:
  - a. Line to Neutral: 400 V, 800 V from high leg.
  - b. Line to Ground: 400 V.
  - c. Neutral to Ground: 400 V.
8. Protection modes and UL 1449 SVR for 240-, 480-, or 600-V, three-phase, three-wire, delta circuits shall be as follows:
  - a. Line to Line: 2000 V for 480 V, 1000 V for 240 V, 2500 V for 600 V.
  - b. Line to Ground: 1500 V for 480 V, 800 V for 240 V, 2500 V for 600 V.

## 2.6 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square D; a brand of Schneider Electric
- C. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
  - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
  - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
  - 3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
    - a. Instantaneous trip.
    - b. Long- and short-time pickup levels.
    - c. Long- and short-time time adjustments.
    - d. Ground-fault pickup level, time delay, and  $I^2t$  response.
  - 4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
  - 5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
  - 6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
  - 7. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
  - 8. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
    - a. Standard frame sizes, trip ratings, and number of poles.
    - b. Lugs: Compression or Mechanical style, suitable for number, size, trip ratings, and conductor materials.
    - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
    - d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
    - e. Communication Capability: Integral communication module with functions and features compatible with power monitoring and control system specified in Division 26 Section "Electrical Power Monitoring and Control."
    - f. Shunt Trip: per manufacturer trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
    - g. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay.

- h. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts.
  - i. Alarm Switch: Single-pole, normally open contact that actuates only when circuit breaker trips.
  - j. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
  - k. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function with other upstream or downstream devices.
  - l. Multipole units enclosed in a single housing or factory assembled to operate as a single unit.
  - m. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
  - n. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.
- D. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
- 1. Fuses, and Spare-Fuse Cabinet: Comply with requirements specified in Division 26 Section "Fuses."
  - 2. Fused Switch Features and Accessories: Standard ampere ratings and number of poles.
  - 3. Auxiliary Contacts: Two normally open and normally closed contact(s) that operate with switch handle operation.

## 2.7 PANELBOARD SUPPRESSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
- 1. Current Technology; a subsidiary of Danahar Corporation.
  - 2. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  - 3. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  - 4. Liebert Corporation.
  - 5. Siemens Energy & Automation, Inc.
  - 6. Square D; a brand of Schneider Electric.
- C. Surge Protection Device: IEEE C62.41-compliant, integrally mounted, solid-state, parallel-connected, non-modular type, with sine-wave tracking suppression and filtering modules, UL 1449, second edition, short-circuit current rating matching or exceeding the panelboard short-circuit rating, and with the following features and accessories:
- 1. Accessories:
    - a. LED indicator lights for power and protection status.
    - b. Audible alarm, with silencing switch, to indicate when protection has failed.
    - c. One set of dry contacts rated at 5 A and 250-V ac, for remote monitoring of protection status.
- D. Surge Protection Device: IEEE C62.41-compliant, integrally mounted, plug-in or wired-in, solid-state, parallel-connected, modular (with field-replaceable modules) type, with sine-wave tracking suppression and filtering modules, UL 1449, second edition, short-circuit current rating matching or exceeding the panelboard short-circuit rating, and with the following features and accessories:

1. Accessories:
  - a. Fuses rated at 200-kA interrupting capacity.
  - b. Fabrication using bolted compression lugs for internal wiring.
  - c. Integral disconnect switch.
  - d. Redundant suppression circuits.
  - e. Redundant replaceable modules.
  - f. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
  - g. LED indicator lights for power and protection status.
  - h. Audible alarm, with silencing switch, to indicate when protection has failed.
  - i. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of system operation. Contacts shall reverse position on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
  - j. Four-digit, transient-event counter set to totalize transient surges.
2. Peak Single-Impulse Surge Current Rating: 160 kA per mode/320 kA per phase.
3. Minimum single-impulse current ratings, using 8-by-20-mic.sec. waveform described in IEEE C62.41.2.
  - a. Line to Neutral: 70,000A.
  - b. Line to Ground: 70,000A.
  - c. Neutral to Ground: 50,000A.
4. Withstand Capabilities: 12,000 IEEE C62.41, Category C3 (10 kA), 8-by-20-mic.sec. surges with less than 5 percent change in clamping voltage.
5. Protection modes and UL 1449 SVR for grounded wye circuits with 480Y/277, 208Y/120, 600Y/347-V, three-phase, four-wire circuits shall be as follows:
  - a. Line to Neutral: 800 V for 480Y/277, 400 V for 208Y/120, 1200 V for 600Y/347.
  - b. Line to Ground: 800 V for 480Y/277, 400 V for 208Y/120, 1200 V for 600Y/347.
  - c. Neutral to Ground: 800 V for 480Y/277, 400 V for 208Y/120, 1200 V for 600Y/347.
6. Protection modes and UL 1449 SVR for 240/120-V, single-phase, three-wire circuits shall be as follows:
  - a. Line to Neutral: 400 V.
  - b. Line to Ground: 400 V.
  - c. Neutral to Ground: 400 V.
7. Protection modes and UL 1449 SVR for 240/120-V, three-phase, four-wire circuits with high leg shall be as follows:
  - a. Line to Neutral: 400 V, 800 V from high leg.
  - b. Line to Ground: 400 V.
  - c. Neutral to Ground: 400 V.
8. Protection modes and UL 1449 SVR for 240-, 480-, or 600-V, three-phase, three-wire, delta circuits shall be as follows:
  - a. Line to Line: 2000 V for 480 V, 1000 V for 240 V, 2500 V for 600 V.
  - b. Line to Ground: 1500 V for 480 V, 800 V for 240 V, 2500 V for 600 V.

## 2.8 ACCESSORY COMPONENTS AND FEATURES

- A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
- B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NECA 407 and NEMA PB 1.1.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install panelboards and accessories according to NECA 407 and NEMA PB 1.1.
- B. Equipment Mounting: Install panelboards on concrete bases, 4-inch (100-mm) nominal thickness. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-Place Concrete and/or Miscellaneous Cast-in-Place Concrete."
  - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around full perimeter of base.
  - 2. For panelboards, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
  - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 4. Install anchor bolts to elevations required for proper attachment to panelboards.
  - 5. Attach panelboard to the vertical finished or structural surface behind the panelboard.
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- D. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
- E. Mount top of trim 90 inches (2286 mm) above finished floor unless otherwise indicated.
- F. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- G. Install overcurrent protective devices and controllers not already factory installed.
  - 1. Set field-adjustable, circuit-breaker trip ranges.

- H. Install filler plates in unused spaces.
- I. Stub four 1-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.
- J. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
- K. Comply with NECA 1.

### 3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. 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.
- D. Acceptance Testing Preparation:
  - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
  - 2. Test continuity of each circuit.
- E. Tests and Inspections:
  - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
  - 3. Perform the following infrared scan tests and inspections and prepare reports:



- a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
- b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
- c. Instruments and Equipment:
  - 1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

F. Panelboards will be considered defective if they do not pass tests and inspections.

G. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

### 3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Division 26 Section "Overcurrent Protective Device Coordination Study."

C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.

- 1. Measure as directed during period of normal system loading.
- 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
- 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
- 4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

### 3.6 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION

## SECTION 262726 - WIRING DEVICES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
  - 2. Twist-locking receptacles.
  - 3. Receptacles with arc-fault and ground-fault protective devices.
  - 4. Receptacles with integral surge suppression units.
  - 5. Wall-box motion sensors.
  - 6. Isolated-ground receptacles.
  - 7. Snap switches and wall-box dimmers.
  - 8. Solid-state fan speed controls.
  - 9. Wall-switch and exterior occupancy sensors.
  - 10. Communications outlets.
  - 11. Pendant cord-connector devices.
  - 12. Cord and plug sets.
  - 13. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.
- B. Related Sections include the following:
  - 1. Division 27 Section "Communications Horizontal Cabling" for workstation outlets.

#### 1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.

- 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 NFPA 70.

#### 1.5 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
  - 1. Cord and Plug Sets: Match equipment requirements.

#### 1.6 EXTRA MATERIALS

- A. Furnish extra materials described in subparagraphs below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Service/Power Poles: One for every 10, but no fewer than one.
  - 2. Floor Service Outlet Assemblies: One for every 10, but no fewer than one.
  - 3. Poke-Through, Fire-Rated Closure Plugs: One for every five floor service outlets installed, but no fewer than two.
  - 4. TVSS Receptacles: One for every 10 of each type installed, but no fewer than two of each type.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
  - 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
  - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
  - 3. Leviton Mfg. Company Inc. (Leviton).
  - 4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

#### 2.2 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; 5351 (single), 5352 (duplex).
    - b. Hubbell; HBL5351 (single), CR5352 (duplex).
    - c. Leviton; 5891 (single), 5352 (duplex).
    - d. Pass & Seymour; 5381 (single), 5352 (duplex).
- B. Isolated-Ground, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
  - a. Hubbell; CR 5253IG.
  - b. Leviton; 5362-IG.
  - c. Pass & Seymour; IG6300.
3. Description: Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

C. Tamper-Resistant Convenience Receptacles, 125 V, 20 A

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
  - a. Cooper; TR8300.
  - b. Hubbell; HBL8300SG.
  - c. Leviton; 8300-SGG.
  - d. Pass & Seymour; 63H.
3. Regulatory Requirements:
  - a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
4. General Characteristics:
  - a. Reference Standards: UL CCN RTRT and UL 498.

D. Tamper-Resistant Duplex Straight-Blade Receptacle with USB Outlet to Power Class 2 Equipment.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
  - a. Eaton; TRUSBC20
  - b. Hubbell; USB20A
  - c. Leviton; M58AAHG
  - d. Pass & Seymour; TR5362USB
3. Regulatory Requirements:
  - a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
4. General Characteristics:
  - a. Reference Standards: UL CCN RTRT and UL 498.

2.3 RECEPTACLES WITH ARC-FAULT AND GROUND-FAULT PROTECTIVE DEVICES

- A. General Description: Straight blade, feed or non-feed through type as per location dictates. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Hubbell; GF20.
    - b. Leviton; GFNT2
    - c. Pass & Seymour; 2084.
  2. Regulatory Requirements:
    - a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
  3. General Characteristics:
    - a. Reference Standards: UL CCN AWBZ, UL 498, UL 1699, and UL Subject 1699A.
- C. General-Grade, Tamper-Resistant Duplex Straight-Blade Receptacle with AFCI Device, 125 V, 20A
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Hubbell
    - b. Leviton
    - c. Pass & Seymour
  2. Regulatory Requirements:
    - a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
  3. General Characteristics:
    - a. Reference Standards: UL CCN AWBZ, UL 498, UL 1699, and UL Subject 1699A.

## 2.4 TVSS RECEPTACLES

- A. General Description: Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 1449, with integral TVSS in line to ground, line to neutral, and neutral to ground.
  1. TVSS Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 volts and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.
  2. Active TVSS Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."
- B. Duplex TVSS Convenience Receptacles:
  1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  2. Products: Subject to compliance with requirements, provide one of the following:

- a. Cooper; 5362BLS.
    - b. Hubbell; HBL5362SA.
    - c. Leviton; 5380.
  - 3. Description: Straight blade, 125 V, 20 A; NEMA WD 6 configuration 5-20R.
- C. Isolated-Ground, Duplex Convenience Receptacles:
- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; IG5362BLS.
    - b. Hubbell; IG5362SA.
    - c. Leviton; 5380-IG.
  - 3. Description: Straight blade, 125 V, 20 A; NEMA WD 6 configuration 5-20R. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

## 2.5 HAZARDOUS (CLASSIFIED) LOCATION RECEPTACLES

- A. Available Wiring Devices for Hazardous (Classified) Locations: Comply with NEMA FB 11 and UL 1010.
- 1. 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:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Cooper Crouse-Hinds.
    - b. EGS/Appleton Electric.
    - c. Killark; a division of Hubbell Inc.

## 2.6 TWIST-LOCKING RECEPTACLES

- A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498.
- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; L520R.
    - b. Hubbell; HBL2310.
    - c. Leviton; 2310.
    - d. Pass & Seymour; L520-R.
- B. Isolated-Ground, Single Convenience Receptacles, 125 V, 20 A:
- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Products: Subject to compliance with requirements, provide one of the following:

- a. Hubbell; IG2310.
  - b. Leviton; 2310-IG.
3. Description: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

## 2.7 PENDANT CORD-CONNECTOR DEVICES

- A. Description: Matching, locking-type plug and receptacle body connector; NEMA WD 6 configurations L5-20P and L5-20R, heavy-duty grade.
- 1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.
  - 2. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

## 2.8 CORD AND PLUG SETS

- A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.
- 1. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and equipment-rating ampacity plus a minimum of 30 percent.
  - 2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

## 2.9 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.
- B. Switches, 120/277 V, 20 A:
- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).
    - b. Hubbell; CS1221 (single pole), CS1222 (two pole), CS1223 (three way), CS1224 (four way).
    - c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
    - d. Pass & Seymour; 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).
- C. Pilot Light Switches, 20 A:
- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; 2221PL for 120 V and 277 V.

- b. Hubbell; HPL1221PL for 120 V and 277 V.
      - c. Leviton; 1221-PLR for 120 V, 1221-7PLR for 277 V.
      - d. Pass & Seymour; PS20AC1-PLR for 120 V.
    - 3. Description: Single pole, with neon-lighted handle, illuminated when switch is "ON."
  - D. Key-Operated Switches, 120/277 V, 20 A:
    - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - 2. Products: Subject to compliance with requirements, provide one of the following:
      - a. Cooper; 2221L.
      - b. Hubbell; HBL1221L.
      - c. Leviton; 1221-2L.
      - d. Pass & Seymour; PS20AC1-L.
    - 3. Description: Single pole, with factory-supplied key in lieu of switch handle.
  - E. Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors.
    - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - 2. Products: Subject to compliance with requirements, provide one of the following:
      - a. Cooper; 1995.
      - b. Hubbell; HBL1557.
      - c. Leviton; 1257.
      - d. Pass & Seymour; 1251.
  - F. Key-Operated, Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.
    - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - 2. Products: Subject to compliance with requirements, provide one of the following:
      - a. Cooper; 1995L.
      - b. Hubbell; HBL1557L.
      - c. Leviton; 1257L.
      - d. Pass & Seymour; 1251L.
- 2.10 WALL-BOX DIMMERS
- A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
  - B. Control: Continuously adjustable slider; with single-pole or three-way switching. Comply with UL 1472.
  - C. Incandescent Lamp Dimmers: 120 V; control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.



1. 600 W; dimmers shall require no derating when ganged with other devices. Illuminated when "OFF."

D. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

## 2.11 FAN SPEED CONTROLS

A. Modular, 120-V, full-wave, solid-state units with integral, quiet on-off switches and audible frequency and EMI/RFI filters. Comply with UL 1917.

1. Continuously adjustable slider, toggle switch, rotary knob, 5 A.
2. Three-speed adjustable slider, rotary knob, 1.5 A.

## 2.12 OCCUPANCY SENSORS

A. Wall-Switch Sensors:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
  - a. Cooper; 6111 for 120 V, 6117 for 277 V.
  - b. Hubbell; WS1277.
  - c. Leviton; ODS 10-ID.
  - d. Pass & Seymour; WS3000.
  - e. Watt Stopper (The); WS-200.
3. Description: Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 180-degree field of view, with a minimum coverage area of 900 sq. ft. (84 sq. m).

B. Wall-Switch Sensors:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
  - a. Hubbell; AT120 for 120 V, AT277 for 277 V.
  - b. Leviton; ODS 15-ID.
3. Description: Adaptive-technology type, 120/277 V, adjustable time delay up to 20 minutes, 180-degree field of view, with a minimum coverage area of 900 sq. ft. (84 sq. m).

C. Long-Range Wall-Switch Sensors:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
  - a. Hubbell; ATP1600WRP.
  - b. Leviton; ODWWV-IRW.
  - c. Pass & Seymour; WA1001.

- d. Watt Stopper (The); CX-100.
  - 3. Description: Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 110-degree field of view, with a minimum coverage area of 1200 sq. ft. (111 sq. m).
- D. Long-Range Wall-Switch Sensors:
- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Hubbell; ATD1600WRP.
    - b. Leviton; ODW12-MRW.
    - c. Watt Stopper (The); DT-200.
  - 3. Description: Dual technology, with both passive-infrared- and ultrasonic-type sensing, 120/277 V, adjustable time delay up to 30 minutes, 110-degree field of view, and a minimum coverage area of 1200 sq. ft. (111 sq. m).
- E. Wide-Range Wall-Switch Sensors:
- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Hubbell; ATP120HBRP.
    - b. Leviton; ODWHB-IRW.
    - c. Pass & Seymour; HS1001.
    - d. Watt Stopper (The); CX-100-3.
  - 3. Description: Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 150-degree field of view, with a minimum coverage area of 1200 sq. ft. (111 sq. m).
- F. Exterior Occupancy Sensors:
- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Leviton; PS200-10.
    - b. Watt Stopper (The); EW-100-120.
  - 3. Description: Passive-infrared type, 120/277 V, weatherproof, adjustable time delay up to 15 minutes, 180-degree field of view, and 110-foot (34-m) detection range. Minimum switch rating: 1000-W incandescent, 500-VA fluorescent.

## 2.13 COMMUNICATIONS OUTLETS

### A. Telephone Outlet:

- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- 2. Products: Subject to compliance with requirements, provide one of the following:
  - a. Cooper; 3560-6.

- b. Leviton; 40649.
  - 3. Description: Single RJ-45 jack for terminating 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 5e. Comply with UL 1863.
- B. Combination TV and Telephone Outlet:
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; 3562.
    - b. Leviton; 40595.
  - 3. Description: Single RJ-45 jack for 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 5e; and one Type F coaxial cable connector.

## 2.14 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
  - 1. Plate-Securing Screws: Metal with head color to match plate finish.
  - 2. Material for Finished Spaces: Steel with white baked enamel, suitable for field painting Smooth, high-impact thermoplastic 0.035-inch- (1-mm-) thick, satin-finished stainless steel 0.04-inch- (1-mm-) thick, brushed brass with factory polymer finish 0.05-inch- (1.2-mm-) thick anodized aluminum 0.04-inch- (1-mm-) thick steel with chrome-plated finish as coordinated with and directed by Architect.
  - 3. Material for Unfinished Spaces: Galvanized steel, smooth, high-impact thermoplastic.
  - 4. Material for Damp Locations: Thermoplastic, Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum or thermoplastic with lockable cover.

## 2.15 FLOOR SERVICE FITTINGS

- A. Type: Modular, flush-type, flap-type, above-floor per drawings, dual-service units suitable for wiring method used.
- B. Compartments: Barrier separates power from voice and data communication cabling.
- C. Service Plate: Rectangular, solid brass with satin finish unless noted otherwise.
- D. Power Receptacle: NEMA WD 6 configuration 5-20R, gray finish, unless otherwise indicated.
- E. Voice and Data Communication Outlet: Blank cover with bushed cable opening. Two modular, keyed, color-coded, RJ-45 Category 5e jacks for UTP cable.

## 2.16 POKE-THROUGH ASSEMBLIES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hubbell Incorporated; Wiring Device-Kellems.
2. Pass & Seymour/Legrand; Wiring Devices & Accessories.
3. Square D/ Schneider Electric.
4. Thomas & Betts Corporation.
5. Wiremold Company (The).

C. Description: Factory-fabricated and -wired assembly of below-floor junction box with multi-channelled, through-floor raceway/firestop unit and detachable matching floor service outlet assembly.

1. Service Outlet Assembly: Pedestal type with services indicated, Flush type with two simplex receptacles and space for two RJ-45 jacks, Flush type with four simplex receptacles and space for four RJ-45 jacks as noted.
2. Size: Selected to fit nominal 3-inch (75-mm) or 4-inch (100-mm) cored holes in floor and matched to floor thickness.
3. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
4. Closure Plug: Arranged to close unused 3-inch (75-mm) or 4-inch (100-mm) cored openings and reestablish fire rating of floor.
5. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of four, 4-pair, Category 5e voice and data communication cables unless otherwise noted.

## 2.17 MULTIOUTLET ASSEMBLIES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Hubbell Incorporated; Wiring Device-Kellems.
  2. Wiremold Company (The).
- C. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.
- D. Raceway Material: Metal, with manufacturer's standard finish or PVC as appropriate for the location.
- E. Wire: No. 12 AWG.

## 2.18 SERVICE POLES

- A. Description: Factory-assembled and -wired units to extend power and voice and data communication from distribution wiring concealed in ceiling to devices or outlets in pole near floor.
1. Poles: Nominal 2.5-inch- (65-mm-) square cross section, with height adequate to extend from floor to at least 6 inches (150 mm) above ceiling, and with separate channels for power wiring and voice and data communication cabling.
  2. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling supports; with pole foot and carpet pad attachment.
  3. Finishes: Manufacturer's standard painted finish and trim combination or Satin-anodized aluminum as directed by the Architect.

4. Wiring: Sized for minimum of five No. 12 AWG power and ground conductors and a minimum of four, 4-pair, Category 3 or 5 voice and data communication cables.
5. Power Receptacles: Two duplex, 20-A, heavy-duty, NEMA WD 6 configuration 5-20R units.
6. Voice and Data Communication Outlets: Blank insert with bushed cable opening, Two RJ-45 Category 5e jacks, Four RJ-45 Category 5e jacks as noted for the location.

## 2.19 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
  1. Wiring Devices Connected to Normal Power System: As selected by Architect, unless otherwise indicated or required by NFPA 70 or device listing.
  2. Wiring Devices Connected to Emergency Power System: Red.
  3. TVSS Devices: Blue.
  4. Isolated-Ground Receptacles: As specified above, with orange triangle on face.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
  1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
  2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
  3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
  4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
  1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
  2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
  3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
  4. Existing Conductors:
    - a. Cut back and pigtail, or replace all damaged conductors.
    - b. Straighten conductors that remain and remove corrosion and foreign matter.
    - c. Pigtailling existing conductors is permitted provided the outlet box is large enough.
- D. Device Installation:
  1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.

2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the left.
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

### 3.2 IDENTIFICATION

A. Comply with Division 26 Section "Identification for Electrical Systems."

1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black, white, or red-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

### 3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. In healthcare facilities, prepare reports that comply with recommendations in NFPA 99.
2. Test Instruments: Use instruments that comply with UL 1436.

3. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.
- B. Tests for Convenience Receptacles:
1. Line Voltage: Acceptable range is 105 to 132 V.
  2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
  3. Ground Impedance: Values of up to 2 ohms are acceptable.
  4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
  5. Using the test plug, verify that the device and its outlet box are securely mounted.
  6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Test straight blade convenience outlets in patient-care areas, hospital-grade convenience outlets for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz. (115 g).

END OF SECTION

## SECTION 263213.13 - DIESEL-ENGINE-DRIVEN GENERATOR SETS

### 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. Diesel engine.
2. Diesel fuel-oil system.
3. Control and monitoring.
4. Generator overcurrent and fault protection.
5. Generator, exciter, and voltage regulator.
6. Load bank.
7. Outdoor engine generator enclosure.
8. Remote radiator motors.
9. Vibration isolation devices.

- B. Related Requirements:

1. Section 263600 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine generators.

#### 1.3 DEFINITIONS

- A. EPS: Emergency power supply.
- B. EPSS: Emergency power supply system.
- C. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Include thermal damage curve for generator.
3. Include time-current characteristic curves for generator protective device.
4. Include fuel consumption in gallons per hour (liters per hour) at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.



5. Include generator efficiency at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
6. Include airflow requirements for cooling and combustion air in cubic feet per minute (cubic meters per minute) at 0.8 power factor, with air-supply temperature of 95, 80, 70, and 50 deg F (35, 27, 21, and 10 deg C). Provide Drawings indicating requirements and limitations for location of air intake and exhausts.
7. Include generator characteristics, including, but not limited to, kilowatt rating, efficiency, reactances, and short-circuit current capability.

B. Shop Drawings:

1. Include plans and elevations for engine generator and other components specified. Indicate access requirements affected by height of subbase fuel tank.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Identify fluid drain ports and clearance requirements for proper fluid drain.
4. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include base weights.
6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for engine generators and functional relationship between all electrical components.

## 1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: Certificates, for engine generator, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: With engine and generator mounted on rails, identify center of gravity and total weight, including full fuel tank, supplied enclosure, external silencer, subbase-mounted fuel tank, and each piece of equipment not integral to the engine generator, and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Source Quality-Control Reports: Including, but not limited to, the following:

1. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
2. Certified Summary of Performance Tests: Certify compliance with specified requirement to meet performance criteria for sensitive loads.
3. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
4. Report of sound generation.
5. Report of exhaust emissions showing compliance with applicable regulations.
6. Certified Torsional Vibration Compatibility: Comply with NFPA 110.

C. Field quality-control reports.

- D. Warranty: For special warranty.

## 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals.
  - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
    - a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
    - b. Operating instructions laminated and mounted adjacent to generator location.
    - c. Training plan.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Testing Agency Qualifications: Accredited by NETA.
  - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.
- C. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.
- D. 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.

## 1.8 COORDINATION

- A. Coordinate size and location of concrete bases for package engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

## 1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 5 years from date of Substantial Completion.

## 1.10 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include

quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Kohler
  - 2. Generac
  - 3. Cummins
- B. Source Limitations: Obtain packaged engine generators and auxiliary components from single source from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Engine generator housing, subbase fuel tank, engine generator, batteries, battery racks, silencers, sound attenuating equipment, accessories, and components shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
  - 2. Shake-table testing shall comply with ICC-ES AC156. Testing shall be performed with all fluids at worst-case normal levels. Water shall be substituted for diesel fuel in fuel tank during test.
  - 3. Component Importance Factor: 1.5.
- B. B11 Compliance: Comply with B11.19.
- C. NFPA Compliance:
  - 1. Comply with NFPA 37.
  - 2. Comply with NFPA 70.
  - 3. Comply with NFPA 110 requirements for Level 1 EPSS.
- D. Engine Exhaust Emissions: Comply with EPA Tier [4] requirements and applicable state and local government requirements.
- E. Noise Emission: Comply with applicable state and local government requirements maximum noise level at adjacent property boundaries due to sound emitted by engine generator including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.
- F. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
  - 1. Ambient Temperature: 5 to 104 deg F (Minus 15 to plus 40 deg C).
  - 2. Relative Humidity: Zero to 95 percent.

3. Altitude: Sea level to 1000 feet (300 m)]

## 2.3 ENGINE GENERATOR ASSEMBLY DESCRIPTION

- A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- C. Power Rating: Standby.
- D. EPSS Class: Engine generator shall be classified as a Class 62 according to NFPA 110.
- E. Service Load: 120 kVA.
- F. Power Factor: 0.8 lagging.
- G. Frequency: 60 Hz.
- H. Voltage: 208V ac.
- I. Phase: Three-phase, four wire, wye
- J. Induction Method: Naturally aspirated.
- K. Governor: Adjustable isochronous, with speed sensing.
- L. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.
  1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and engine generator center of gravity.
- M. Capacities and Characteristics:
  1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries, with capacity as required to operate as a unit as evidenced by records of prototype testing.
  2. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.
- N. Engine Generator Performance:
  1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
  2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
  3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.

4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
7. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
8. Start Time:
  - a. Comply with NFPA 110, Type 10 system requirements.

## 2.4 DIESEL ENGINE

Verify requirements with authorities having jurisdiction. Tier 4 engines have more restrictions on diesel fuel characteristics than Tier 3 or lower engines. Confirm specific fuel requirements with manufacturer if specifying Tier 4 engines. Diesel grade specified below does not perform well in cold environments.

A. Fuel: ASTM D975, diesel fuel oil, Grade 2-D S15.

1. **<Insert specific fuel grade requirements>.**

B. Rated Engine Speed: 1800 rpm.

C. Lubrication System: Engine or skid-mounted.

1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

D. Jacket Coolant Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with UL 499 and with NFPA 110 requirements for Level 1 equipment for heater capacity.

E. Integral Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine generator set mounting frame and integral engine-driven coolant pump.

1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.

4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
  5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, UV-, and abrasion-resistant fabric.
    - a. Rating: 50-psig (345-kPa) maximum working pressure with coolant at 180 deg F (82 deg C), and non-collapsible under vacuum.
    - b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.
- F. Muffler/Silencer:
1. Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
    - a. Minimum sound attenuation of 25 dB at 500 Hz.
    - b. Sound level measured at a distance of 25 feet (8 m) from exhaust discharge after installation is complete shall be 65 dBA or less.
- G. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
- H. Starting System: 24-V electric, with negative ground.
1. Components: Sized so they are not damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Performance Requirements" Article.
  2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
  3. Cranking Cycle: 60 seconds.
  4. Battery: Adequate capacity within ambient temperature range specified in "Performance Requirements" Article to provide specified cranking cycle at least three times without recharging.
  5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
  6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 50 deg F (10 deg C) regardless of external ambient temperature within range specified in "Performance Requirements" Article. Include accessories required to support and fasten batteries in place. Provide ventilation to exhaust battery gases.
  7. Battery Stand: Factory-fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.
  8. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
  9. Battery Charger: Current-limiting, automatic-equalizing, and float-charging type. Unit shall comply with UL 1236 and include the following features:
    - a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
    - b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 to 140 deg F (minus 40 to plus 60 deg C) to prevent overcharging at high temperatures and undercharging at low temperatures.

- c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
- d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
- e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
- f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

## 2.5 DIESEL FUEL-OIL SYSTEM

- A. Comply with NFPA 37.
- B. Piping: Fuel-oil piping shall be Schedule 40 black steel, complying with requirements in Section 231113 "Facility Fuel-Oil Piping." Cast iron, aluminum, copper, and galvanized steel shall not be used in the fuel-oil system.
- C. Main Fuel Pump: Mounted on engine to provide primary fuel flow under starting and load conditions.
- D. Fuel Filtering: Remove water and contaminants larger than 1 micron.
- E. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.
- F. Subbase-Mounted, Double-Wall, Fuel-Oil Tank: Factory installed and piped, complying with UL 142 fuel-oil tank. Features include the following:
  - 1. Tank level indicator.
  - 2. Fuel-Tank Capacity: Minimum 133 percent of total fuel required for planned operation plus fuel for periodic maintenance operations between fuel refills.
  - 3. Leak detection in interstitial space.
  - 4. Vandal-resistant fill cap.
  - 5. Containment Provisions: Comply with requirements of authorities having jurisdiction.

## 2.6 CONTROL AND MONITORING

- A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of engine generator. When mode-selector switch is switched to the on position, engine generator starts. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.
- B. Provide minimum run time control set for 30 minutes with override only by operation of a remote emergency-stop switch.
- C. Comply with UL 508A.
- D. Configuration:

1. Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the engine generator. Mounting method shall isolate the control panel from engine generator vibration. Panel shall be powered from the engine generator battery.
2. Digital engine generator controller with integrated LCD display, controls, and microprocessor, capable of local and remote control, monitoring, and programming, with battery backup.
3. Analog control panel with dedicated gages and indicator lights for the instruments and alarms indicated below.
4. Instruments: Located on the control and monitoring panel and viewable during operation.
  - a. Engine lubricating-oil pressure gage.
  - b. Engine-coolant temperature gage.
  - c. DC voltmeter (alternator battery charging).
  - d. Running-time meter.
  - e. AC voltmeter, for each phase.
  - f. AC ammeter, for each phase.
  - g. AC frequency meter.
  - h. Generator-voltage adjusting rheostat.
5. Controls and Protective Devices: Controls, shutdown devices, and common alarm indication, including the following:
  - a. Cranking control equipment.
  - b. Run-Off-Auto switch.
  - c. Control switch not in automatic position alarm.
  - d. Overcrank alarm.
  - e. Overcrank shutdown device.
  - f. Low-water temperature alarm.
  - g. High engine temperature prealarm.
  - h. High engine temperature.
  - i. High engine temperature shutdown device.
  - j. Overspeed alarm.
  - k. Overspeed shutdown device.
  - l. Low fuel main tank.
    - 1) Low-fuel-level alarm shall be initiated when the level falls below that required for operation for duration required for the indicated EPSS class.
  - m. Coolant low-level alarm.
  - n. Coolant low-level shutdown device.
  - o. Coolant high-temperature prealarm.
  - p. Coolant high-temperature alarm.
  - q. Coolant low-temperature alarm.
  - r. Coolant high-temperature shutdown device.
  - s. EPS load indicator.
  - t. Battery high-voltage alarm.
  - u. Low cranking voltage alarm.
  - v. Battery-charger malfunction alarm.
  - w. Battery low-voltage alarm.
  - x. Lamp test.
  - y. Contacts for local and remote common alarm.
  - z. Generator overcurrent-protective-device not-closed alarm.
  - aa. Hours of operation.
  - bb. Engine generator metering, including voltage, current, hertz, kilowatt, kilovolt ampere, and power factor.



- E. Connection to Datalink:
  - 1. A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication is reserved for connections for data-link transmission of indications to remote data terminals.
  
- F. Remote Alarm Annunciator: An LED indicator light labeled with proper alarm conditions shall identify each alarm event, and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.
  - 1. Overcrank alarm.
  - 2. Low water-temperature alarm.
  - 3. High engine temperature prealarm.
  - 4. High engine temperature alarm.
  - 5. Low lube oil pressure alarm.
  - 6. Overspeed alarm.
  - 7. Low fuel main tank alarm.
  - 8. Low coolant level alarm.
  - 9. Low cranking voltage alarm.
  - 10. Contacts for local and remote common alarm.
  - 11. Audible-alarm silencing switch.
  - 12. Air shutdown damper when used.
  - 13. Run-Off-Auto switch.
  - 14. Control switch not in automatic position alarm.
  - 15. Low-cranking voltage alarm.
  
- G. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator unless otherwise indicated.
  
- H. Remote Emergency-Stop Switch: Flush; wall mounted unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

## 2.7 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Overcurrent protective devices shall be coordinated to optimize selective tripping when a short circuit occurs.
  - 1. Overcurrent protective devices for the entire EPSS shall be coordinated to optimize selective tripping when a short circuit occurs. Coordination of protective devices shall consider both utility and EPSS as the voltage source.
  - 2. Overcurrent protective devices for the EPSS shall be accessible only to authorized personnel.
  
- B. Generator Overcurrent Protective Device:
  - 1. Molded-case circuit breaker, thermal-magnetic type; 100 percent rated; complying with UL 489:
    - a. Tripping Characteristic: Designed specifically for generator protection.

- b. Trip Rating: Matched to generator output rating.
- c. Shunt Trip: Connected to trip breaker when engine generator is shut down by other protective devices.
- d. Mounting: Adjacent to, or integrated with, control and monitoring panel.

## 2.8 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation: Class H or Class F.
- D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.
- E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- F. Enclosure: Dripproof.
- G. Instrument Transformers: Mounted within generator enclosure.
- H. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.
  - 1. Adjusting Rheostat on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.
- I. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.

## 2.9 OUTDOOR ENGINE GENERATOR ENCLOSURE

- A. Description:
  - 1. Vandal-resistant, sound-attenuating, weatherproof steel housing; wind resistant up to 100 mph (160 km/h). Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.
  - 2. Prefabricated or pre-engineered, galvanized-steel-clad, integral structural-steel-framed, walk-in enclosure; erected on concrete foundation.
- B. Structural Design and Anchorage: Comply with ASCE/SEI 7 for wind loads up to 100 mph (160 km/h).
- C. Seismic Design: Comply with seismic requirements in Section 260548.16 "Seismic Controls for Electrical Systems."
- D. Fire Protection: Provide smoke detector in enclosure; mounted according to NFPA 72.
- E. Hinged Doors: With padlocking provisions.

- F. Space Heater: Thermostatically controlled and sized to prevent condensation.
- G. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.
- H. Muffler Location: External to enclosure.
- I. Engine-Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for two hours with ambient temperature at top of range specified in system service conditions.

## 2.10 VIBRATION ISOLATION DEVICES

- A. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
  - 1. Material: Standard neoprene, Natural rubber, or Bridge-bearing neoprene, complying with AASHTO M 251 separated by steel shims.
- B. Comply with requirements in Section 232116 "Hydronic Piping Specialties" for vibration isolation and flexible connector materials for steel piping.
- C. Comply with requirements in Section 233113 "Metal Ducts" for vibration isolation and flexible connector materials for exhaust shroud and ductwork.
- D. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

## 2.11 FINISHES

- A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

## 2.12 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine generator using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
  - 1. Tests: Comply with IEEE 115.
- B. Project-Specific Equipment Tests: Before shipment, factory test engine generator and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:
  - 1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
  - 2. Test generator, exciter, and voltage regulator as a unit.
  - 3. Full load run.
  - 4. Maximum power.
  - 5. Voltage regulation.

6. Transient and steady-state governing.
7. Single-step load pickup.
8. Safety shutdown.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine generator performance.
- B. Examine roughing-in for piping systems and electrical connections. Verify actual locations of connections before packaged engine generator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 404.
- B. Comply with packaged engine generator manufacturers' written installation and alignment instructions and with NFPA 110.
- C. Equipment Mounting:
  1. Coordinate size and location of concrete bases for packaged engine generators anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
- D. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- E. Exhaust System: Install Schedule 40 black steel piping with welded joints and connect to engine muffler. Install thimble at wall. Piping shall be same diameter as muffler outlet.
  1. Piping materials and installation requirements are specified in Section 232113 "Hydronic Piping."
  2. Install flexible connectors and steel piping materials according to requirements in Section 232116 "Hydronic Piping Specialties."
  3. Insulate muffler/silencer and exhaust system components according to requirements in Section 230719 "HVAC Piping Insulation."
- F. Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

### 3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping and specialties.

- B. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow space for service and maintenance.
- C. Connect engine exhaust pipe to engine with flexible connector.
- D. Connect fuel piping to engines with a gate valve and union and flexible connector.
- E. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- F. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Provide a minimum of one 90-degree bend in flexible conduit routed to the engine generator from a stationary element.
- G. Balance single-phase loads to obtain a maximum of 10 percent unbalance between any two phases.

### 3.4 IDENTIFICATION

- A. Identify system components according to Section 230553 "Identification for HVAC Piping and Equipment" and Section 260553 "Identification for Electrical Systems."
- B. Install a sign indicating the generator neutral is bonded to the main service neutral at the main service location.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency:
  1. Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Tests and Inspections:
  1. Perform tests recommended by manufacturer and each visual and mechanical inspection for "AC Generators and for Emergency Systems" specified in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here, including, but not limited to, single-step full-load pickup test.
  3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
    - a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
    - b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
    - c. Verify acceptance of charge for each element of the battery after discharge.
    - d. Verify that measurements are within manufacturer's specifications.
  4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.

5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.
  6. Exhaust Emissions Test: Comply with applicable government test criteria.
  7. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
  8. Harmonic-Content Tests: Measure harmonic content of output voltage at 25 and 100 percent of rated linear load. Verify that harmonic content is within specified limits.
  9. Noise Level Tests: Measure A-weighted level of noise emanating from engine generator installation, including engine exhaust and cooling-air intake and discharge, at four the property line, and compare measured levels with required values.
- C. Coordinate tests with tests for transfer switches and run them concurrently.
  - D. Test instruments shall have been calibrated within the past 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.
  - E. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.
  - F. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.
  - G. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - H. Remove and replace malfunctioning units and retest as specified above.
  - I. Retest: Correct deficiencies identified by tests and observations, and retest until specified requirements are met.
  - J. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.
  - K. Infrared Scanning: After Substantial Completion, but not more than 60 days after final acceptance, perform an infrared scan of each power wiring termination and each bus connection while running with maximum load. Remove all access panels so terminations and connections are accessible to portable scanner.
    1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan 11 months after date of Substantial Completion.
    2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    3. Record of Infrared Scanning: Prepare a certified report that identifies terminations and connections checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

### 3.6 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 48 months' full maintenance by skilled employees of manufacturer's authorized service

representative. Include quarterly preventive maintenance and exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Parts shall be manufacturer's authorized replacement parts and supplies.

### 3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

END OF SECTION 263213.13

## SECTION 263600 - TRANSFER SWITCHES

### 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. Molded-case-type automatic transfer switches.
  2. Transfer switch accessories.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for transfer switches.
  2. Include rated capacities, operating characteristics, electrical characteristics, and accessories.
- B. Shop Drawings:
  1. Include plans, elevations, sections, details showing minimum clearances, conductor entry provisions, gutter space, and installed features and devices.
  2. Include material lists for each switch specified.
  3. Single-Line Diagram: Show connections between transfer switch power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Data: Certificates, for transfer switches, accessories, and components, from manufacturer.
  1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- B. Field quality-control reports.



## 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.
  - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
    - a. Features and operating sequences, both automatic and manual.
    - b. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications:
  - 1. Member company of NETA.
    - a. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

## 1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 12 months from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- 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. Comply with NEMA ICS 1.
- C. Comply with NFPA 99.
- D. Comply with NFPA 110.
- E. Comply with UL 1008 unless requirements of these Specifications are stricter.
- F. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.
- G. Tested Fault-Current Closing and Short-Circuit Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.
- H. Repetitive Accuracy of Solid-State Controls: All settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.
- I. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.62. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
- J. Electrical Operation: Accomplish by a non-fused, momentarily energized solenoid or electric-motor-operated mechanism. Switches for emergency or standby purposes shall be mechanically and electrically interlocked in both directions to prevent simultaneous connection to both power sources unless closed transition.
- K. Neutral Terminal: Solid and fully rated unless otherwise indicated.
- L. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units
- M. Battery Charger: For generator starting batteries.
1. Float type, rated 10 A.
  2. Ammeter to display charging current.
  3. Fused ac inputs and dc outputs.
- N. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.
- O. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, by color-code or by numbered or lettered wire and cable tape markers at terminations. Color-coding and wire and cable markers are specified in Section 260553 "Identification for Electrical Systems."
1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
  2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
  3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
- P. Enclosures: General-purpose NEMA 250, Type 1 and Type 3R complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

## 2.2 MOLDED-CASE-TYPE AUTOMATIC TRANSFER SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Kohler
  2. Generac
  3. Cummins
- B. Comply with Level 1 equipment according to NFPA 110.
- C. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.

1. Limitation: Switches using contactor-based components are unacceptable.
  2. Switch Action: Double throw; mechanically held in both directions.
  3. Contacts: Silver composition or silver alloy for load-current switching.
  4. Conductor Connectors: Suitable for use with conductor material and sizes.
  5. Main and Neutral Lugs: Mechanical type.
  6. Ground bar.
  7. Connectors shall be marked for conductor size and type according to UL 1008.
- D. Automatic Closed-Transition Transfer Switches: Connect both sources to load momentarily. Transition is controlled by programming in the automatic transfer-switch controller.
1. Fully automatic make-before-break operation when transferring between two available power sources.
  2. Load transfer without interruption, through momentary interconnection of both power sources not exceeding 100 ms.
  3. Initiation of No-Interruption Transfer: Controlled by in-phase monitor and sensors confirming both sources are present and acceptable.
    - a. Initiation occurs without active control of generator.
    - b. Controls ensure that closed-transition load transfer closure occurs only when the two sources are within plus or minus 5 electrical degrees maximum, and plus or minus 5 percent maximum voltage difference.
  4. Failure of power source serving load initiates automatic break-before-make transfer.
- E. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.
- F. Transfer Switches Based on Molded-Case-Switch Components: Comply with UL 489 and UL 869A.
- G. Automatic Transfer-Switch Controller Features:
1. Controller operates through a period of loss of control power.
  2. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage shall be adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
  3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
  4. Time Delay for Retransfer to Normal Source: Adjustable from zero to 30 minutes, and factory set for 10 minutes. Override shall automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
  5. Test Switch: Simulate normal-source failure.
  6. Switch-Position Pilot Lights: Indicate source to which load is connected.
  7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.
    - a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."

- b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
  9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
  10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
  11. Engine Shutdown Contacts:
    - a. Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
  12. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods shall be adjustable from 10 to 30 minutes. Factory settings shall be for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:
    - a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
    - b. Push-button programming control with digital display of settings.
    - c. Integral battery operation of time switch when normal control power is unavailable.

## 2.3 TRANSFER SWITCH ACCESSORIES

### A. Bypass/Isolation Switches:

1. Source Limitations: Same manufacturer as transfer switch in which installed.
2. Comply with requirements for Level 1 equipment according to NFPA 110.
3. Description: Manual type, arranged to select and connect either source of power directly to load, isolating transfer switch from load and from both power sources. Include the following features for each combined automatic transfer switch and bypass/isolation switch:
  - a. Means to lock bypass/isolation switch in the position that isolates transfer switch with an arrangement that permits complete electrical testing of transfer switch while isolated. Interlocks shall prevent transfer-switch operation, except for testing or maintenance, while automatic transfer switch is isolated.
  - b. Provide means to make power available to transfer-switch control circuit for testing and maintenance purposes.
  - c. Drawout Arrangement for Transfer Switch: Provide physical separation from live parts and accessibility for testing and maintenance operations. Transfer switch and bypass/isolation switch shall be in isolated compartments.
  - d. Transition:
    - 1) Provide closed-transition operation when transferring from main transfer switch to bypass/isolation switch on the same power source.
  - e. Bypass/Isolation Switch Current, Voltage, Closing, and Short-Circuit Withstand Ratings: Equal to or greater than those of associated automatic transfer switch, and with same phase arrangement and number of poles.

- f. Contact temperatures of bypass/isolation switches shall not exceed those of automatic transfer-switch contacts when they are carrying rated load.
  - g. Automatic and Nonautomatic Control: Automatic transfer-switch controller shall also control the bypass/isolation switch.
  - h. Legend: Manufacturer's standard legend for control labels and instruction signs shall describe operating instructions.
  - i. Maintainability: Fabricate to allow convenient removal of major components from front without removing other parts or main power conductors.
4. Interconnection of Bypass/Isolation Switches with Automatic Transfer Switches: Factory-installed copper bus bars; plated at connection points and braced for the indicated available short-circuit current.
- B. Remote Annunciator System:
- 1. Source Limitations: Same manufacturer as transfer switch in which installed.
  - 2. Functional Description: Remote annunciator panel shall annunciate conditions for indicated transfer switches.
  - 3. Annunciation panel display shall include the following indicators:
    - a. Sources available, as defined by actual pickup and dropout settings of transfer-switch controls.
    - b. Switch position.
    - c. Switch in test mode.
    - d. Failure of communication link.
  - 4. Annunciator Panel: LED-lamp type with audible signal and silencing switch.
    - a. Indicating Lights: Grouped for each transfer switch monitored.
    - b. Label each group, indicating transfer switch it monitors, location of switch, and identity of load it serves.
    - c. Mounting: Flush, modular, steel cabinet unless otherwise indicated.
    - d. Lamp Test: Push-to-test or lamp-test switch on front panel.
- C. Remote Annunciator and Control System:
- 1. Source Limitations: Same manufacturer as transfer switch in which installed.
  - 2. Include the following functions for indicated transfer switches:
    - a. Indication of sources available, as defined by actual pickup and dropout settings of transfer-switch controls.
    - b. Indication of switch position.
    - c. Indication of switch in test mode.
    - d. Indication of failure of digital communication link.
    - e. Key-switch or user-code access to control functions of panel.
    - f. Control of switch-test initiation.

## 2.4 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect components, assembled switches, and associated equipment according to UL 1008. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

- B. Prepare test and inspection reports.
  - 1. For each of the tests required by UL 1008, performed on representative devices, for emergency systems. Include results of test for the following conditions:
    - a. Overvoltage.
    - b. Undervoltage.
    - c. Loss of supply voltage.
    - d. Reduction of supply voltage.
    - e. Alternative supply voltage or frequency is at minimum acceptable values.
    - f. Temperature rise.
    - g. Dielectric voltage-withstand; before and after short-circuit test.
    - h. Overload.
    - i. Contact opening.
    - j. Endurance.
    - k. Short circuit.
    - l. Short-time current capability.
    - m. Receptacle withstand capability.
    - n. Insulating base and supports damage.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Floor-Mounting Switch: Anchor to floor by bolting.
  - 1. Comply with requirements for seismic control devices specified in Section 260548.16 "Seismic Controls for Electrical Systems."
  - 2. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.
  - 3. Provide workspace and clearances required by NFPA 70.
- B. Annunciator and Control Panel Mounting: Flush in wall unless otherwise indicated.
- C. Identify components according to Section 260553 "Identification for Electrical Systems."
- D. Set field-adjustable intervals and delays, relays, and engine exerciser clock.
- E. Comply with NECA 1.

### 3.2 CONNECTIONS

Retain "Wiring to Remote Components" Paragraph below if connections are to remote annunciator, control panel, or motor controller. Coordinate with Drawings.

- A. Wiring to Remote Components: Match type and number of cables and conductors to generator sets, control, and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Wiring Method: Install cables in raceways and cable trays except within electrical enclosures. Conceal raceway and cables except in unfinished spaces.

1. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
- D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- F. Connect twisted pair cable according to Section 260523 "Control-Voltage Electrical Power Cables."
- G. Route and brace conductors according to manufacturer's written instruction and Section 260529 "Hangers and Supports for Electrical Systems." Do not obscure manufacturer's markings and labels.
- H. Brace and support equipment according to Section 260548.16 "Seismic Controls for Electrical Systems."

### 3.3 FIELD QUALITY CONTROL

- A. Administrant for Tests and Inspections:

[Retain one of four subparagraphs below to specify who administers and performs tests and inspections.](#)

1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

- B. Tests and Inspections:

1. After installing equipment, test for compliance with requirements according to NETA ATS.
2. Visual and Mechanical Inspection:
  - a. Compare equipment nameplate data with Drawings and Specifications.
  - b. Inspect physical and mechanical condition.
  - c. Inspect anchorage, alignment, grounding, and required clearances.
  - d. Verify that the unit is clean.
  - e. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
  - f. Verify that manual transfer warnings are attached and visible.
  - g. Verify tightness of all control connections.
  - h. Inspect bolted electrical connections for high resistance using one of the following methods, or both:
    - 1) Use of low-resistance ohmmeter.
    - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data.
  - i. Perform manual transfer operation.
  - j. Verify positive mechanical interlocking between normal and alternate sources.
  - k. Perform visual and mechanical inspection of surge arresters.

- I. Inspect control power transformers.
  - 1) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.
  - 2) Verify that primary and secondary fuse or circuit-breaker ratings match Drawings.
  - 3) Verify correct functioning of drawout disconnecting contacts, grounding contacts, and interlocks.
  
3. Electrical Tests:
  - a. Perform insulation-resistance tests on all control wiring with respect to ground.
  - b. Perform a contact/pole-resistance test. Compare measured values with manufacturer's acceptable values.
  - c. Verify settings and operation of control devices.
  - d. Calibrate and set all relays and timers.
  - e. Verify phase rotation, phasing, and synchronized operation.
  - f. Perform automatic transfer tests.
  - g. Verify correct operation and timing of the following functions:
    - 1) Normal source voltage-sensing and frequency-sensing relays.
    - 2) Engine start sequence.
    - 3) Time delay on transfer.
    - 4) Alternative source voltage-sensing and frequency-sensing relays.
    - 5) Automatic transfer operation.
    - 6) Interlocks and limit switch function.
    - 7) Time delay and retransfer on normal power restoration.
    - 8) Engine cool-down and shutdown feature.
  
4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
  - a. Check for electrical continuity of circuits and for short circuits.
  - b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
  - c. Verify that manual transfer warnings are properly placed.
  - d. Perform manual transfer operation.
  
5. After energizing circuits, perform each electrical test for transfer switches stated in NETA ATS and demonstrate interlocking sequence and operational function for each switch at least three times.
  - a. Simulate power failures of normal source to automatic transfer switches and retransfer from emergency source with normal source available.
  - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
  - c. Verify time-delay settings.
  - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
  - e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
  - f. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.



- C. Coordinate tests with tests of generator and run them concurrently.
- D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- E. Transfer switches will be considered defective if they do not pass tests and inspections.
- F. Remove and replace malfunctioning units and retest as specified above.
- G. Prepare test and inspection reports.
- H. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switch. Remove all access panels so joints and connections are accessible to portable scanner.
  - 1. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
  - 2. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
  - 3. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.

#### 3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment.
- B. Training shall include testing ground-fault protective devices and instructions to determine when the ground-fault system shall be retested. Include instructions on where ground-fault sensors are located and how to avoid negating the ground-fault protection scheme during testing and circuit modifications.
- C. Coordinate this training with that for generator equipment.

END OF SECTION 263600

## SECTION 265119 - LED INTERIOR LIGHTING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

1. Cylinder.
2. Downlight.
3. Highbay, linear.
4. Highbay, nonlinear.
5. Lowbay.
6. Recessed, linear.
7. Strip light.
8. Surface mount, linear.
9. Surface mount, nonlinear.
10. Suspended, linear.
11. Suspended, nonlinear.
12. Materials.
13. Luminaire support.

- B. Related Requirements:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

#### 1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Arrange in order of luminaire designation.
  - 2. Include data on features, accessories, and finishes.
  - 3. Include physical description and dimensions of luminaires.
  - 4. Include emergency lighting units, including batteries and chargers.
  - 5. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
  - 6. Photometric data and adjustment factors based on laboratory tests
    - a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Shop Drawings: For nonstandard or custom luminaires.
  - 1. Include plans, elevations, sections, and mounting and attachment details.
  - 2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include diagrams for power, signal, and control wiring.
- C. Product Schedule: For luminaires and lamps.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing laboratory providing photometric data for luminaires.
- B. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Product Certificates: For each type of luminaire.
- D. Sample warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
  - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

#### 1.7 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications:

1. Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Provide luminaires from a single manufacturer for each luminaire type.
- C. Mockups: For interior luminaires in room or module mockups, complete with power and control connections.
  1. Obtain Architect's approval of luminaires in mockups before starting installations.
  2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

## 1.9 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: One year(s) from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance:
  1. Luminaires shall withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7
  2. Luminaires and lamps shall be labeled vibration and shock resistant.
  3. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."
- B. Ambient Temperature: 41 to 104 deg F (5 to 40 deg C).
- C. Altitude: Sea level to 1000 feet (300 m).

### 2.2 LUMINAIRE REQUIREMENTS

- 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. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
  - 1. Label shall include the following lamp characteristics:
    - a. "USE ONLY" and include specific lamp type.
    - b. Lamp diameter, shape, size, wattage, and coating.
    - c. CCT and CRI.
- C. Recessed luminaires shall comply with NEMA LE 4.
- D. California Title 24 compliant.

### 2.3 CYLINDER.

- A. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.
- B. Nominal Operating Voltage: 120 V ac.
- C. Lamp:
  - 1. Minimum 1000 lm.
  - 2. Minimum allowable efficacy of 80 lm/W.
  - 3. CRI of minimum 80 CCT of 3500K.
  - 4. Rated lamp life of 50,000 hours to L70.
  - 5. Dimmable from 100 percent to zero percent of maximum light output.
  - 6. Internal driver.
  - 7. User-Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61 or IEC 60061-1 and California Title 24.
  - 8. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.
- D. Housings:
  - 1. Extruded-aluminum housing and heat sink.
  - 2. Clear anodized, powder-coat or painted finish.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
  - 1. Tempered Fresnel glass, Prismatic glass, Diffuse glass, Clear glass, Prismatic acrylic, or Clear UV-stabilized acrylic.
  - 2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  - 3. Glass: Annealed crystal glass unless otherwise indicated.
  - 4. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

G. With integral mounting provisions.

H. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. California Title 20

## 2.4 DOWNLIGHT

A. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.

B. Nominal Operating Voltage: 120 V ac.

C. Lamp:

1. Minimum 1000 lm.
2. Minimum allowable efficacy of 80 lm/W.
3. CRI of minimum 80 CCT of 3500K.
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. User-Replaceable Lamps:
  - a. Bulb shape complying with ANSI C78.79.
  - b. Lamp base complying with ANSI C81.61 or IEC 60061-1, and California Title 20.
8. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.
9. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. Universal mounting bracket.
3. Integral junction box with conduit fittings.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Fixed lens.
2. Tempered Fresnel glass, Prismatic glass, Diffuse glass, Clear glass, Prismatic acrylic, Clear, or UV-stabilized acrylic.
3. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
4. Glass: Annealed crystal glass unless otherwise indicated.
5. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

G. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. Recessed luminaires shall comply with NEMA LE 4.
5. California Title 20.

2.5 HIGHBAY, LINEAR.

A. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.

B. Nominal Operating Voltage: 120 V ac.

C. Lamp:

1. Minimum 1000 lm.
2. Minimum allowable efficacy of 80 lm/W.
3. CRI of minimum 80 CCT of 3500 K.
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. User-Replaceable Lamps:
  - a. Bulb shape complying with ANSI C78.79.
  - b. Lamp base complying with ANSI C81.61 or IEC 60061-1 and California Title 20.
8. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. Powder coated or painted finish.
3. With integral mounting provisions.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Prismatic acrylic or Clear, UV-stabilized acrylic.
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

G. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.

## 2.6 HIGHBAY, NONLINEAR.

- A. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.
- B. Nominal Operating Voltage: 120 V ac.
- C. Lamp:
  - 1. Minimum 1000 lm.
  - 2. Minimum allowable efficacy of 80 lm/W.
  - 3. CRI of minimum 80 CCT of 3500 K.
  - 4. Rated lamp life of 50,000 hours to L70.
  - 5. Dimmable from 100 percent to zero percent of maximum light output.
  - 6. Internal driver.
  - 7. User-Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61 or IEC 60061-1 and California Title 20.
  - 8. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.
- D. Housings:
  - 1. Extruded-aluminum housing and heat sink.
  - 2. Powder-coated or painted finish.
  - 3. Universal mounting bracket.
  - 4. Integral junction box with conduit fittings.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
  - 1. Prismatic acrylic or Clear, UV-stabilized acrylic.
  - 2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  - 3. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.
- G. Standards:
  - 1. ENERGY STAR certified.
  - 2. RoHS compliant.
  - 3. UL Listing: Listed for damp location.
  - 4. California Title 20.

## 2.7 LINEAR INDUSTRIAL

- A. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.
- B. Nominal Operating Voltage: 120 V ac.



C. Lamp:

1. Minimum 1000 lm.
2. Minimum allowable efficacy of 80 lm/W.
3. CRI of minimum 80 CCT of 3500 K.
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. User-Replaceable Lamps:
  - a. Bulb shape complying with ANSI C78.79.
  - b. Lamp base complying with ANSI C81.61 or IEC 60061-1 and California Title 20.
8. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

D. Housing and Heat Sink Rating:

1. IP 54.
2. IP 66.
3. CSA C22.2 No 137.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Prismatic acrylic or Clear, UV-stabilized acrylic.
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

G. With integral mounting provisions.

H. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. California Title 20.

## 2.8 LOWBAY

A. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.

B. Nominal Operating Voltage: 120 V ac.

C. Lamp:

1. Minimum 1000 lm.
2. Minimum allowable efficacy of 80 lm/W.
3. CRI of minimum 80 CCT of 3500 K.
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.

6. Internal driver.
7. User-Replaceable Lamps:
  - a. Bulb shape complying with ANSI C78.79.
  - b. Lamp base complying with ANSI C81.61 or IEC 60061-1 and California Title 20.
8. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. Powder-coated or painted finish.
3. Universal mounting bracket.
4. Integral junction box with conduit fittings.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Prismatic acrylic or Clear, UV-stabilized acrylic.
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

G. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. California Title 20.

## 2.9 RECESSED, LINEAR.

A. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.

B. Nominal Operating Voltage: 120 V ac.

C. Lamp:

1. Minimum 2000 lm.
2. Minimum allowable efficacy of 80 lm/W.
3. CRI of minimum 80 CCT of 3500 K.
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. User-Replaceable Lamps:
  - a. Bulb shape complying with ANSI C78.79.
  - b. Lamp base complying with ANSI C81.61 or IEC 60061-1 and California Title 20.

8. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. Powder-coated or painted finish.
3. Universal mounting bracket.
4. Integral junction box with conduit fittings.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Prismatic acrylic or Clear, UV-stabilized acrylic.
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

G. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. NEMA LE 4.
5. California Title 20.

## 2.10 STRIP LIGHT

A. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.

B. Nominal Operating Voltage: 120 V ac.

C. Lamp:

1. Minimum 1000 lm.
2. Minimum allowable efficacy of 80 lm/W.
3. CRI of minimum 80 CCT of 3500 K.
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. User-Replaceable Lamps:
  - a. Bulb shape complying with ANSI C78.79.
  - b. Lamp base complying with ANSI C81.61 or IEC 60061-1 and California Title 20.

8. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.

2. Powder-coated or painted finish.
  3. Universal mounting bracket.
  4. Integral junction box with conduit fittings.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
1. Prismatic acrylic or Clear, UV-stabilized acrylic.
  2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  3. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.
- G. Standards:
1. ENERGY STAR certified.
  2. RoHS compliant.
  3. California Title 20.

## 2.11 SURFACE MOUNT, LINEAR

1. Minimum 1000 lm.
  2. Minimum allowable efficacy of 80 lm/W.
  3. CRI of minimum 80 CCT of 3500 K.
  4. Rated lamp life of 50,000 hours to L70.
  5. Dimmable from 100 percent to zero percent of maximum light output.
  6. Internal driver.
  7. User-Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61 or IEC 60061-1 and California Title 20.
  8. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.
- B. Housings:
1. Extruded-aluminum housing and heat sink.
  2. Powder-coated or painted finish.
  3. With integral mounting provisions.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- D. Diffusers and Globes:
1. Prismatic acrylic or Clear, UV-stabilized acrylic.
  2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  3. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

- E. Standards:
  - 1. ENERGY STAR certified.
  - 2. RoHS compliant.
  - 3. UL Listing: Listed for damp location.
  - 4. California Title 20.

## 2.12 SURFACE MOUNT, NONLINEAR

- A. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.
- B. Nominal Operating Voltage: 120 V ac.
- C. Lamp:
  - 1. Minimum 750 lm.
  - 2. Minimum allowable efficacy of 80 lm/W.
  - 3. CRI of minimum 80. CCT of 3500K.
  - 4. Rated lamp life of 50,000 hours to L70.
  - 5. Dimmable from 100 percent to zero percent of maximum light output.
  - 6. Internal driver.
  - 7. User-Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61 or IEC 60061-1, and California Title 20.
  - 8. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.
- D. Housings:
  - 1. Extruded-aluminum housing and heat sink.
  - 2. Clear anodized, powder-coat, or painted finish.
  - 3. With integral mounting provisions.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
  - 1. Tempered Fresnel glass, Prismatic glass, Diffuse glass, Clear glass, Prismatic acrylic, Clear, UV-stabilized acrylic.
  - 2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  - 3. Glass: Annealed crystal glass unless otherwise indicated.
  - 4. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.
- G. Standards:
  - 1. ENERGY STAR certified.
  - 2. RoHS compliant.
  - 3. UL Listing: Listed for damp location.

4. California Title 20.

#### 2.13 SUSPENDED, LINEAR

1. Minimum 1000 lm.
2. Minimum allowable efficacy of 80 lm/W.
3. CRI of minimum 80 CCT of 3500 K.
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. User-Replaceable Lamps:
  - a. Bulb shape complying with ANSI C78.79.
  - b. Lamp base complying with ANSI C81.61 or IEC 60061-1 and California Title 20.
8. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

#### B. Housings:

1. Extruded-aluminum housing and heat sink.
2. Powder-coated or painted finish.
3. With integral mounting provisions.

#### C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

#### D. Diffusers and Globes:

1. Prismatic acrylic or Clear, UV-stabilized acrylic.
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

#### E. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. California Title 20.

#### 2.14 SUSPENDED, NONLINEAR

#### A. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.

#### B. Nominal Operating Voltage: 120 V ac.

#### C. Lamp:

1. Minimum 1000 lm.
2. Minimum allowable efficacy of 80 lm/W.

3. CRI of minimum 80 CCT of 3500 K.
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. User-Replaceable Lamps:
  - a. Bulb shape complying with ANSI C78.79.
  - b. Lamp base complying with ANSI C81.61 or IEC 60061-1 and California Title 20.
8. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. Powder-coated or painted finish.
3. Universal mounting bracket.
4. Integral junction box with conduit fittings.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Prismatic acrylic or Clear, UV-stabilized acrylic.
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

G. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. California Title 20.

## 2.15 SURFACE MOUNT, LINEAR

1. Minimum 1000 lm.
2. Minimum allowable efficacy of 80 lm/W.
3. CRI of minimum 80 CCT of 3500 K.
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to zero percent of maximum light output.
6. Internal driver.
7. User-Replaceable Lamps:
  - a. Bulb shape complying with ANSI C78.79.
  - b. Lamp base complying with ANSI C81.61 or IEC 60061-1 and California Title 20.
8. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

B. Housings:

1. Extruded-aluminum housing and heat sink.

2. Powder-coated or painted finish.
  3. With integral mounting provisions.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- D. Diffusers and Globes:
1. Prismatic acrylic or Clear, UV-stabilized acrylic.
  2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  3. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.
- E. Standards:
1. ENERGY STAR certified.
  2. RoHS compliant.
  3. UL Listing: Listed for damp location.
  4. California Title 20.

## 2.16 MATERIALS

- A. Metal Parts:
1. Free of burrs and sharp corners and edges.
  2. Sheet metal components shall be steel unless otherwise indicated.
  3. Form and support to prevent warping and sagging.
- B. Steel:
1. ASTM A36/A36M for carbon structural steel.
  2. ASTM A568/A568M for sheet steel.
- C. Stainless Steel:
1. Manufacturer's standard grade.
  2. Manufacturer's standard type, ASTM A240/240M.
- D. Galvanized Steel: ASTM A653/A653M.
- E. Aluminum: ASTM B209.

## 2.17 METAL FINISHES

- A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.



## 2.18 LUMINAIRE SUPPORT

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).
- D. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 TEMPORARY LIGHTING

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

### 3.3 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports:
  - 1. Sized and rated for luminaire weight.
  - 2. Able to maintain luminaire position after cleaning and relamping.
  - 3. Provide support for luminaire without causing deflection of ceiling or wall.
  - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- E. Flush-Mounted Luminaires:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaires:

1. Attached to structural members in walls.
2. Do not attach luminaires directly to gypsum board.

G. Suspended Luminaires:

1. Ceiling Mount:

- a. Two 5/32-inch- (4-mm-) diameter aircraft cable supports adjustable to 10 feet (3 m) in length
- b. Four-point pendant mount with 5/32-inch- (4-mm-) diameter aircraft cable supports adjustable to 10 feet (3 m) in length.

2. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
3. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
4. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
5. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

H. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

- I. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

### 3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

### 3.6 STARTUP SERVICE

- A. Comply with requirements for startup specified in Section 260943.23 "Relay-Based Lighting Controls."

### 3.7 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
  - 1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
  - 2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION 265119

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Emergency lighting.
2. Exit signs.
3. Materials.
4. Luminaire support components.

#### B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

### 1.2 DEFINITIONS

- A. Correlated Color Temperature (CCT): The absolute temperature, measured in kelvins, of a blackbody whose chromaticity most nearly resembles that of the light source.
- B. Color Rendering Index (CRI): Measure of the degree of color shift that objects undergo when illuminated by the light source as compared with the color of those same objects when illuminated by a reference source.
- C. Emergency Lighting Unit: A lighting unit with internal or external emergency battery powered supply and the means for controlling and charging the battery and unit operation.
- D. Lumen (lm): The SI derived unit of luminous flux equal to the luminous flux emitted within a unit solid angle by a unit point source (1 lm = 1 cd-sr).

### 1.3 ACTION SUBMITTALS

#### A. Product Data:

1. For each type of emergency lighting unit, exit sign, and emergency lighting support.
  - a. Include data on features, accessories, and finishes.
  - b. Include physical description of unit and dimensions.
  - c. Battery and charger for light units.
  - d. Include life, output of luminaire (lumens, CCT, and CRI), and energy-efficiency data.
  - e. Include photometric data and adjustment factors based on laboratory tests by, or under supervision of, qualified luminaire photometric testing laboratory, for each luminaire type.

#### B. Shop Drawings:

1. For nonstandard or custom luminaires.
  - a. Include plans, elevations, sections, and mounting and attachment details.
  - b. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - c. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: For each type of luminaire with factory-applied finishes.
- D. Product Schedule:
  1. For emergency lighting units. Use same designations indicated on Drawings.
  2. For exit signs. Use same designations indicated on Drawings.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of luminaire.
- B. Product Test Reports: For each luminaire for tests performed by, or under supervision of, qualified luminaire photometric testing laboratory.
- C. Sample Warranty: For manufacturer's special warranty.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

#### 1.6 WARRANTY

- A. Special Manufacturer Extended Warranty for Batteries for Emergency and Exit Lighting: Manufacturer warrants that batteries for emergency luminaires and exit signs perform in accordance with specified requirements and agrees to provide repair or replacement of batteries that fail to perform as specified within extended warranty period.
  1. Extended Warranty Period: Five year(s) from date of Substantial Completion; prorated coverage for labor, materials, and equipment.

### PART 2 - PRODUCTS

#### 2.1 GENERAL REQUIREMENTS FOR EMERGENCY LIGHTING

- A. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70 and UL 924, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
- B. Comply with NFPA 101.
- C. Comply with NEMA LE 4 for recessed luminaires.

- D. Internal Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body.
1. Emergency Connection: Operate continuously at full lumen output upon loss of normal power. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire ballast.
  2. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
  3. Nightlight Connection: Operate lamp continuously at 80 percent of rated light output.
  4. Test Push-Button and Indicator Light: Visible and accessible without opening luminaire or entering ceiling space.
    - a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    - b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
  5. Battery: Sealed, maintenance-free, nickel-cadmium type.
  6. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
  7. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.
- E. External Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, suitable for powering one or more lamps, remote mounted from luminaire.
1. Emergency Connection: Operate LED lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire.
  2. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
  3. Nightlight Connection: Operate lamp in a remote luminaire continuously.
  4. Battery: Sealed, maintenance-free, nickel-cadmium type.
  5. Charger: Fully automatic, solid-state, constant-current type.
  6. Housing: Type 1 enclosure listed for installation inside, on top of, or remote from luminaire. Remote assembly must be located no less than half of distance recommended by emergency power unit manufacturer, whichever is less.
  7. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
  8. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
  9. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

## 2.2 EMERGENCY LIGHTING

- A. General Characteristics: Self-contained units.

- B. Emergency Luminaire
  - 1. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.
  - 2. Options:
    - a. Operating at nominal voltage of 120 V(ac).
    - b. If battery backup noted in drawings, internal emergency power unit.
    - c. Rated for installation in damp locations, and for sealed and gasketed luminaires in wet locations.
    - d. UL 94 5VA and V-1 flame rating.
  
- C. Emergency Lighting Unit
  - 1. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.
  - 2. Options:
    - a. Operating at nominal voltage of [120 V(ac)
    - b. Wall or ceiling mount with universal junction box adaptor.
    - c. UV stable thermoplastic housing
    - d. Two LED lamp heads.
    - e. Internal emergency power unit.
  
- D. Remote Emergency Lighting Unit
  - 1. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.
  - 2. Options:
    - a. Operating at nominal voltage of 120 V(ac).
    - b. Wall mount with universal junction box adaptor.
    - c. UV stable thermoplastic housing, rated for damp locations.
    - d. One or two LED] lamp heads.
    - e. External emergency power unit.

## 2.3 EXIT SIGNS

- A. General Characteristics: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
  
- B. Internally Lighted Sign
  - 1. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.
  - 2. Options:
    - a. Operating at nominal voltage of 120 V(ac)
    - b. Lamps for AC Operation:
      - 1) LEDs; 50,000 hours minimum rated lamp life.
    - c. Self-Powered Exit Signs (Battery Type): Internal emergency power unit.
    - d. Master/Remote Sign Configurations:
      - 1) Master Unit: Comply with requirements above for self-powered exit signs, and provide additional capacity in LED power supply for power connection to remote unit.

- 2) Remote Unit: Comply with requirements above for self-powered exit signs, except omit power supply, battery, and test features. Arrange to receive full power requirements from master unit. Connect for testing concurrently with master unit as a unified system.

## 2.4 MATERIALS

### A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components must be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

### B. Doors, Frames, and Other Internal Access:

1. Smooth operating, free of light leakage under operating conditions.
2. Designed to permit relamping without use of tools.
3. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

### C. Diffusers and Globes:

1. Prismatic acrylic or Clear, UV-stabilized acrylic.
2. Acrylic: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

### D. Housings:

1. Extruded aluminum housing and heat sink.
2. Clear anodized, powder coat or painted finish.

### E. Conduit: EMT or FMC, minimum metric designator 21 (trade size 3/4).

## 2.5 METAL FINISHES

- A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

## 2.6 LUMINAIRE SUPPORT COMPONENTS

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Support Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 0.106 inch (2.69 mm).



## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for conditions affecting performance of luminaires.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Examine walls, floors, roofs, and ceilings for suitable conditions where emergency lighting luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- B. Supports:
  - 1. Sized and rated for luminaire weight.
  - 2. Able to maintain luminaire position when testing emergency power unit.
  - 3. Provide support for luminaire and emergency power unit without causing deflection of ceiling or wall.
  - 4. Luminaire-mounting devices must be capable of supporting a horizontal force of 100 percent of luminaire and emergency power unit weight and vertical force of 400 percent of luminaire weight.
- C. Wall-Mounted Luminaire Support:
  - 1. Attached to structural members in walls or attached to a minimum 20-gauge backing plate attached to wall structural members.
  - 2. Do not attach luminaires directly to gypsum board.
- D. Suspended Luminaire Support:
  - 1. Pendants and Rods: Where longer than 48 inch (1200 mm), brace to limit swinging.
  - 2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
  - 3. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
  - 4. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.
- E. Ceiling Grid Mounted Luminaires:
  - 1. Secure to outlet box, if provided.
  - 2. Secure emergency power unit using approved fasteners in a minimum of four locations, spaced near corners of emergency power unit.

3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

### 3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.4 FIELD QUALITY CONTROL

- A. Tests and Inspections:
  1. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Nonconforming Work:
  1. Luminaire will be considered defective if it does not pass operation tests and inspections.
  2. Remove and replace defective units and retest.
- C. Prepare test and inspection reports.
- D. Manufacturer Services:
  1. Engage factory-authorized service representative to support field tests and inspections.

### 3.5 SYSTEM STARTUP

- A. Perform startup service:
  1. Charge emergency power units and batteries minimum of one hour and depress switch to conduct short-duration test.
  2. Charge emergency power units and batteries minimum of 24 hours and conduct one-hour discharge test.

### 3.6 PROTECTION

- A. Remove and replace luminaires and exit signs that are damaged or caused to be unfit for use by construction activities.

END OF SECTION 265213

## SECTION 265613 - LIGHTING POLES AND STANDARDS

### 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. Poles and accessories for support of luminaires.
  - 2. Luminaire-lowering devices.

#### 1.3 DEFINITIONS

- A. EPA: Equivalent projected area.
- B. Luminaire: Complete luminaire.
- C. Pole: Luminaire-supporting structure, including tower used for large-area illumination.
- D. Standard: See "Pole."

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each pole, accessory, and luminaire-supporting and -lowering device, arranged as indicated.
  - 1. Include data on construction details, profiles, EPA, cable entrances, materials, dimensions, weight, rated design load, and ultimate strength of individual components.
  - 2. Include finishes for lighting poles and luminaire-supporting devices.
  - 3. Anchor bolts.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and mounting and attachment details.
  - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Detail fabrication and assembly of poles and pole accessories.
  - 4. Foundation construction details, including material descriptions, dimensions, anchor bolts, support devices, and calculations, signed and sealed by a professional engineer licensed in the state of installation.
  - 5. Anchor bolt templates keyed to specific poles and certified by manufacturer.
  - 6. Method and procedure of pole installation. Include manufacturer's written installations.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements according to AASHTO LTS-6-M and that load imposed by luminaire and attachments has been included in design. The certification shall be based on design calculations signed and sealed by a professional engineer.
- B. Qualification Data: For Installer and testing agency.
- C. Material Test Reports:
  - 1. For each foundation component, by a qualified testing agency.
  - 2. For each pole, by a qualified testing agency.
- D. Source quality-control reports.
- E. Field quality-control reports.
- F. Sample Warranty: Manufacturer's standard warranty.
- G. Soil test reports

## 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For poles to include in emergency, operation, and maintenance manuals.
  - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include pole inspection and repair procedures.

## 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Pole repair materials.

## 1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C1093 for foundation testing.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Package aluminum poles for shipping according to ASTM B660.
- B. Store poles on decay-resistant skids at least 12 inches (300 mm) above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.
- C. Retain factory-applied pole wrappings on metal poles until right before pole installation. Handle poles with web fabric straps.

## 1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of pole(s) that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within a specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs from special warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.
  - 2. Warranty Period for Corrosion Resistance: Five years from date of Substantial Completion.
  - 3. Warranty Period for Color Retention: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Foundation and pole shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."
  - 2. Component Importance Factor: 1.5.
- B. Structural Characteristics: Comply with AASHTO LTS-6-M.
- C. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied according to AASHTO LTS-6-M.
- D. Live Load: Single load of 500 lbf (2200 N) distributed according to AASHTO LTS-6-M.
- E. Ice Load: Load of 3 lbf/sq. ft. (145 Pa), applied according to AASHTO LTS-6-M for applicable areas on the Ice Load Map.
- F. Wind Load: Pressure of wind on pole and luminaire, calculated and applied according to AASHTO LTS-6-M.
  - 1. Basic wind speed for calculating wind load for poles 50 feet (15 m) high or less is 100 mph (45 m/s).
    - a. Wind Importance Factor: 1.0.
    - b. Minimum Design Life: 25 years.
    - c. Velocity Conversion Factor: 1.0.
- G. Strength Analysis: For each pole, multiply the actual EPA of luminaires and brackets by a factor of 1.1 to obtain the EPA to be used in pole selection strength analysis.
- H. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

## 2.2 STEEL POLES

- A. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.
- B. Source Limitations: Obtain poles from single manufacturer or producer.
- C. Poles: Comply with ASTM A500/A500M, Grade B carbon steel with a minimum yield of 46,000 psig (317 MPa); one-piece construction up to 40 feet (12 m) in height with access handhole in pole wall.
  - 1. Shape: Round, tapered.
  - 2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- D. Poles: Comply with ASTM A240/A240M, stainless steel with a minimum yield of 55,000 psig (379 MPa); one-piece construction up to 40 feet (12 m) in height with access handhole in pole wall.
  - 1. Shape: Round, tapered.
  - 2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- E. Steel Mast Arms: Single-arm type, continuously welded to pole attachment plate. Material and finish same as plate.
- F. Brackets for Luminaires: Detachable, cantilever, without underbrace.
  - 1. Adaptor fitting welded to pole, allowing the bracket to be bolted to the pole-mounted adapter, then bolted together with stainless or galvanized-steel bolts.
  - 2. Cross Section: Tapered oval, with straight tubular end section to accommodate luminaire. Match pole material and finish.
- G. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.
- H. Fasteners: Stainless steel or Galvanized steel, size and type as determined by manufacturer. Corrosion-resistant items compatible with support components.
  - 1. Materials: Compatible with poles and standards as well as the substrates to which poles and standards are fastened and shall not cause galvanic action at contact points.
  - 2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
- I. Grounding and Bonding Lugs: Welded 1/2-inch (13-mm) threaded lug, complying with requirements in Section 260526 "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size indicated, and accessible through handhole.
- J. Handhole: Oval shaped, with minimum clear opening of 2-1/2 by 5 inches (65 by 130 mm), with cover secured by stainless-steel captive screws.
- K. Cable Support Grip: Wire-mesh type with rotating attachment eye, sized for diameter of cable and rated for a minimum load equal to weight of supported load multiplied by a 5.0 safety factor.

- L. Galvanized Finish: After fabrication, hot-dip galvanize according to ASTM A123/A123M.
- M. Factory-Painted Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
  - 1. Surface Preparation: Clean surfaces according to SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, according to SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
  - 2. Interior Surfaces of Pole: One coat of bituminous paint, or otherwise treat for equal corrosion protection.
  - 3. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high gloss, high-build polyurethane enamel.
    - a. Color: As indicated by manufacturer's designations.
- N. Powder-Coat Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
  - 1. Surface Preparation: Clean surfaces according to SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair powder coat bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, according to SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
  - 2. Powder Coat: Comply with AAMA 2604.
    - a. Electrostatic-applied powder coating; single application and cured to a minimum 2.5- to 3.5-mils (64- to 89-um) dry film thickness. Coat interior and exterior of pole for equal corrosion protection.
    - b. Color: As indicated by manufacturer's designations.

## 2.3 ALUMINUM POLES

- A. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.
- B. Poles: Seamless, extruded structural tube complying with ASTM B221, Alloy 6061-T6, with access handhole in in pole wall.
  - 1. Shape: Round, tapered.
  - 2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- C. Mast Arms: Aluminum Single-arm type, continuously welded to pole attachment plate. Material and finish same as plate.
- D. Brackets for Luminaires: Detachable, cantilever, without underbrace.
  - 1. Adaptor fitting welded to pole, allowing the bracket to be bolted to the pole-mounted adapter, then bolted together with stainless or galvanized-steel bolts.
  - 2. Cross Section: Tapered oval, with straight tubular end section to accommodate luminaire. Match pole material and finish.
- E. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.

- F. Grounding and Bonding Lugs: Bolted 1/2-inch (13-mm) threaded lug, complying with requirements in Section 260526 "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.
- G. Fasteners: Stainless steel or Galvanized steel, size and type as determined by manufacturer. Corrosion-resistant items compatible with support components.
  - 1. Materials: Compatible with poles and standards as well as to substrates to which poles and standards are fastened and shall not cause galvanic action at contact points.
  - 2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
- H. Handhole: Oval shaped, with minimum clear opening of 2-1/2 by 5 inches (65 by 130 mm), with cover secured by stainless-steel captive screws.
- I. Factory-Painted Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
  - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, according to SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
  - 2. Interior Surfaces of Pole: One coat of bituminous paint, or otherwise treat for equal corrosion protection.
  - 3. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
    - a. Color: As indicated by manufacturer's designations.
- J. Powder-Coat Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
  - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair powder coat bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, according to SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
  - 2. Powder coat shall comply with AAMA 2604.
    - a. Electrostatic applied powder coating; single application with a minimum 2.5- to 3.5-mils (64- to 89-um) dry film thickness; cured according to manufacturer's instructions. Coat interior and exterior of pole for equal corrosion protection.
    - b. Color: As indicated by manufacturer's designations.

## 2.4 POLE ACCESSORIES

- A. Minimum 1800-W transformer, protected by replaceable fuses, mounted behind access cover.
- B. Base Covers: Manufacturers' standard metal units, finished same as pole, and arranged to cover pole's mounting bolts and nuts.
- C. Transformer-Type Base: Same material and color as pole. Coordinate dimensions to suit pole's base flange and to accept indicated accessories. Include removable flanged access cover secured with bolts or screws.



## 2.5 LOWERING SYSTEM FOR LUMINAIRES

- A. System Description: Capable of lowering luminaire assembly to a service position within 36 inches (900 mm) of finished grade in winds up to 30 mph (49 km/h). Provide manual plug connection to electrical power accessible in lowered position. Assembled system of pole, luminaire, and lowering device shall be capable of loads specified in "Performance Requirements" Article.
- B. Compatibility of Material: Materials for attachment and connection of luminaire-mounting assembly, lowering device, lowering cable, and portable winch shall be compatible to avoid corrosion and electrolysis.
- C. Structural and Mechanical Design Safety Factor: 5.0, minimum, for static and dynamic loads of load-bearing components, including cable.
- D. Luminaire-Mounting and Disconnect Arrangement: Multiple ring or carriage-mounted luminaires, arranged for lowering and rising as a group.
  - 1. Electrical cable for normal operating power to luminaires shall manually disconnect inside pole base, using weatherproof multi-pin connector, and shall be arranged to move within the pole during lowering and rising of luminaire assembly.
  - 2. Electrical cable for normal operating power to luminaires shall automatically disconnect at weatherproof multi-pin connector within the pole-top lowering head at the beginning of the lowering cycle and reconnect when luminaire or luminaire assembly is raised to the operating position.
- E. Lowering Device: Weatherproof, cast-aluminum housing, and multiple mechanical latches. Moving parts of latching assembly shall be located in the portion of the unit that is lowered to servicing position. Positive latching in the operating position shall be indicated to the operator at the base of the pole by a clear visual signal or by other means acceptable to Owner or authorities having jurisdiction.
- F. Lowering Cable: Zinc-electroplated or stainless steel aircraft cable.
- G. Portable Winch: Manual or 120-V electric type. One required.
  - 1. Winch Power Connection: Cord and plug.
  - 2. Winch Raise-Lower Control: Remote-control station with 15 feet (5 m) of cable.

## 2.6 MOUNTING HARDWARE

- A. Anchor Bolts: Manufactured to ASTM F1554, Grade 55, with a minimum yield strength of 55,000 psi (380 000 kPa).
  - 1. Galvanizing: Hot dip galvanized according to ASTM A153, Class C.
  - 2. Bent or Headed rods.
  - 3. Threading: Uniform National Coarse, Class 2A.
- B. Nuts: ASTM A563, Grade A, Heavy-Hex.
  - 1. Galvanizing: Hot dip galvanized according to ASTM A153, Class C.
  - 2. Two nuts provided per anchor bolt, shipped with nuts pre-assembled to the anchor bolts.
- C. Washers: ASTM F436, Type 1.

1. Galvanizing: Hot dip galvanized according to ASTM A153, Class C.
2. One washer(s) provided per anchor bolt.

## 2.7 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine poles, luminaire-mounting devices, lowering devices, and pole accessories before installation. Components that are scratched, dented, marred, wet, moisture damaged, or visibly damaged are considered defective.
- C. Examine roughing-in for foundation and conduit to verify actual locations of installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 POLE FOUNDATION

- A. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Structural steel complying with ASTM A36/A36M and hot-dip galvanized according to ASTM A123/A123M; and with top-plate and mounting bolts to match pole-base flange and strength required to support pole, luminaire, and accessories. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."
- B. Direct-Buried Poles with Concrete Backfill: Set poles in augered holes to depth below finished grade indicated on Drawings, but not less than as indicated. To ensure a plumb installation, continuously check pole orientation with plumb bob while tamping.
  1. Make holes 6 inches (150 mm) in diameter larger than pole diameter.
  2. Fill augered hole around pole with air-entrained concrete having a minimum compressive strength of 3000 psi (20 MPa) at 28 days and finish in a dome above finished grade.
  3. Use a short piece of 1/2-inch (13-mm) diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
  4. Cure concrete a minimum of 72 hours before performing work on pole.
- C. Anchor Bolts: Install plumb using manufacturer-supplied template, uniformly spaced.

### 3.3 POLE INSTALLATION

- A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on pole.
- B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on drawing.
  - 1. Fire Hydrants and Water Piping: 60 inches (1520 mm).
  - 2. Water, Gas, Electric, Communications, and Sewer Lines: 10 feet (3 m).
  - 3. Trees: 15 feet (5 m) from tree trunk.
- C. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Section 033000 "Cast-in-Place Concrete."
- D. Foundation-Mounted Poles: Mount pole with leveling nuts and tighten top nuts to torque level according to pole manufacturer's written instructions.
  - 1. Use anchor bolts and nuts selected to resist seismic forces defined for the application and approved by manufacturer.
  - 2. Grout void between pole base and foundation. Use nonshrink or expanding concrete grout firmly packed to fill space.
  - 3. Install base covers unless otherwise indicated.
  - 4. Use a short piece of 1/2 -inch (13-mm) diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
- E. Poles and Pole Foundations Set in Concrete-Paved Areas: Install poles with a minimum 6-inch- (150-mm-) wide, unpaved gap between the pole or pole foundation and the edge of the adjacent concrete slab. Fill unpaved ring with pea gravel. Insert material to a level 1 inch (25 mm) below top of concrete slab.
- F. Raise and set pole using web fabric slings (not chain or cable) at locations indicated by manufacturer.

### 3.4 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum using insulating fittings or treatment.
- B. Steel Conduits: Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- (0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50-percent overlap.

### 3.5 GROUNDING

- A. Ground Metal Poles and Support Structures: Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
  - 1. Install grounding electrode for each pole unless otherwise indicated.
  - 2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

B. Ground Nonmetallic Poles and Support Structures: Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

1. Install grounding electrode for each pole.
2. Install grounding conductor and conductor protector.
3. Ground metallic components of pole accessories and foundation.

### 3.6 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.7 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Inspect poles for nicks, mars, dents, scratches, and other damage.
2. System function tests.

END OF SECTION 265613

## SECTION 265619 - LED EXTERIOR LIGHTING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

##### A. Section Includes:

1. Luminaire-mounted photoelectric relays.
2. Luminaire types.
3. Materials.
4. Finishes.
5. Luminaire support components.

##### B. Related Requirements:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
2. in Section 265100 "Interior Lighting."
3. Section 260943.23 "Relay-Based Lighting Controls" for manual or programmable control systems with low-voltage control wiring or data communication circuits.
4. Section 265613 "Lighting Poles and Standards" for poles and standards used to support exterior lighting equipment.

#### 1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color rendering index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of luminaire.
  1. Arrange in order of luminaire designation.

2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaire.
4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.
5. Photometric data and adjustment factors based on laboratory tests, complying with IES Lighting Measurements Testing and Calculation Guides, of each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project.
  - a. Manufacturer's Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.
  - b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
6. Wiring diagrams for power, control, and signal wiring.
7. Photoelectric relays.
8. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Samples: For each luminaire and for each color and texture indicated with factory-applied finish.

D. Product Schedule: Use same designations indicated on Drawings.

## 1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing laboratory providing photometric data for luminaires.

B. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Product Certificates: For each type of the following:

1. Luminaire.
2. Photoelectric relay.

D. Product Test Reports: For each luminaire, for tests performed by a qualified testing agency.

E. Source quality-control reports.

- F. Sample warranty.

## 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires to include in operation and maintenance manuals.
  - 1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.
  - 2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

## 1.7 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications:
  - 1. Luminaire manufacturers' laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Provide luminaires from a single manufacturer for each luminaire type.
- C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.
- D. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

## 1.9 FIELD CONDITIONS

- A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.
- B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

## 1.10 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures, including luminaire support components.
    - b. Faulty operation of luminaires and accessories.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: 2 year(s) from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

#### A. Seismic Performance:

1. Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7
2. Luminaires and lamps shall be labeled vibration and shock resistant.
3. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

### 2.2 LUMINAIRE REQUIREMENTS

- 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. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.
- C. UL Compliance: Comply with UL 1598 and listed for wet location.
- D. Lamp base complying with ANSI C81.61 or IEC 60061-1.
- E. Bulb shape complying with ANSI C79.1.
- F. CRI of minimum 80. CCT of 4000K.
- G. L70 lamp life of 50,000 hours.
- H. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- I. Internal driver.
- J. Nominal Operating Voltage: 120 V ac.
- K. In-line Fusing: Separate in-line fuse for each pole mounted luminaire.
- L. Lamp Rating: Lamp marked for outdoor use or in enclosed locations.
- M. Source Limitations:
  1. Obtain luminaires from single source from a single manufacturer.

### 2.3 LUMINAIRE-MOUNTED PHOTOELECTRIC RELAYS

- A. Comply with UL 773 or UL 773A.



- B. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc (16 to 32 lx) and off at 4.5 to 10 fc (48 to 108 lx) with 15-second minimum time delay. Relay shall have directional lens in front of photocell to prevent artificial light sources from causing false turnoff.
  - 1. Relay with locking-type receptacle shall comply with ANSI C136.10.
  - 2. Adjustable window slide for adjusting on-off set points.

## 2.4 LUMINAIRE TYPES

- A. Area and Site:
  - 1. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.
  - 2. Luminaire Shape: Square.
  - 3. Mounting: Pole or Building.
  - 4. Luminaire-Mounting Height as noted on drawings.
  - 5. Distribution: as noted on drawings.
  - 6. Diffusers and Globes: Tempered Fresnel glass, Prismatic glass, Diffuse glass, Clear glass, Prismatic acrylic, Clear, UV-stabilized acrylic, or Clear polycarbonate.
  - 7. Housings:
    - a. Extruded-aluminum housing and heat sink.
    - b. Clear anodized, powder-coat, or painted finish.
- B. Canopy:
  - 1. Available Products: Subject to compliance with requirements, products as listed in the drawing's luminaire schedule.
  - 2. Diffusers and Globes: Tempered Fresnel glass, Prismatic glass, Diffuse glass, Clear glass, Prismatic acrylic, Clear, UV-stabilized acrylic, or Clear polycarbonate.
  - 3. Housings:
    - a. Extruded-aluminum housing and heat sink.
    - b. Clear anodized, powder-coat, or painted finish.

## 2.5 MATERIALS

- A. Metal Parts: Free of burrs and sharp corners and edges.
- B. Sheet Metal Components: Corrosion-resistant aluminum. Form and support to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.
- D. Diffusers and Globes:
  - 1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  - 2. Glass: Annealed crystal glass unless otherwise indicated.
  - 3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

- E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
  - 1. White Surfaces: 85 percent.
  - 2. Specular Surfaces: 83 percent.
  - 3. Diffusing Specular Surfaces: 75 percent.
- G. Housings:
  - 1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
  - 2. Provide filter/breather for enclosed luminaires.
- H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
  - 1. Label shall include the following lamp characteristics:
    - a. "USE ONLY" and include specific lamp type.
    - b. Lamp diameter, shape, size, wattage and coating.
    - c. CCT and CRI for all luminaires.

## 2.6 FINISHES

- A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- C. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
  - 2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20 requirements; and seal aluminum surfaces with clear, hard-coat wax.
  - 3. Class I, Clear-Anodic Finish: AA-M32C22A41 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
  - 4. Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.
    - a. Color: As noted in drawings.

- D. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
  - 2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
    - a. Color:
      - 1) As selected from manufacturer's standard catalog of colors.

## 2.7 LUMINAIRE SUPPORT COMPONENTS

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.
- C. Examine walls, roofs, and canopy ceilings for suitable conditions where luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 TEMPORARY LIGHTING

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is substantially complete, clean luminaires used for temporary lighting and install new lamps.

### 3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with NECA 1.
- B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Install lamps in each luminaire.
- D. Fasten luminaire to structural support.

- E. Wall-Mounted Luminaire Support:
  - 1. Attached to structural members in walls or attached to a minimum 1/8 inch (3 mm) backing plate attached to wall structural members
- F. Wiring Method: Install cables in raceways. Conceal raceways and cables.
- G. Install luminaires level, plumb, and square with finished grade unless otherwise indicated.
- H. Coordinate layout and installation of luminaires with other construction.
- I. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.
- J. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

### 3.4 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- (0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

### 3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.6 FIELD QUALITY CONTROL

- A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
  - 2. Verify operation of photoelectric controls.
    - a. IES LM-72.
  - 3. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
- C. Luminaire will be considered defective if it does not pass tests and inspections.
- D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.7 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain luminaires and photocell relays.

END OF SECTION 265619

## SECTION 31 23 00

### EARTHWORK

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A.** The Work of this Section includes all earthwork required for construction of the Work. Earthwork shall include, but not be limited to the loosening, removing, loading, transporting, depositing and compacting in its final location of all materials wet and dry, as required for the purposes of completing the work specified in the Contract Documents which shall include, but not be limited to: the sawcutting and removal of A.C. pavement, P.C.C. concrete and underlying material to a subbase design grade indicated on the Plans, the installation of subbase material to a subbase grade beneath A.C. pavement and concrete infrastructure, excavations for above-grade and below-grade structures, backfill requirements for material to be placed beneath above-grade and below-grade structures, backfill requirements for the areas surrounding above-grade and below-grade structures, backfilling of depressed areas resultant from demolition, the disposal of excess excavated materials, borrow of materials to make up deficiencies for fills; and all other incidental earthwork, all in accordance with the requirements of the Contract Documents.

Principal work items included in this Section are:

1. Site preparation, clearing and grubbing.
2. Preparation of fill areas.
3. Excavation and controlled fill construction.
4. Structural excavation and backfills.
5. Disposal of surplus and/or unsuitable materials.
6. Dust control and drainage control.
7. Grading
8. Clean-up.

## 1.02 REFERENCE STANDARDS

ASTM C 131	Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM D 75	Practice for Sampling Aggregates
ASTM D 422	Method for Particle-Size Analysis of Soils
ASTM D 698	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Rammer and 12-in (304.8-mm) Drop
ASTM D 1556	Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	Test Method for Moisture-Density Relations of Soils Using Remmer and Drop
ASTM D 1682	Test method for Breaking Load and Elongation of Textile Fabrics
ASTM D 2419	Test method for Sand Equivalent Values of Soil and Fine Aggregate
ASTM D 2487	Classification of Soils for Engineering Purposes
ASTM D 2922	Test Method for Density of Soil in Places by Nuclear Methods (Shallow Depth)
ASTM D 3017	Test method for Water Content of Soil and Rock in Place by Nuclear Methods
ASTM D 3776	Test Method for Mass Per Unit Area (Weight) of Woven Fabric
ASTM D 4253	Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Plate

ASTM D 4254	Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
ASTM D 4751	Test Method for Determining the Apparent Opening Size of a Geotextile
CAL-OSHA	Title 8 General Industry Safety Orders

### 1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 31 23 50 – Trenching and Backfilling – Water and Sewer Pipelines
- B. Section 31 41 00 – Sheeting, Shoring and Bracing
- C. Section 33 14 00 – PVC Pipelines

### 1.04 DEFINITIONS

- A. Site: The property owned by the County of Imperial per APN #051-241-019 and as illustrated on the plans. The site includes the Seeley Fire Station and Cooling Center Site on the East side of the property and unimproved land on the West side of the property. The land on the West side of the site shall be used by the Contractor as a staging area.
- B. Controlled Fill: Compacted suitable fill material in all areas of the site requiring filling to grade as shown on the Plans.
- C. Structural Fill: Compacted suitable fill material which will support a structure or some part of a structure. This includes support material for P.C.C. structures and pads.
- D. Structural Backfill: Compacted suitable material placed between the wall of a structure and construction excavation slope up to finished grade.
- E. Suitable Material: As specified herein shall be any material imported or excavated from the cut areas that is, in the opinion of the Engineer, suitable for use in constructing fills.
- F. Waste Excavation: Also Surplus Material. Material from project excavations which is not suitable for use in backfill or compacted fills or is in excess of that required to be



used for backfill or to construct fills.

- G. Pipe Zone Backfill: Material suitable for placement below or surrounding the pipe to a given vertical distance above the pipe as required by the pipe section.
- H. Pipe Trench Backfill: Material suitable for placement from the pipe zone to finish grade or to pavement subbase material.

## 1.05 SITE INVESTIGATION

- A. Soil Investigation Report: A Geotechnical Report has been prepared for this project and is included in the Special Conditions Section of the Specifications.
- B. Contractor's Responsibility: The Contractor shall carefully examine the site and make all inspections necessary in order to determine the full extent of the work required to make the completed Work conform to the Plans and Specifications. The Contractor shall satisfy himself/herself as to the nature and location of the Work, conditions, the conditions of the existing ground surface, and the character of equipment and facilities needed prior to and during prosecution of the Work. The Contractor shall satisfy himself/herself as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered. The Contractor shall review water table conditions. Any inaccuracies or discrepancies between the actual field conditions and the Plans, or between the Plans and Specifications must be brought to the Engineer's attention in order to clarify the exact nature of the Work to be performed.
- C. Existing Elevations: All existing elevations illustrated on the Plans are approximate. The Contractor shall recognize and acknowledge the condition that the bid lump sum price shall include all earthwork activities irrespective of the possible localized difference in contour elevations and actual ground; and that there will be no additional compensation from the Owner for earthwork changes, engineering, or field staking in this regard.

## 1.06 SAFETY

The Contractor shall familiarize himself/herself with, and shall at all times conform to, the regulations of the "OSHA General Industry Occupational Safety and Health Standards", and "OSHA Safety and Health Regulations for Construction Safety Orders" and "Trench Construction Safety Orders" of the State of California, Department of Industrial Relations, Division of Occupational Health and Safety. A copy of these documents shall be kept on the job site.

## 1.07 ENVIRONMENTAL SAFEGUARDS AND REGULATIONS

The Contractor shall comply with regulations in force at all times to prevent pollution of air and water.

## 1.08 GEOTECHNICAL TESTING

**The Contractor is responsible to employ a qualified Geotechnical Engineer to perform the required earthwork geotechnical testing specified within the contents of the Plans and Specifications. The cost for the Geotechnical Testing shall be borne by the Contractor.** A copy of all tests shall be forwarded to the Construction Manager within four (4) days after the testing is complete. Geotechnical Earthwork Testing shall include in-situ native soil compaction testing, moisture-density soils testing, moisture testing of in-situ native material, compaction testing, gradation testing, sand equivalent testing and similar testing. **The geotechnical testing required for submittal documentation shall be included in the Geotechnical Testing cost to be borne by the Contractor.** The Contractor shall bear the cost of retest and re-inspection of re-worked material due to faulty work.

## 1.09 STANDARDS FOR SOIL CLASSIFICATION, PROPERTIES AND TESTS

### A. Earthwork and Embankment:

1. Classification - ASTM D 2487.
2. Physical Properties - ASTM D 854, D 2216.
3. Compaction - Modified Proctor ASTM D 1557-91.

### B. Backfill for Trench:

1. Classification - ASTM D 2487.
2. Compaction - Modified Proctor ASTM D 1557-91.
3. Field Density Test - ASTM 1556-82; D 2937-83, D 2922-81 (as approved by Engineer).

C. Structural Fill and Backfill:

1. Classification - ASTM D 2487.
2. Attenberg Limits - PlastiOwner Index and Liquid Limit ASTM D 4318.
3. Compaction - Modified Proctor ASTM D 1557-91.
4. Physical Properties - ASTM D 854, D 2216.
5. Field Density Test - ASTM D 1556-82, D 2937-83, D 2922-81 (as approved by Engineer).

D. Controlled Fills:

1. Classification - ASTM D 2487.
2. Physical Properties - ASTM D 854, D 2216.
3. Compaction - Modified Proctor ASTM D 1557-91.
4. CBR - ASTM D 1883 (R-Value - ASTM 2844).
5. Field Density Test - ASTM D 1556-82, D 2937-83, D 2922-81 (as approved by Engineer).

E. Earth Embankments and Berms:

1. Classification - ASTM D 2487.
2. Physical Properties - ASTM D 854, D 2216.
3. Compaction - Modified Proctor ASTM D 1557-91
4. CBR - ASTM D 1883.

5. Field Density Test - ASTM D 1556-82, D 2937-83, D 2922-81 (as approved by Engineer).

F. Borrow:

1. Classification - ASTM D 2487.
2. Other properties - as determined by requirements at point of use.

G. Pipe Trenches:

1. Classification - ASTM D 2487.
2. Physical Properties - ASTM D 854, D 2216.
3. Compaction - Modified Proctor ASTM D 1557-91.
4. CBR - ASTM D 1883.
5. Field Density Test - ASTM D 1556-82, D 2937-83, D 2922-81 (as approved by Engineer).

## 1.10 COMPACTION

The maximum dry density, optimum moisture content and field density of each soil type used in the controlled compacted fill shall be determined as stated in Section 1.09 above.

## 1.11 INSPECTION

Observation and compaction tests shall be obtained by the Geotechnical Engineer employed by the Contractor during the filling and compacting operations.

## 1.12 GUARANTEE

Work required by this Section shall be subject to the guarantee requirements stated in the Conditions of the Contract and included in the Performance/Maintenance Bond.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Controlled Fill Material: Materials for controlled fill shall consist of any material imported or excavated from the *cut areas* that, in the opinion of the Engineer, is appropriate for use in constructing fills. The material shall contain no rocks or hard lumps greater than 12 inches in size and shall contain at least 40 percent of material smaller than  $\frac{3}{4}$ -inch in size. Materials greater than 6 inches in size shall be placed by the Contractor in windrows on a clean, over-excavated or unyielding compacted fill or firm natural ground surface. Select native or imported granular soil (sand equivalent greater than 30) shall be placed and thoroughly flooded over and around all windrowed rock, such that voids are filled. Windrows of oversize material should be staggered so that successive strata of oversized material are not in the same vertical plane. No nesting or rocks shall be permitted. No material of a perishable, spongy, or otherwise of an improper nature shall be used in filling.

Material placed within 24 inches of rough grade shall be select material that contains no rocks or hard lumps greater than 6 inches in size and that swells less than 3 percent when compacted as hereinafter specified for compacted fill and when subjected to an axial pressure of 160 PSF, if not specified in the Geotechnical report.

Representative samples of material to be used for fill shall be tested in the laboratory by the Geotechnical Engineer in order to determine the maximum density, optimum moisture content, sand equivalent and classification of the soil. In addition, the Geotechnical Engineer shall determine the approximate bearing value of a recompacted saturated sample by direct shear tests or other tests applicable to the particular soil.

During grading operations, soil types other than those analyzed in the report of the soil investigation may be encountered by the Contractor. The Geotechnical Engineer shall be consulted to determine the suitability of these soils. The Contractor shall bear the expenses of the Geotechnical investigation.

- B. Structural Fill Material: Materials shall consist of crushed rocks, Class 2 Base, granular sand, decomposed granite (crusher fines) or fine gravel either imported or manufactured from excavated onsite rocky material as required by the plans.

The crushed aggregate, granular sand, decomposed granite (crusher fines) or fine gravel shall be uniformly graded. The following gradations shall apply:

1. Granular Sand:

Clean granular sand free of clay, shale and deleterious material. Sand shall be compacted to 95 percent of maximum density at optimum water content per ASTM D 1557 unless otherwise noted on the Plans. The material shall conform to a sand equivalent of 30 or greater. The maximum amount of material passing the Number 200 sieve shall be 5 percent. The sand shall conform to the following gradation percentages:

<u>SIEVE SIZE</u>	<u>GRANULAR SAND</u> <u>% PASSING</u>
3/8"	100
No. 4	98-90
No. 8	90-75
No. 10	75-60
No. 16	60-50
No. 30	50-38
No. 40	38-29
No. 50	29-19
No. 100	19-7
No. 200	5-0

The Contractor shall supply a 5-gallon sample of sand material to the material testing laboratory within five (5) days after the Notice to Proceed is issued. The gradation, sand equivalent and maximum density of the sand material shall be determined. The test results shall be forwarded to the Construction Manager. The cost of testing shall be incurred by the Contractor. The gradation of the granular sand shall be determined and the test results forwarded to the Construction Manager prior to the delivery of the granular sand material to the Site. Prior to the placement of sand the native subbase grade shall be checked and approved by the Construction Manager.

Crusher fines shall be allowed to be utilized in lieu of sand if approved by the Engineer.

2. Crusher Fines:

Crusher fines shall consist of decomposed granite indigenous to the Imperial Valley. Crusher fines utilized for this project shall conform to the following gradation requirements:

<u>SIEVE SIZE</u>	<u>PERCENT PASSING</u>
5/8"	100
No. 4	80-100
No. 8	50-85
No. 30	30-50
No. 200	4-15

The sand equivalent shall be 20 or greater.

The Contractor shall supply a five-gallon sample of crusher fines material to the material testing laboratory within five (5) days after the Notice to Proceed is issued. The Gradation and Maximum Density of the crusher fines material shall be determined. The test results shall be forwarded to the Construction Manager for approval prior to the delivery of the material to the Site. The cost of the testing shall be incurred by the Contractor.

3. Fine Gravel:

Clean fine gravel free of clay, shale and deleterious material. Fine gravel shall be compacted with a plate compactor with one pass in maximum 1 foot lifts. Additional lifts shall not be added until previous lifts shall have been passed over by the plate compactor. The maximum amount of material passing the 1/4" Sieve shall be 2 percent. The fine gravel shall conform to the following gradation percentages:

<u>SIEVE SIZE</u>	<u>PERCENT PASSING</u>
3/8"	100
1/4"	0-2

The Contractor shall supply a five-gallon sample of fine gravel material to the material testing laboratory within five (5) days after the Notice to Proceed is issued. The Gradation and Maximum Density of the fine gravel material shall be determined. The test results shall be forwarded to the Construction Manager for approval prior to the delivery of the material to the Site. The cost of the testing shall be incurred by the Contractor.

4. Class 2 Base:

The Class 2 Base material shall conform to Caltrans Section 26, Latest Edition, for 25mm maximum base material. The gradation requirements are as follows:

<u>SIEVE SIZE</u>	<u>CLASS 2 BASE</u> <u>% PASSING</u>
1"	100
3/4"	87-100
No. 4	30-65
No. 30	5-35
No. 200	0-12

The sand equivalent shall be 25 or greater. An angular aggregate is to be used. Class 2 Base material shall be compacted to 95 percent of maximum density according to ASTM D 1557, unless otherwise noted on the Plans or Details. The tolerance for the Class 2 Base between design subgrade elevation and actual subgrade elevation as constructed in the field shall be plus or minus 0.02 feet as referenced from the design subgrade. Prior to the placement of Class 2 Base, the native subbase grade shall be checked and approved by the Construction Manager. The native subbase grade shall be within plus or minus 0.05 feet of native subbase design grade prior to the placement of Class 2 Base.

The Contractor shall supply a 5-gallon sample of the Class 2 Base to the material testing laboratory within four (4) days of the Notice to Proceed. The material shall be delivered to the testing laboratory to determine the maximum density, gradation and sand equivalent of the Class 2 Base. A copy of the test results shall be forwarded to the Construction Manager by the Geotechnical Consultant for review. The gradation of the Class 2 Base shall be determined and the test results forwarded to the Construction Manager for approval prior to the delivery of the Class 2 Base material to the Site. *Class 2 Base utilizing recycled materials shall not be allowed.*

- C. Structural Backfill Material: Structural Backfill Material shall consist of the same material listed with the Structural Fill Material item above.
- D. Special Crushed Rock Bedding and Structure Foundation: When groundwater is encountered in the excavation and/or where indicated on the Plans, the material in the bottom of the trench or excavation shall be removed to a depth directed by the Geotechnical Engineer and replaced with 3/4-inch maximum crushed rock bedding or 1"



round rock bedding. The rock beddings shall be installed and compacted per these Specifications. The 3/4-inch maximum crushed rock and 1" round rock materials shall be approved by the Geotechnical Engineer before use.

The bottom and sidewalls of the trench shall be covered with a geotextile. The geotextile fabric shall extend to the top of the pipe zone material on both sides of the trench excavation, and cover the top of the crushed rock and or 1-inch round rock.

1. 3/4-Inch Maximum Crushed Rock

Crushed rock shall be the product of crushing rock or gravel. Fifty percent (50%) of the particles by weight retained on a 3/8-inch sieve shall have their entire surface area composed of faces resulting from fracture due to mechanical crushing. Not over 5% shall be particles that show no faces resulting from crushing. Less than 10% of the particles that pass the 3/8-inch sieve and are retained on the No. 4 sieve shall be waterworn particles. Gravel shall not be added to the crushed rock. Crushed rock (3/4") shall have the following gradation:

<u>SIEVE SIZES</u>	<u>3/4-INCH MAX. CRUSHED ROCK % PASSING</u>
1"	100
3/4"	90-100
1/2"	30-60
3/8"	0-20
No. 4	0-5
No. 8	-

The 3/4-inch maximum crushed rock shall be compacted with a plate compactor in one pass in maximum 1 foot lifts. Additional lifts shall not be added until previous lifts shall have been passed over by the plate compactor.

The Contractor shall supply a five-gallon sample of the 3/4-inch maximum crushed rock material to the material testing laboratory within four (4) days of the Notice to Proceed. The Gradation and Sand Equivalent of the crushed rock shall be determined. The tests results shall be forwarded to the Construction Manager for approval prior to the delivery of the material to the Site. The cost of the testing shall be incurred by the Contractor.

2. 1" Round Rock

The 1-inch round rock material shall conform to the following gradation requirements:

<u>SIEVE SIZES</u>	<u>1-INCH ROUND ROCK % PASSING</u>
1-1/2"	100
1"	96
3/4"	79
1/2"	25
3/8"	1

The 1-inch round rock shall be compacted with a plate compactor in one pass in maximum 1 foot lifts. Additional lifts shall not be added until previous lifts shall have been passed over by the plate compactor.

The Contractor shall supply a five-gallon sample of the 1-inch round rock material to the material testing laboratory within four (4) days of the Notice to Proceed. The Gradation of the round rock shall be determined. The tests results shall be forwarded to the Construction Manager for approval prior to the delivery of the material to the Site. The cost of the testing shall be incurred by the Contractor.

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

The Work performed under this Specification shall be constructed to the lines, grades, elevations, slopes and cross-sections indicated on the Plans, specified herein, and/or directed by the Owner. Slopes, graded surfaces, and drainage features shall present a neat uniform appearance upon completion of the Work.

It shall be the Contractor's responsibility (1) to maintain adequate safety measures and working conditions; and (2) to take all measures necessary during the performance of the Work to protect the entire project area and adjacent properties which would be affected by this Work from storm damage, flood hazard, caving of trenches and embankments, and sloughing of material, until final acceptance by the Owner. It shall be the Contractor's responsibility to maintain completed areas until the entire project area is in satisfactory compliance with the job specification.

Utility lines and structures indicated on the Plans which are to remain in service shall be protected by the Contractor from any damage as a result of his/her operation. Where utility lines or structures not shown on the Plans are encountered, the Contractor shall report them to the Owner before proceeding with the Work. The Contractor shall bear the cost of repair or replacement of any utility lines or structures which are broken or damaged by his/her operations.

### 3.02 REMOVALS, CLEARING AND GRUBBING

- A. Clearing: Clearing consists of the complete removal of objectionable materials and obstructions above and below the ground surface including tree stumps, brush, grass, vegetative matter and other objectionable materials within the project limits. All brush and organic material shall be removed before placing any earth fills. It shall be the Contractor's responsibility to save and protect all trees that lie outside the construction area.
- B. Grubbing: Grubbing consists of the complete removal of stumps, including tap roots or lateral roots 1-1/2 inches or more in diameter, and the removal of brush, grass or weeds to depths below the natural ground as specified herein. Stumps shall be grubbed to a depth of 3 feet and grass or weeds shall be grubbed to a depth of 6 inches below the natural ground surface, or to the depths as determined in the field by the Construction Manager at the time of construction.
- C. Protection: Existing items not designated to be demolished or removed shall be protected from damage. Any such item damaged by the Contractor shall be restored or replaced immediately at the Contractor's expense.
- D. Debris and Waste Material: All debris and waste material resulting from demolition, clearing and grubbing shall be removed from the site and disposed of by the Contractor.

### 3.03 DUST CONTROL

The Contractor shall take all steps possible to prevent and reduce dust arising from the construction activity. The Contractor shall comply with the requirements by County of Imperial Air Pollution Control District.

### 3.04 CARE OF DRAINAGE WATER

Contractor shall take care of drainage water from the construction operations, and of stormwater and/or wastewater reaching the construction area from any source, so that damage is not incurred to the excavation, pipe or structures. The Contractor shall be responsible for any damages to persons or property on or off the Site due to such drainage water or to the interruption or diversion of such stormwater or wastewater on account of his/her operation.

Such grading shall be done as may be necessary to prevent surface water from flowing into excavations, and any water accumulating therein shall be removed by pumping or by other reviewed methods.

Protection of the site during construction shall be the responsibility of the Contractor. Completion of a portion of the project shall not preclude that portion or adjacent areas from the requirements for site protection until such time as the entire project is complete.

### 3.05 EXCAVATION

- A. General: The Contractor shall perform all excavation necessary or required as illustrated on the Plans. The excavation shall include the removal and disposal of all earth materials of whatever nature encountered, which shall include both rock excavation and common excavation when both are present, and shall include the furnishing, placing and maintaining of shoring and bracing necessary to safely support the sides of the excavations. See Technical Specifications Section 31 41 00 - Sheeting, Shoring and Bracing.
  
- B. Excavation for Structures: Structure excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the Work. The removal of such materials shall conform to the lines and grades shown on the Plans and/or herein specified. Temporary structure excavations shall at all times conform to the Requirements of the State of California, Division of Occupational Health and Safety, and pertinent requirements contained in referenced Geotechnical Investigation Report and Specification Section 31 41 00 - Sheeting, Shoring and Bracing.

Continuous wall and isolated footings shall be underlain by a minimum compacted controlled fill thickness to a minimum 1.5 times the footing width or greater if indicated in the referenced Geotechnical Investigation Report or as required by the Plans. This zone of over-excavation, scarification and recompaction shall extend a minimum of five feet (5') beyond the footing lines unless otherwise illustrated on the Plans. Exposed native surface shall be scarified, and brought to 2 percent over optimum moisture content and compacted to a minimum of 90 percent of maximum density per ASTM D1557 as required by the Geotechnical Investigation Report and the Plans.

*All building concrete slabs and foundations shall be underlain by a minimum compacted granular sand and class 2 base controlled fill thickness of 36 or 38 inches as required by the Plans.*

*The entire project site development area existing native earth surface shall be scarified, moisture conditioned and compacted prior to the installation of controlled fill material. According to the Geotechnical report the surface 3 foot depth of native earth material is loose. The surface 2.25 foot depth of native material is to be removed from the entire project site development area and stockpiled on the project site area which is not to be developed. The approximate surface 9 inches within the project site development area resultant excavation is to be scarified and compacted at 2 percent over optimum water content to 90 percent of maximum density per ASTM D-1557 to a scarification bottom elevation depth of 955.00 as illustrated on the improvement plan section drawings. The scarified and compacted surface shall be placed at an elevation of 955.75. The scarified and compacted surface shall be satisfactorily tested for compaction and moisture content prior to allowing additional native lifts to be placed. After the area is satisfactorily tested for compaction and moisture content the stockpiled native earth is to be mixed and compacted at 2 percent over optimum water content to 90 percent of maximum density in 9 inch lifts. Satisfactory moisture and compaction tests shall be completed over the entire project site development area before the succeeding 9 inch lifts will be allowed to be placed. The final native earth lift shall be brought to an elevation of 958.00 across the entire project site development area. After satisfactory moisture and compaction tests are obtained on the final native earth lift at elevation 958.00 the remaining controlled fill shall be allowed to be placed as illustrated on the improvement plans.*

Rough grade excavations for structures and footings will be inspected by the Geotechnical Engineer to verify that the excavations extend into satisfactory soils and are free of loose and disturbed materials.

Foundation for tanks, pump vaults or subsurface chambers shall have structural fill material extending 12 inches, minimum, below the structural base slab to native material, which has been scarified and compacted to 95% relative compaction unless otherwise indicated on the Plans.

### **3.06 CONTROLLED FILL**

- A. General: Controlled fill shall consist of granular sand, class 2 base or native earth. The native earth subbase grade shall be excavated to within plus or minus 0.05 feet of design subbase grade prior to the placement of controlled fill material. The native earth subbase material shall be scarified and compacted at 2 percent over optimum water content to 90 percent of maximum density per previous specification section 3.05B. The design subbase grade elevation is 958.00. The design subbase grade shall be field verified and approved by the Construction Manager prior to the placement of the controlled fill material. *Prior to the Construction Manager's inspection of the subbase grade, the Contractor shall establish bluetop stakes on a 25 foot by 25 foot grid across the entire development area prior to the placement of controlled fill material.*

Native earth controlled fill shall be placed in maximum 9 inch lifts and compacted to 90 percent maximum density per ASTM D 1557 at 2 percent over optimum water content. Additional 9 inch lifts shall not be placed until previous lifts have attained the specified compaction and moisture requirements and are approved by both the on-site geotechnical representative and the Construction Manager.

Granular sand or class 2 base controlled fill material shall be placed in maximum 8-inch lifts and compacted to 95 percent of maximum density at optimum water content per ASTM D 1557 unless otherwise specified by the plans. Additional granular sand or class 2 base lifts shall not be placed until previous lifts have attained the specified compaction requirement and are approved by both the on-site geotechnical representative and the Construction Manager.

- B. Preparing Areas To Be Filled: *All vegetation and objectionable material shall be removed and disposed by the Contractor from the entire project site including the area to be developed and area to remain undeveloped.* The native earth surface material in the area to be developed shall be removed, moisture conditioned and compacted per previous specification section 3.05 B.

When placing fill in horizontal lifts adjacent to areas sloping steeper than 5:1 (horizontal:vertical), horizontal keys and vertical benches shall be excavated into the adjacent slope area. Keying and benching shall be sufficient to provide at least 6-foot wide benches and a minimum of 4 feet vertical bench height within the firm natural ground, firm bedrock or engineered compacted fill. No compacted fill shall be placed in an area subsequent to keying and benching until the area has been reviewed by the Geotechnical Engineer. Material generated by the benching operation shall be moved sufficiently away from the bench area to allow for the review of the horizontal bench prior to placement of fill.

- C. Placing, Spreading and Compacting Fill Material: The fill material shall be placed by the Contractor in thin layers that when compacted shall not exceed 8 inches for granular sand, Class 2 Base and crusher fines and 9 inches deep for native material unless otherwise required by the plans. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material in each layer.

When the moisture content of the fill material is below that required by the Geotechnical Report, Technical Specifications or plans, water shall be added by the Contractor until the moisture content is as required for the specified compaction.

When the moisture content of the fill material is above that required by the Geotechnical Engineer, the fill material shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the moisture content is as required for the specified compaction.

After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted by the Contractor to the specified density. Compaction shall be accomplished by sheepsfoot rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers or other types of acceptable compacting equipment. Equipment shall be of such design that it shall be able to compact the fill to the specified density. Compaction shall be continuous over the entire area and the equipment shall make sufficient passes over the material to ensure that the desired density has been obtained.

*Compacted fill slopes shall be overbuilt and cut back to grade, exposing the firm, compacted inner core. The slopes shall be overbuilt a minimum of five feet (5').* If the desired compaction is not achieved, the existing slope shall be over excavated and reconstructed. The amount of overbuilding shall be increased until the desired compaction is achieved on the slope. The Contractor shall provide thorough mechanical compaction to the outer edge of the overbuilt slope surface. There shall be no excessive loose soil on the slopes.

The Contractor shall provide and maintain adequate erosion control facilities during the construction of the fill areas. The erosion control facilities shall be maintained in optimum condition until the permanent drainage system and vegetation is complete. The facilities shall be inspected following significant rainfall, repairs made and excess sediment removed. It shall be the Contractor's responsibility to prevent the discharge of sediment off-site or to adjacent watercourses.

### 3.07. STRUCTURE FILL AND STRUCTURE BACKFILL MATERIAL

- A. Placement of Structure Backfill: Before beginning backfilling, all foreign material, including water, shall be removed from the space to be backfilled and the area to be backfilled shall be inspected and approved by the Geotechnical Engineer. Sloping sides of the excavated space shall be stepped to prevent wedging action of the backfill against the structure. No backfill shall be placed around or upon any structure until it is proven that the concrete has attained satisfactory strength in accordance with the Division 3 of Technical Specifications and that the structure as a whole is adequate to receive backfill. The compressive strength shall be determined by tests on representative cylinders cured under conditions similar to those prevailing at the site.
  
- B. General: Structure fill and structure backfill shall consist of granular sand, Class 2 Base, crusher fines or other material as indicated on the Plans. The subbase grade shall be excavated to within plus or minus 0.05 feet of design grade prior to the placement of structure fill and structure backfill. The design subbase grade shall be field verified and approved by the Engineer prior to the placement of the structure fill or structure backfill material. The Engineer shall determine the number and location of points to check for the subbase grade elevation compliance. Prior to the Engineer's inspection of the subbase grade the Contractor shall establish bluetop stakes on a 10-foot by 10-foot grid across the area which structure backfill is to be placed.

Granular sand, Class 2 Base and crusher fine structure fill and structure backfill material shall be placed in maximum 8-inch lifts and compacted to 95 percent of maximum density at optimum water content per ASTM D 1557 unless otherwise required by the plans. Additional granular sand, Class 2 Base or crusher fine lifts shall not be placed until previous lifts have attained the specified compaction requirement and are approved by both the on-site geotechnical representative and the Construction Manager.

- C. Placing, Spreading and Compacting Fill Material: The structural fill and structural backfill material shall be placed by the Contractor in thin layers that when compacted shall not exceed 8 inches. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material in each layer.

When the moisture content of the fill material is below that required by the Geotechnical Engineer, water shall be added by the Contractor until the moisture content is as required for the specified compaction.

When the moisture content of the fill material is above that required by the Geotechnical Engineer and plans, the fill material shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the moisture content is as required for the specified compaction.

After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted by the Contractor to the specified density. Compaction shall be accomplished by sheepsfoot rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers or other types of acceptable compacting equipment. Equipment shall be of such design that it shall be able to compact the fill to the specified density. Compaction shall be continuous over the entire area and the equipment shall make sufficient passes over the material to ensure that the desired density has been obtained.

Compacted fill slopes shall be overbuilt and cut back to grade, exposing the firm, compacted inner core. The slopes shall be overbuilt a minimum of five feet (5'). If the desired compaction is not achieved, the existing slope shall be overexcavated and reconstructed. The amount of overbuilding shall be increased until the desired compaction is achieved on the slope. The Contractor shall provide thorough mechanical compaction to the outer edge of the overbuilt slope surface. There shall be no excessive loose soil on the slopes.

The Contractor shall provide and maintain adequate erosion control facilities during the construction of the fill areas. The erosion control facilities shall be maintained in optimum condition until the permanent drainage system and vegetation is complete. The facilities shall be inspected following significant rainfall, repairs made and excess sediment removed. It shall be the Contractor's responsibility to prevent the discharge of sediment off-site or to adjacent watercourses.



### 3.08 SUITABLE MATERIAL AND WASTE EXCAVATION

- A. General: Suitable material or waste excavation consists of native material. The subbase grade shall be excavated to within plus or minus 0.05 feet of design grade prior to the placement of suitable material or waste excavation material. The design subbase grade shall be field verified and approved by the Engineer prior to the placement of the suitable material or waste excavation material. The Engineer shall determine the number and location of points to check for the subbase grade elevation compliance. Prior to the Engineer's inspection of the subbase grade the Contractor shall establish bluetop stakes on a 10-foot by 10-foot grid across the area suitable material or waste excavation material is to be placed.

The suitable material or waste excavation material shall be placed in maximum 1-foot lifts and compacted to 90 percent of maximum density at optimum water content per ASTM D 1557 unless otherwise required by the plans. Additional suitable material or waste excavation material lifts shall not be placed until previous lifts have attained the specified compaction requirement and are approved by both the on-site geotechnical representative and the Construction Manager.

- B. Placing, Spreading and Compacting Suitable Material and Waste Excavation Material: The suitable material and waste excavation material shall be placed by the Contractor in 9-inch lifts unless otherwise indicated on the plans. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material in each layer.

When the moisture content of the fill material is below that required by the Geotechnical Engineer and plans, water shall be added by the Contractor until the moisture content is as required for the specified compaction.

When the moisture content of the fill material is above that required by the Geotechnical Engineer and plans, the fill material shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the moisture content is as required for the specified compaction.

After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted by the Contractor to the specified density. Compaction shall be accomplished by sheepsfoot rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers or other types of acceptable compacting equipment. Equipment shall be of such design that it shall be able to compact the fill to the specified density. Compaction shall be continuous over the entire area and the equipment shall make sufficient passes over the material to ensure that the desired density has been obtained.

Compacted fill slopes shall be overbuilt and cut back to grade, exposing the firm,

compacted inner core. The slopes shall be overbuilt a minimum of five feet (5'). If the desired compaction is not achieved, the existing slope shall be overexcavated and reconstructed. The amount of overbuilding shall be increased until the desired compaction is achieved on the slope. The Contractor shall provide thorough mechanical compaction to the outer edge of the overbuilt slope surface. There shall be no excessive loose soil on the slopes.

The Contractor shall provide and maintain adequate erosion control facilities during the construction of the fill areas. The erosion control facilities shall be maintained in optimum condition until the permanent drainage system and vegetation is complete. The facilities shall be inspected following significant rainfall, repairs made and excess sediment removed. It shall be the Contractor's responsibility to prevent the discharge of sediment off-site or to adjacent watercourses.

### **3.09 ESTABLISHMENT OF SUBBASE GRADE, SUBGRADE OR FINISH GRADE**

Finish Grade is defined as the finish surface grade. For instance, the top of an A.C. or P.C.C. paved surface is referred to as finish grade.

Subgrade is defined as the grade of the material beneath the finish surface. For instance, the top of Class 2 Base grade beneath an A.C. or P.C.C. paved surface is referred to as subgrade.

Subbase is defined as the grade of the material beneath the base material. For instance, the top of native material beneath the Class 2 Base subgrade material of an A.C. or P.C.C. paved roadway is the subbase grade.

Finish grade surfaces are to be graded to within plus or minus 0.02 feet from design grade as illustrated on the Grading Plans. The Engineer shall obtain elevations across finish grade surfaces at locations determined by the Engineer prior to accepting and approving the finish grade surfaces. Work items to occur after the establishment of finish grade shall not occur until the Engineer has approved the finish grade.

Subgrade surfaces are to be graded to within plus or minus 0.02 feet from design grade as illustrated on the Grading Plans. A bluetop stake is defined as a stake placed at the subbase design elevation finish grade. Bluetop stakes shall be placed on a 10-foot x 10-foot grid pattern across rectangular or square facilities such as parking lots, access roads, building pads, pcc slabs, etc. The Engineer shall obtain elevations across the subgrade surfaces at locations determined by the Engineer prior to accepting and approving the subgrade surfaces. The Contractor shall regrade areas not conforming to the subgrade tolerance as required. Work items to occur after the establishment of subgrade shall not occur until the Engineer has approved the subgrade surface elevations and grades.

Subbase surfaces are to be graded to within plus or minus 0.05 feet of subbase design grade as illustrated on the Grading Plans. Bluetop stakes shall be placed on a 10-foot x 10-foot grid

pattern across rectangular or square facilities such as parking lots, access roads, building pads, sludge beds, etc. The Engineer shall obtain elevations across the subbase surfaces at locations determined by the Engineer prior to accepting and approving the subbase surfaces. The Contractor shall regrade areas not conforming to the subbase design grade tolerance as required. Work items to occur after the establishment of subbase grade shall not occur until the Engineer has approved the subbase grade.

### 3.10 COMPACTION TEST SCHEDULE

The following **compaction test(s)** shall apply to this project:

<u>NO.</u>	<u>ITEM</u>	<u>FREQUENCY</u>
1	Compaction and moisture tests are to be obtained for each 7,500 square feet of native earth scarified and compacted or mixed and compacted for each 9-inch lift of native earth installed. The site to be developed is approximately 70,000 square feet. It is estimated there will be 10 tests per each 9-inch native earth vertical segment compacted and moisture conditioned. The estimated compaction and moisture tests are 10 tests x 4 vertical segments = 40 compaction and moisture tests.	Compaction and moisture test for every 7,500 S.F. for each 9-inch lift of native material.
2.	Compaction test for building pad granular sand material. Place and compact granular sand material in maximum 8-inch lifts. The estimated building pad with 5-foot blowup area is approximately 6,500 square feet.	Obtain 7 tests for each 8-inch lift of granular sand material placed.
3.	Compaction tests for native material placed above elevation 958.00.	Every 800 square feet for each 9-inch lift of native material placed.
4.	Compaction tests for Class 2 Base beneath P.C.C driveway slabs and exterior P.C.C slabs.	Every 625 square feet for each 8-inch lift of Class 2 Base material placed.
5.	Compaction tests for Class 2 Base beneath P.C.C slab in Apparatus Bays.	A total of 4 tests for each 6-inch lift of Class 2 Base installed.

<u>NO.</u>	<u>ITEM</u>	<u>FREQUENCY</u>
6.	Compaction tests for Class 2 Base beneath A.C. pavement areas.	Every 800 square feet for each 8-inch lift of Class 2 Base material placed.
7.	Compaction tests for native earth beneath P.C.C curb and gutter or barrier curb.	Every 40 lineal feet.
8.	Compaction tests for Class 2 Base beneath P.C.C curb and gutter or barrier curb.	Every 40 lineal feet.
9.	Compaction tests for granular sand beneath sidewalk and walkway areas on the South, East and North sides of the building.	Every 150 square feet.
10.	Compaction tests for Class 2 Base beneath fire hydrant and backflow preventer P.C.C slab.	1 test.
11.	Compaction tests for Class 2 Base beneath Trash Enclosure footings and slabs, and P.C.C. slab in front of trash enclosure.	10 tests.
12.	Additional native earth compaction tests along the native earth side slope areas from P.C.C. slabs, P.C.C. curb and gutter, barrier curb and existing native earth grade edges.	1 test for each 50 lineal feet of native earth side slope per each 9-inch lift of native earth material installed.
13.	Compaction tests for Class 2 Base area beneath A.C. driveway entrance and taper area along Evan Hewes Highway.	6 tests for each 6-inch lift of Class 2 Base installed.
14.	Compaction tests for Class 2 Base beneath project entrance sign.	1 test.
15.	Compaction tests for Class 2 Base beneath Building Footings and column supports pads.	1 test for each column support pad. 1 test for each 15 lineal feet of P.C.C footing, grade beam, etc.
16.	Compaction tests for Class 2 Base beneath P.C.C. post indicator support slab.	1 test.

NO.

ITEM

FREQUENCY

### 3.11 CLEAN-UP

Upon completion of Work in this Section, all rubbish and debris shall be removed from the site. All construction equipment and implements of service shall be removed and the entire area involved shall be left in a clean, neat and acceptable condition

**END OF SECTION**

**SECTION 31 23 50**  
**TRENCHING AND BACKFILLING – WATER AND SEWER PIPELINES**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

Requirements specified in the Technical and Special Conditions form a part of this Section. The Work of this Section includes all labor, machinery, construction equipment and appliances to perform all trench excavation and backfill work illustrated on the Plans and herein specified.

- A. Principal items included:
  - 1. Trench excavation, backfill and compaction.

**1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 31 23 00 – Earthwork
- B. Section 31 41 00 – Sheeting, Shoring and Bracing

**1.03 SAFETY**

The Contractor shall be familiarized with, and shall at all times conform to all applicable regulations of “Excavations, Trenching, and Shoring” of OSHA Safety and Health Regulations for Construction, “General Construction Safety Orders” and “Trench Construction Safety Orders” of the State of California, Department of Industrial Relations, Division of Occupational Health and Safety.

**1.04 INSPECTION AND CONTROL**

The Contractor shall provide inspection and testing by a Geotechnical Engineer approved by the Engineer engaged and paid for by the Contractor. In this regard, a Geotechnical Engineer may be engaged by the Owner, who shall act as the direct representative of the Owner in geotechnical work, to perform inspection of the removal and replacement of unsuitable materials, all excavations, and the placement and compaction of all fills and backfills within the limits of earthwork on this Project. Costs for all such inspections and tests will be paid by the

Contractor, and Contractor shall bear the cost of retest and re-inspection of reworked fills and backfills due to compaction test failure.

## 1.05 REQUIREMENTS

### A. General:

1. The Work performed under this Specification shall be constructed to the lines, grades, elevations, slopes and cross-sections indicated on the Plans, specified herein, and/or directed by the Engineer in writing. Slopes, graded surfaces, and drainage features shall present a neat, uniform appearance upon completion of the Work.
2. It shall be the Contractor's responsibility (1) to maintain adequate safety measures and working conditions; and (2) to take all measures necessary during the performance of the Work to protect the entire project area and adjacent properties which would be affected by this Work from storm damage, flood hazard, caving of trenches, cavings of excavations, and embankments, and sloughing of material, until final acceptance by the Owner. It shall be the Contractor's responsibility to maintain completed areas in good condition until the entire project area is in satisfactory compliance with the Project Specifications.
3. Contractor shall be responsible for the excavation and disposition of unsuitable or surplus material, including all associated costs, by approved means of conveyance away from the working area. The costs of excavation and disposition of unsuitable or surplus material shall be incidental to the pipeline installation costs.

### B. Protection of Existing Utilities:

1. Utilities: Unless otherwise illustrated on the Plans or stated in the Specifications, all utilities, both underground or overhead, shall be maintained in continuous service throughout the entire contract period. The Contractor shall be responsible and liable for any damages to or interruption of service caused by the construction.

If the Contractor desires to simplify his operation by temporarily or permanently relocating or shutting down any utility or appurtenance, he/she shall make the necessary arrangements, agreements and approvals with the utility purveyor, Owner and Construction Manager and shall be completely responsible for all costs concerned with the relocation or shutdown and reconstruction. All property shall be reconstructed in its original or new location as soon as possible and to a condition at least as good as its previous condition. This cycle

of relocation or shutdown and reconstruction shall be subject to inspection and approval by the Engineer, Owner and the utility purveyor.

The Contractor shall be entirely responsible for safeguarding and maintaining all conflicting utilities that are illustrated on the Plans. This includes overhead wires and cables and their supporting poles whether they are inside or outside of the open trench. If, in the course of work, a conflicting utility line that was not illustrated on the Plans is discovered, it shall be brought to the immediate attention of the Construction Manager for a determination regarding alternatives to the conflict.

2. Building, Foundations and Structures: Where trenches are located adjacent to buildings, foundations and structures, the Contractor shall take all necessary precaution against damage to them. The Contractor shall be liable for any damage caused by the construction except where authorized in the Special Conditions or in writing by the Construction Manager. Water settling of backfill material in trenches adjacent to structures will not be permitted.
3. Electronic, Telephonic, Telegraphic, Electrical, Oil and Gas Lines: These underground facilities shall be adequately supported by the Contractor. Support for plastic pipe shall be continuous along the bottom of the pipe. Support for metal pipe and electrical conduit may be continuous or nylon webbing may be used for suspension at no greater than ten foot (10') intervals. The Contractor shall avoid damaging the plastic pipe, pipe ways or conduits during trench backfilling and during foundation and bedding placement.



## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Granular Sand Material: Granular sand material shall consist of imported granular sand complying with Section 31 23 00, of the specifications.
- B. Crusher Fines: Crusher fines material shall consist of imported decomposed granite complying with Section 31 23 00, of the specifications.
- C. Class 2 Base Material: Class 2 Base material shall consist of imported virgin (not recycled) Class 2 Base complying with Section 31 23 00, of the Specifications.
- D. Crushed Rock Bedding: Crushed rock bedding shall consist of imported rock complying with Section 31 23 00, of the Specifications.
- E. 1-inch Round Rock: 1-inch Round Rock material shall consist of import rock material complying with Section 31 23 00, of the Specifications.
- F. Concrete: 5,000 PSI compressive strength, minimum, as specified in Division 3, Concrete, of the Specifications.
- G. Pipelines: Use materials shown on the Plans and as specified in Specification Sections 33 14 00, and 33 15 00.

## PART 3 - EXECUTION

### 3.01 TRENCH EXCAVATION

- A. Excavation for Trenches: Shall include the removal of all material of any nature for the installation of the pipe or facility and shall include the construction of trench shoring and stabilization measures, timbering and all necessary installations for dewatering.
- B. Minimum Width of Trench: The minimum width of pipe trenches, measured at the crown of the pipe, shall not be less than 12 inches greater than the exterior diameter of the pipe, exclusive of bells and the minimum base width of such trench shall be not less than 12 inches greater than the exterior diameter of the pipe, exclusive of special structures or connections, and such minimum width shall be exclusive of all trench supports.

- C. Maximum Width of Trench: The maximum allowable width of trench for all pipelines measured at the top of the pipe shall be the outside diameter of the pipe (exclusive of bells or collars) plus 16 inches, and such maximum shall be inclusive of all timbers. A trench wider than the outside diameter plus 16 inches may be used without special bedding if the Contractor, at his expense, furnishes pipe of the required strength to carry the additional trench load. Such modifications shall be submitted for the Engineer's review. Whenever such maximum allowable width of trench is exceeded for any reason, except as provided for on the Plans or in the Specifications, or by the written direction of the Engineer, the Engineer may, at its discretion, require that the Contractor, at his own expense for all labor and materials, cradle the pipe in 5,000 PSI compressive strength concrete, or other approved pipe bedding.
- D. Maximum Length of Open Trench: Except by special permission by the Construction Manager only that amount of open trench shall be permitted, which shall allow for that amount of pipeline construction, including excavation, construction of pipeline, and backfill in any one location, which can be completed in one day; however, maximum length of open trench shall never exceed 600 feet. This length includes open excavation, pipe laying and appurtenant construction and backfill which has not been temporarily resurfaced.
- E. Trench Side Slopes:
1. Temporary trench excavations shall at all times conform to the safety requirements hereinbefore specified in Section entitled "Safety".
  2. Loose cobbles or boulders shall be removed from the sides of the trenches before allowing workmen into the excavation, or the trench slopes must be protected with screening or other methods. Trench side slopes shall be kept moist during construction to prevent local sloughing and raveling. Surcharge loads due to construction equipment shall not be permitted within 10 feet of the top of any excavated slope.
  3. If the Contractor elects to shore or otherwise stabilize the trench sides, he shall file with the Construction Manager copies of drawings for same prepared, signed and stamped by a Civil Engineer duly registered in the State of California before commencing excavation.
- F. Excess Trench Excavation: If any trench, through the neglect of the Contractor, is excavated below the bottom grade required, it shall be refilled to the bottom grade, at the Contractor's expense for all labor and material, with granular sand material compacted to a firm stable foundation.

### 3.02 BRACING TRENCHES

The sides of the trenches shall be supported with plank sheeting and bracing in such a manner as to prevent caving of the sides of the trench. Space left by withdrawal of sheeting or shoring shall be filled completely with dry granular material blown or rammed in place. Trench shoring shall be completed per the recommendations of the Geotechnical Report and OSHA Standards.

### 3.03 PIPING BEDDING

The Contractor shall excavate to four inches (4") below the bells or couplings for the full width of the trench and shall place four inches (4") of granular material upon which the pipe is to be laid, unless indicated otherwise on the Plans. Construct pipe bedding as indicated on the Plans.

At pipe subgrade, if foundation soil in trench is soft, wet, spongy, unstable or does not afford solid foundation for pipe, the Contractor shall excavate as directed by the Construction Manager and provide stable base by excavating any unsuitable material 18" minimum below the subgrade base or as the Construction Manager determines is necessary for placement of pipe bedding. A filter fabric shall be placed in the trench bottom and along the trench sidewalls in the pipe zone to the top of the pipe zone material. A crushed rock material shall be placed at the bottom of the trench and sidewalls of the pipe to a point 1 foot above the pipe. The crushed rock material shall be hand tamped in 16-inch lifts along the sidewalls. The crushed rock shall be compacted with a plate compactor in minimum 6 inch lifts beneath the pipe and over the top of the pipe.

Where rock is encountered in the trench, the Contractor shall excavate to a minimum 18 inch depth below subgrade or as the Construction Manager determines is necessary, and shall construct a base by placing crushed rock bedding upon which a subgrade can be prepared.

Before any pipe is lowered in place, the trench bottom shall be prepared so that each pipe shall be supported for the full length of the barrel with full bearing on the bottom segment of the pipe equal to a minimum of one-half (1/2) of the pipe OD, and a width equal to the trench width. All adjustments in line and grade shall be made by scraping away or filling and tamping in under the barrel of the pipe. Wedging or blocking is not permitted.

The pipe bedding shall be compacted to a minimum of 90 or 95 percent relative compaction as hereinafter specified or as required by the Plans.

### 3.04 BACKFILLING PIPE TRENCHES

- A. Backfilling Pipe Zone: Backfill material for the pipe zone shall consist of imported granular material or two sack cement/sand slurry as required by the Plans. Place

material in the trench simultaneously on each side of the pipe for the full width of the trench and the depth of the pipe zone in layers 6 inches in depth. Each layer shall be thoroughly compacted by tamping. In all cases, backfilling of the pipe zone must be accomplished by hand. Particular attention shall be given to underside of the pipe and fittings to provide a firm support along the full length of the pipe. The pipe zone shall be considered to extend 12 inches above the top of the pipe unless otherwise illustrated on the Plans, and shall be compacted in the trench to a relative compaction of not less than 90 or 95 percent of maximum density per ASTM D 1557 as illustrated on the Plans. If the compaction is not illustrated on the plans then the relative compaction shall be 95 percent of maximum density per ASTM D1557. Care shall be taken not to damage pipe and fittings or special coatings on the pipe and fittings.

1. Use of material other than those specified shall be reviewed by the Engineer prior to use. The Contractor shall bear all cost of removal of rejected material, its hauling to an authorized disposal site, and cost of providing required material to complete the bedding and backfilling.
- B. Backfilling Pipe Trench: After the pipe has been laid in the trench and has been inspected and approved, and backfilling in the pipe zone is complete and compacted, the remainder of the trench may be backfilled. Care shall be taken to ensure that no voids remain under, around or near the pipe. **The backfill material shall be assumed to be granular sand or Class 2 Base as specified in Paragraph 2.01 if the trench material is not illustrated on the plans.**
1. The Contractor shall incur the expense to remove and dispose of the excess trench excavation material displaced by the trench import material and include the costs in the bid. The costs shall be incidental to the pipe installation.
- C. Compaction: The maximum dry density and optimum moisture content of each soil type used in the controlled compacted fill shall be determined by ASTM D 1557-91. Field density tests shall be determined in accordance with ASTM D 1556-82, ASTM D 2937-83 and ASTM D 2922-81.
- D. Placement and Compaction of Trench Backfill: The placement and compaction of all trench backfill shall be as follows:
1. Mechanically Compacted Backfill: With approval of the Engineer, backfill shall be mechanically compacted by means of tamping rollers, sheepsfoot rollers, pneumatic tire rollers, vibrating rollers, or other mechanical tampers to 90 or 95 percent relative compaction as illustrated by the Plans. Impact-type pavement breakers (stompers or hydro-hammers) shall not be permitted over any pipe. Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent ground, existing improvements or improvements installed under the Contract. The Contractor shall make his own determination in this regard. Backfill shall be placed in horizontal layers not exceeding eight inches

(8"). Each layer shall be evenly spread, the moisture content brought to near optimum condition and then tamped or rolled until the specific relative compaction has been attained. Additional backfill lifts shall not be placed until previous lifts have been satisfactorily compacted and tested and approved by the Engineer.

### 3.05 CENTRAL PIPELINE INSTALLATION REQUIREMENTS

A. Depth of Pipe: Unless otherwise illustrated on the Plans, all pipelines shall have coverage of at least 36 inches between the top of the pipe and the finished surface. All gravity line invert elevations and locations illustrated on the Plans are intended to be exact and any change in alignment and grade shall be reviewed in accordance with the Contract Documents to the satisfaction of the geotechnical testing representative and Engineer. All force and gravity mains shall have 1 foot vertical clearance between themselves and all other utilities. At all water main, sewer and stormwater crossings, both gravity and force mains shall have 20 linear feet of concrete encasement centered at the crossing as required by the State of California Department of Health.

B. Changes in Line and Grade: In the event obstructions not shown on the Plans, are encountered during the progress of the Work, which will require alterations to the Plans, the Engineer shall issue the necessary revisions to the Plans and order the necessary deviation from the line or grade. The Contractor shall not make any deviation from the specified line and grade without prior review and approval by the Construction Manager. Should any deviations in line and grade be permitted by the Construction Manager in order to reduce the amount of rock excavation or for other similar convenience to the Contractor, any additional costs for thrust blocks, valves, air and vacuum valve assemblies, blow-off assemblies, extra pipe footage, concrete, sewer structures, or other additional costs shall be borne by the Contractor.

1. Contractor shall include in his Bid provisions to cover any deviation from the invert grade shown on the Plans to facilitate the extra depth required to avoid possible conflicts between existing gravity pipelines and other utilities with new water, stormwater or sewer forcemains.

C. Pipe Installation:

All pipe and fittings, and accessories furnished by the Contractor shall be new material free from rust or corrosion. All piping and fittings shall be cleaned on the inside when installed and the Contractor shall take all necessary precautions to ensure that the lines are kept free of any foreign matter and dirt until the work is completed. All pipes shall be carefully placed and supported at the proper lines and grades as shown on the Plans. Piping runs shown on the Plans shall be followed as closely as possible, except for minor adjustments as approved by the Construction Manager to avoid other piping or structural features. Bedding material shall first be placed so that the pipe is

supported for the full length of the barrel with full bearing on the bottom segment of the pipe. Hunching of the pipe shall not be allowed. Pipe will be carefully inspected in the field before and after laying. If any cause for rejection is discovered in a pipe after it has been laid, it shall be subject to rejection by the Construction Manager. Any corrective work shall be approved by the Construction Manager. Pipe shall be laid true to line and grade with uniform bearing under the full length of the barrel of the pipe. Suitable excavation shall be made to receive the bell or collar which shall not bear upon the subgrade or bedding. Any pipe which is not in true alignment or shows any undue settlement after laying shall be taken up and relayed at the Contractor's expense. Pipe shall be laid upgrade with the socket ends of the pipe upgrade unless otherwise authorized by the Construction Manager. Pipe sections shall be laid and joined in such a manner that the offset of the inside of the pipe at any joint will be held to a minimum at the invert. The maximum horizontal offset at the invert of the pipe shall be 1% of the inside diameter of the pipe or 0.02 feet, whichever is smaller. The vertical grade shall be  $\pm 0.02$  feet of the design invert. In joining socket pipe, the spigot of each pipe shall be so seated in the socket of the adjacent pipe as to give a uniform annular space all around the pipe in the socket.

The following pipe installation items shall be required:

1. No pipe shall be laid which is damaged, cracked, checked or spalled or has any other defect deemed by the Construction Manager to make it unacceptable, and all such sections shall be permanently removed from the Work.
2. At all times when the Work of installing pipe is not in progress, all openings into the ends of the pipelines shall be kept tightly closed with suitable plywood or sheet metal bulkheads to prevent the entrance of animals and foreign materials and to prevent water from entering the pipe.
3. Keep the pipe trench free from water at all times and take all necessary precautions to prevent the pipe from floating due to water entering the trench from any sources. Any damage is the Contractor's full responsibility. Restore and replace the pipe to its specified conditions and grade if it is displaced due to floating.
4. All pipelines adjoining concrete structures (including manholes) shall have a flexible joint, such as sleeve transition couplings, within 36 inches from the face of such concrete structures. Flexible joints shall be installed on all pipe 4" and larger whether or not a flexible joint is illustrated on the Plans. Where the flexible joint is illustrated on the Plans, install the joint at the location indicated.

### **3.06 COMPACTION OF PIPE BEDDING AND BACKFILL**

Unless specified in the Plans or Earthwork Specification (Section 31 23 00), the following compaction test for piping shall be required.

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#### **TRENCHING AND BACKFILLING – WATER AND SEWER PIPELINES**

31 23 50 - 9

- A. One (1) compaction test for the pipe bedding granular sand backfill along each 75 lineal foot of sanitary sewer or water pipeline placed for each 1.5 foot lift of material installed. This applies for the sewer and water pipelines installed along Evan Hewes Highway.
- B. One (1) compaction test shall be obtained for each 1 foot lift of native material backfilled along each 75 foot section of sanitary sewer or water pipeline placed along Evan Hewes Highway.
- C. One (1) compaction test shall be obtained for each 1 foot lift of native material backfilled for the two (2) sanitary sewer manholes to be installed along the south side of Evan Hewes Highway.
- D. One (1) additional compaction test shall be obtained, in addition to item A, for the granular sand backfill material for the water pipeline within the A.C. pavement area at the north intersection of Mount Signal Avenue and Evan Hewes Highway.
- E. One (1) additional compaction test shall be obtained, in addition to item A, for the granular sand backfill material for the sanitary sewer pipeline within the A.C. pavement driveway area along the south side of Evan Hewes Highway between Stations 1+41 and 2+00.
- F. Two (2) additional compaction tests shall be obtained, in addition to Item B, for the native earth backfill material for the water pipeline within the A.C. pavement area at the north intersection of Mount Signal Avenue and Evan Hewes Highway.
- G. Six (6) additional compaction tests shall be obtained, in addition to Item B, for the native earth backfill material for the sanitary sewer pipeline within the A.C. pavement driveway area along the south side of Evan Hewes Highway between Stations 1+41 and 2+00.
- H. One (1) compaction test shall be obtained for each 9 inch lift of granular sand material placed for every 40 foot section of pipe length for the fire hydrant pipeline and fire backflow preventor/fire sprinkler line.
- I. One (1) compaction test shall be obtained for 1.5 foot lift of native earth material placed for every 40 foot section of pipe length for the fire hydrant pipeline and fire backflow preventor/fire sprinkler line.
- J. One (1) compaction test shall be obtained for each 9 inch lift of granular material placed beneath the concrete slab for the pipeline section extending to the fire hydrant and for the pipeline section extending to the fire backflow preventer. A total of four (4) compaction tests shall be obtained.
- K. Four (4) total compaction tests shall be obtained in the Class 2 Base area beneath the concrete slab for the pipeline sections extending to the fire hydrant and the fire backflow preventer.
- L. Obtain two (2) total compaction tests in the granular sand sanitary sewer pipeline trench area between the new sanitary sewer manhole and the south pavement edge of Evan Hewes Highway.

- M. One (1) compaction test shall be obtained for each 1 foot lift of native backfill material placed in the sanitary sewer pipeline trench between the new sanitary sewer manhole and the south pavement edge of Evan Hewes Highway.
- N. One (1) compaction test shall be obtained for each 1 foot lift of granular sand backfill material placed in the sanitary sewer pipeline trench located in the south ½ (south of the Evan Hewes Road centerline) beneath the A.C. paved section of Evan Hewes Highway.
- O. One (1) compaction test shall be obtained for each 1 foot lift of granular sand backfill material placed in the sanitary sewer pipeline trench located in the north ½ (north of the Evan Hewes Road centerline) beneath the A.C. paved section of Evan Hewes Highway.
- P. Obtain one (1) compaction test for the class 2 base in the Evan Hewes Highway pavement section located in the south ½ of Evan Hewes Highway (south of the Evan Hewes Highway centerline) for the sanitary sewer pipeline trench.
- Q. Obtain one (1) compaction test for the class 2 base in the Evan Hewes Highway pavement section located in the north ½ of Evan Hewes Highway (north of the Evan Hewes Highway centerline) for the sanitary sewer pipeline trench.
- R. Obtain one (1) compaction test for each 8 inch lift of granular sand backfill material installed for each 30 foot section of sanitary sewer pipeline installed along the sanitary sewer lateral extending beneath the A.C pavement and PCC concrete driveway and entrance slab extending from Evan Hewes Highway to the sanitary sewer pipeline building point of connection.
- S. Obtain one (1) compaction test for the class 2 base beneath the A.C. pavement and PCC concrete driveway and entrance slab for each 30 foot section of sanitary sewer pipeline beneath the driveway and entrance slabs extending from Evan Hewes Highway to the sanitary sewer pipeline building point of connection.
- T. Obtain two (2) total compaction tests for the granular sand backfill for the 2 inch water service trench located within native earth areas.
- U. Obtain four (4) total compaction tests for the native earth backfill for the 2 inch water service trench located within native earth areas.
- V. Obtain six (6) total compaction tests for the granular sand trench backfill for the 2 inch water service trench located within A.C. or PCC paved areas.
- W. Obtain two (2) total compaction tests for the class 2 base within the 2 inch water service trench located within A.C. or PCC paved areas.



**3.07 CLEAN-UP**

Immediately upon completion of Work for this Section, all rubbish and debris shall be removed from the Site. All pipe trench areas shall be finish graded with a "blade" or "motor patrol". All construction equipment and implements of service shall be removed and the entire area involved shall be left in a neat, clean and acceptable condition.

**END OF SECTION**

**SECTION 31 41 00**  
**SHEETING, SHORING AND BRACING**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

This section provides requirements for sheeting, shoring, bracing, wales, posts, piling, anchorages and fastenings or other excavation supports, both temporary or permanent, for accomplishment and protection of Work.

**1.02 QUALITY ASSURANCE**

A. Design Requirements:

In accordance with Section 6500 of the Labor Code, the Contractor is required to obtain a permit, for the excavation of trench which is five feet (5') or more in depth and into which a person is required to descend, from the Division of Industrial Safety.

The Contractor shall furnish all labor, equipment and materials required to design, construct and remove all sheeting, shoring and bracing or other equivalent method of support for the walls of open excavations required for the construction of this project.

Excavation of any trench, pad area, foundation area, or structure five feet (5') or more in depth shall not commence until the Contractor has received approval from the Construction Manager of the Contractor's detailed plan for worker protection from the hazards of trench or soil wall collapse/failure.

Such plan shall be submitted at least five (5) days before the Contractor intends to begin excavation and shall show the details of the design of shoring, bracing, sloping or other provisions to be made for worker protection during such excavation. No such plan shall allow the use of shoring, sloping or a protective system less effective than that required by the Construction Safety Orders of the Division of Industrial Safety. The plan shall be prepared and signed by an engineer who is registered as a Civil or Structural Engineer in the State of California.

Prior to the beginning of excavations requiring shoring, the Contractor shall designate in writing to the Construction Manager, the person responsible to supervise the project safety measures and the person responsible to supervise the installation and removal of sheeting, shoring and bracing.

In addition to shoring the excavations in accordance with minimum requirements of the Industrial Safety Orders, it shall be the Contractor's responsibility to provide any and all additional shoring required to support the sides of the excavation against the effects of loads which may exceed those derived by using the criteria set forth in the Industrial Safety Orders. The Contractor shall be solely responsible for any damages which may result from his failure to provide adequate shoring to support the excavation under any

or all of the conditions of grading which may exist, or which may arise during the construction of the project.

B. Material Standards:

Furnish lumber for shores, wales, and sheeting of grading required by the American Lumber Standards for the particular application.

### 1.03 SUBMITTALS

Contractor shall submit complete calculations of the sheeting system including sizing of sheeting wales, rakers, anchor system, struts, earth anchors, anchor piles, tie rods or any other components pertinent to the design prior to the start of any Work involving sheeting and bracing. All designs submitted shall be stamped and signed by an Engineer with a Civil or Structural designation with an active registration in the State of California.

### 1.04 JOB CONDITIONS

Buried debris may be found at some locations. Federal and local agency requirements for safety of job personnel and public will apply to work under the Section.

### 1.05 ALTERNATIVES

The use of application of alternative methods and materials, and the employment of proprietary systems under lease or franchise in lieu of that specified herein, may be allowed. Demonstration of suitability and compliance with these Specifications will be required. The application of alternative methods will be approved by the Construction Manager.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

A. Lumber:

1. Temporary Shores, Wales and Sheeting: Furnish structural grade planks, beams and posts as defined and specified for stress-grade lumber in the American Lumber Standards. Lumber may be rough, untreated, in random lengths, and shall be of standard dimensions.

2. Permanent Sheeting: When permanent sheeting is called for on the Drawings, provide and install planks, beams, posts and timbers of unseasoned, rough, new southern yellow pine or Douglas Fir meeting the requirements of ASTM Standard D25, Class "C". In lieu of the above, lumber dressed to standard dimensions, dried and treated in accordance with Standard T-3 of the American Wood Preservers' Association may be utilized.

B. Fastenings:

Provide fastenings for permanent sheeting as recommended in the National Design Specification for stress-grade lumber and its fastening.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

Install sheeting and bracing for trench and structure excavation progressively as the removal of excavated material requires. Butt planks to exclude groundwater and fines, preventing the erosion of voids outside sheeting. In soft, wet ground drive sheeting to a lower level as excavation progresses to that sheeting is embedded in undisturbed earth. Bracing of sheet piling may be permitted to penetrate the structural concrete only as directed by the Owner. Refer to Section 03300 – Cast-in-Place Concrete. Install wales and struts at close intervals so as to prevent displacement of the surrounding earth and to maintain safe conditions in the Work area. Any damage proven to result from improper installations shall be the responsibility of the Contractor. Temporary sheeting for trench and structure excavation may be removed and reused. Withdraw individual planks alternately as the backfill is raised, maintaining sufficient sheeting and bracing to protect the Work and workmen. Remove bracing completely. Where unstable conditions occur in the underlying strata from any cause, and withdrawal of sheeting will endanger the Work, a portion of the sheeting, including bracing, may be left in place with the approval of the Owner. Remove all wood within a zone extending four feet (4') below finished grade. Leaving such material in place shall not be cause for an increase in the contract price. The use of horizontal strutting below the barrel of a pipe or the use of a pipe as support will not be permitted. Sheet piling and timbers in trench excavations shall be withdrawn in a manner so as to prevent subsequent settlement of the pipe or additional backfill loadings which might overload the pipe. Trench sheeting below the top of the pipe shall be left in place.

**END OF SECTION**

**SECTION 32 12 00**  
**ASPHALT CONCRETE PAVING**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

Requirements specified in the Technical Specifications form a part of this Section. Provide labor, equipment, tools and materials to accomplish asphalt concrete paving as indicated on the Plans and/or on the Proposal forms.

A. Related work not included in this Section:

1. Section 31 23 00 - Earthwork
2. Section 31 23 50 – Trenching and Backfilling – Water and Sewer Pipelines

**1.02 REFERENCE SPECIFICATION**

Asphalt concrete paving work shall be in accordance with the latest edition of State of California, Department of Transportation Standard Specifications (Caltrans Std. Specs.).

**1.03 PAVEMENT REMOVAL AND REPLACEMENT**

A. General: Pavement removal and replacement for all public roads, including aggregate base and temporary paving where required, shall comply with the Plans and requirements of the agency issuing the Encroachment Permit. In roads established under formation of a special road district, the specifications of the Encroachment Permit shall apply. Any private roads and streets, including driveways in which the surface is removed or damaged, shall be restored to the original grade and crown by the Contractor in accordance with the paving requirements described herein. Removed or damaged sections shall be restored with the type of improvements (or better) conforming to that which existed at the time the Contractor entered upon the work.

It shall be the responsibility of the bidder to observe and familiarize himself/herself as to the existing pavement sections prior to submitting a Bid.

B. Pavement Cutting: Pavement shall be cut to a straight edge parallel to the pipe alignment, curb and gutter, barrier curb, pavement edge, etc., prior to excavation. Method of pavement cutting shall be sawcutting for the full depth of the pavement. Under no circumstances shall excavation be started prior to sawcutting of the pavement. If the adjacent pavement is disturbed during the Contractor's operation, the pavement shall be recut on straight lines to remove

the damaged pavement before resurfacing. Portland cement concrete pavement and sidewalk shall also be sawcut as required.

C. Asphalt Concrete Pipe Trench Pavement: Where required by the agency issuing the Encroachment Permit or other agency having jurisdiction, and where specified in the Contract Documents, an asphalt concrete cap shall be placed in the area of the pipe trench or pipe excavation area. The installation of the asphalt concrete pavement shall be in accordance with the specifications and policies of the agency having jurisdiction. In the event the agency requirements conflict with the Plan requirements or these specifications, the most stringent will apply.

#### 1.04 TEMPORARY PAVEMENT

Install temporary pavement in accordance with the requirements of the agency issuing the Encroachment Permit and Engineer. Steel plates may be allowed to cover excavation areas within road right of ways as approved by the governing agency and Engineer.

#### 1.05 PAYMENT

Payment for asphalt paving (new or replacement) shall be on a lump sum, linear foot, square foot or per ton basis as indicated on the Proposal forms. Where payment for A.C. paving is indicated to be on a per ton basis, certified quantity tickets (tons) shall be provided to the Engineer on the job site as the material is delivered and signed so as to certify delivery and acceptance. Any material for which asphalt concrete quantity tickets are not submitted as the material is delivered will not be accepted. Payment for asphalt concrete designated to be on a per ton basis will be based only upon tickets accepted by the Engineer.

### PART 2 - PRODUCTS

#### 2.01 ASPHALT CONCRETE PAVING

- A. MIX: Hot Mix Asphalt, Type A per 2010 Caltrans Standard Specifications Section 39.
- B. THICKNESS: As specified on the Plans.
- C. AGGREGATE SIZE: ½-inch maximum, medium per 2010 Caltrans Standard Specifications Section 39.
- D. ASPHALT BINDER: PG 70-10.
- E. PRIME COAT: Per 2010 Caltrans Standard Specifications Section 39, if required per the Plans.

**2.02 SLURRY SEAL**

- A. MIX: Type II Slurry Seal per Section 203.5 of Standard Specifications for Public Works Construction, "Greenbook," 2021 Edition.

**2.03 FOG SEAL**

- A. SPECIFICATION: 2010 Caltrans Std. Specs. Section 37.
- B. MATERIAL: Slow setting, mixing type asphaltic emulsion per Caltrans Std. Specs. Section 94.

**2.04 PRIME COAT AND TACK COAT**

- A. SPECIFICATION: 2010 Caltrans Standard Specifications Section 39.
- B. MATERIAL: SS-1h emulsified asphalt

**PART 3 - EXECUTION**

**3.01 ASPHALT CONCRETE PAVING**

Asphalt Concrete shall be applied with a vibratory machine. The hot mix asphalt type shall be HMA, Type A, ½-inch, with PG 70-10 per the 2010 Caltrans Standard Specifications and as approved by the Engineer. The minimum bitumen shall be in accordance with the approved mix design. The Asphalt Concrete shall be compacted to a minimum of 95 percent of Hveem unit weight. The temperature of the asphalt when delivered to the application site shall range between 285° F and 359° F. The finished surface shall be within ± 0.02 feet of finish design grade with maximum high and low variance occurring in a maximum of 10 horizontal feet.

Rollers of the vibratory, steel wheel or pneumatic-tired type may be used. They shall be in good condition, capable of operating at slow speeds to avoid displacement of the bituminous mixture. The number, type and weight of rollers shall be sufficient to compact the mixture to the required density while it is still in a workable condition. The use of equipment which causes excessive crushing of the aggregate will not be permitted.

After spreading, the mixture shall be thoroughly and uniformly compacted by rolling. The surface shall be rolled when the mixture has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor.

The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture. Any displacement occurring as a result of reversing the direction of the roller or from any other cause shall be corrected at once.

Rolling shall continue until the roller marks are eliminated, the surface is of uniform texture and true to grade and cross-section and the required field density is obtained.

To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened, but excessive water will not be permitted.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with hot hand tampers.

Any mixtures that become loose and broken, mixed with dirt, or in any way defective, shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense.

*The Contractor shall pay for all costs associated with the preparation of the Mix Design. The Contractor shall bear the cost for compaction test and extraction/gradation tests required for this project. A total of one (1) extraction gradation test shall be required for each day A.C. pavement installation occurs. A compaction test shall be obtained for every 900 square feet of Asphalt Concrete placed except that a minimum of three (3) compaction tests shall be obtained along the tapers and driveway entrance in the Evan Hewes Right of Way.*

A sample of the bituminous mix will be obtained each morning pavement operations are occurring, or as approved by the Construction Manager and Geotechnical Consultant. The sample shall be obtained by the geotechnical testing consultant. The maximum density of the sample shall be determined. The results of the test will be used to base the field density tests against. An extraction from the sample shall be taken to determine the percentage of bitumen in the mix. The gradation of the sample shall also be obtained. Density tests will be taken during the rolling operation. The pavement shall continue to be rolled until the desired density is obtained. The costs associated with the testing shall be borne by the Contractor.

- A. Application: Mixing, transporting and placing of asphalt concrete shall be in accordance with all applicable provisions of 2010 Caltrans Std. Specs. Section 39. Asphalt concrete shall not be placed when the atmospheric temperature is below 60°F, or during unsuitable weather.
- B. Pressure Treated Headers: Provide 2"x6" pressure treated headers for all pavement edges, if required per the Plans.
- C. Repairs: Deficient paving and/or low areas with inadequate drainage and damaged paving due to subgrade failure, inadequate trench compaction, etc., shall be repaired by the Contractor at no additional cost to the Owner.

### 3.02 ASSOCIATED PAVING RELATED WORK

- A. Manhole Covers: Adjust sewer manhole covers 3 inches below the finish design pavement surface prior to the installation of A.C. pavement. Raise the manhole covers to finish pavement grade after paving operations are completed. Place a 1-foot wide, 1-foot deep 5000 PSI concrete ring concentric around the manhole level with the finish pavement surface.
- B. Valve Covers: Adjust water valve risers and covers 3 inches below the finish design pavement surface prior to the installation of A.C. pavement. Raise the valve risers and covers to finish pavement grade after paving operations are completed. Place an 8-inch wide, 8-inch deep 5,000 PSI concrete ring



concentric around the water valve riser and cover level with the finish pavement surface.

C. Striping: Replace the traffic striping and pavement markers over the areas receiving the overlay. Paint new onsite striping as illustrated on the Plans.

D. Traffic Signs: Replace traffic signs temporarily removed during the construction work.

### 3.03 FOG SEAL

A. Application: Apply fog seal at a rate of 0.06 to 0.10 gallons per square yard of surface area.

B. Fog Seal Schedule: Apply fog seal not less than fourteen (14) days following placement of asphalt concrete surfacing.

C. Compensation: Fog seal application shall be incidental to the A.C. pavement costs.

### 3.04 PRIME COAT AND TACK COAT

A. Prime coat and Tack coat shall be applied in accordance with 2010 Caltrans Standard Specifications Section 39, unless otherwise approved to not coat by County of Imperial and the Construction Manager, in writing.

B. Prime coat shall be applied at the approximate total rate of 0.25-gallon per square yard of surface covered, if required per the Plans.

C. Prime coat shall be applied at a temperature conforming to the range of temperatures provided in Caltrans Specification Section 93-1.03, "Mixing and Applying," for distributor application of the grade of liquid asphalt being used.

D. Tack coat of asphaltic emulsion shall be furnished and applied in conformance with the provisions in Caltrans Standard Specifications Section 94, "Asphaltic Emulsions," and shall be applied to all vertical surfaces of existing pavement, curbs, gutters and construction joints in the surfacing against which additional material is to be placed, to a pavement to be surfaced and to other surfaces designated in the special provisions.

E. Tack coat shall be applied in one application at a rate of from 0.02-gallon to 0.10-gallon per square yard of surface covered.

F. Before placing a layer of Open Graded asphalt concrete on any other type of asphalt concrete or on an existing bituminous pavement, tack coat shall be applied in on application at a rate of from 0.05-gallon to 0.10-gallon per square yard of surface covered.

- G. Prime coat or tack coat shall be applied only so far in any one day than is planned to be covered by asphalt concrete during the same day, unless otherwise authorized by the Engineer. When asphaltic emulsion is used as a tack coat, asphalt concrete shall not be placed until the asphaltic emulsion has cured.
- H. Immediately in advance of placing asphalt concrete or asphalt concrete base, additional prime coat or tack coat shall be applied as directed by the Construction Manager to areas where the prime coat or tack coat has been damaged, and loose or extraneous material shall be removed, and no additional compensation will be allowed therefore.
- I. A similar tack coat shall be applied to the surface of any course, if the surface is such that a satisfactory bond cannot be obtained between it and a succeeding course.
- J. The contact surfaces of all cold pavement joints, curbs, gutters, manholes, and the like shall be painted with Grade SS-1h emulsified asphalt immediately before the adjoining asphalt concrete is placed.
- K. Prime coat or tack coat application shall be incidental to the A.C. pavement cost.

### **3.05 PAVING SCHEDULE**

Unless otherwise approved by the Construction Manager, all permanent paving shall commence only after construction of all other contract work is completed.

The asphalt paved surface may be damaged during the construction activities of the Seeley Fire Station and Cooling Center. If the Construction Manager or Imperial County Representatives determine the asphalt pavement surface is damaged then the Contractor shall apply a Type II Slurry Seal Coat over the entire asphalt paved parking lot and driveway surfaces after the construction of the building is completed. The cost of the Type 2 Slurry Sealcoat over the entire A.C. pavement surface shall be paid at the expense of the Contractor and no compensation for the Type 2 Slurry Sealcoat will be given to the Contractor.

**END OF SECTION**

**SECTION 32 17 00**  
**PAVEMENT MARKINGS**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

This item shall consist of the painting of markings and stripes on the surface of the A.C. pavement in accordance with the locations and requirements illustrated on the Plans. All painting of markings and stripes shall conform to the Standard Specifications for Public Works Construction, "Greenbook", 2012 edition, unless noted otherwise.

**PART 2 - PRODUCTS**

**2.01 PAINT**

Paint shall meet the requirements of the Standard Specifications for Public Works Construction, "Greenbook", 2012 edition, Section 214-4.2 and the Table 214-4.1(a).

**2.02 RAPID DRY PAINT**

The paint shall conform to the rapid dry paint specified in the Standard Specifications for Public Works Construction, "Greenbook", 2012 edition, Section 214.

**2.03 REFLECTIVE MEDIA**

A glass sphere reflective media shall be required per Section 214-3 of the Standard Specifications for Public Works Construction, "Greenbook", 2012 edition.

**PART 3 - EXECUTION**

**3.01 WEATHER LIMITATIONS**

The painting shall be performed only when the surface is dry, when the atmospheric temperature is above 60 degrees F., and when the weather is not foggy or windy.

**3.02 EQUIPMENT**

All equipment for the work shall be approved by the Construction Manager and shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job. The mechanical marker shall be an atomizing spray-type marking machine suitable for application of traffic paint. It shall produce an even and uniform film thickness at the required coverage and shall be designated so as to apply markings of uniform cross sections and clear-cut edges without running or spattering.

### **3.03 PREPARATION OF SURFACE**

Immediately before application of the paint, the pavement surface shall be dry and free from dirt, grease, oil, laitance, or other foreign material which would reduce the bond between the paint and the pavement. The area to be painted shall be cleaned by sweeping and blowing or by other methods as required to remove all dirt, laitance, and loose materials.

### **3.04 LAYOUT OF MARKINGS**

The proposed markings shall be laid out in advance of the paint application according to the dimensions required by the Plans and Specifications or by 2018 Caltrans Standards.

### **3.05 APPLICATION**

Markings shall be applied at the locations and to the dimensions and spacing shown on the Plans. Paint shall not be applied until the layout and condition of the surface have been approved by the Construction Manager.

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at a rate specified in the Standard Specifications for Public Works Construction, "Greenbook", 2012 edition, Section 214.

The addition of thinner will not be permitted. The edges of the markings shall not vary from a straight line more than  $\frac{1}{4}$  inch in 50 feet, and the dimensions shall be within a tolerance of plus or minus 2 percent.

The Contractor shall furnish certified test reports for the materials shipped to the project. The reports shall not be interpreted as a basis for final acceptance. The Contractor shall notify the Construction Manager upon arrival of shipment of the paint to the job site. All emptied containers shall be returned to the paint storage area for checking by the Construction Manager. The containers shall not be removed from the project site or destroyed until authorized by the Construction Manager.

A minimum of two (2) coating applications shall be applied for two (2) separate times. First two (2) coating applications shall be completed at least fifteen (15) calendar days after the A.C. pavement has been installed. Second two (2) coating applications shall be completed at least fifteen (15) days after the initial two (2) coating applications have been completed.

### **3.06 PROTECTION**

After application of the paint, all markings shall be protected from damage until the paint is dry. All surfaces shall be protected from disfiguration by spatter, splashes, spillage or drippings of paint.

**END OF SECTION**

**SECTION 33 13 00**  
**EXISTING UNDERGROUND UTILITIES**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. WORK INCLUDED IN THIS SECTION: Principal items are:
1. Exposure of existing utilities (potholing).
  2. Advance notification to utility agencies.
  3. Crossing, protection and/or relocation of utilities.
  4. Protection of other existing facilities.
- B. RELATED WORK NOT INCLUDED IN THIS SECTION:
1. Section 31 23 00 – Earthwork.
  2. Section 31 23 50 – Trenching and Backfilling – Water and Sewer Pipelines
  3. Potholing note and other similar notes on the Plans.

**1.02 EXPOSURE OF UTILITIES IN ADVANCE OF WORK**

- A. DETERMINATION OF LOCATION AND DEPTH:
1. Determine the true location and depth of all utilities and service connections; including the type, material, and condition of any utility which may be affected by or affect the work. Note the diameter size, dimensions, material, type of utility, top of structure or pipe elevation, horizontal location, existing finish surface grade at utility location and all other relevant information. The Contractor shall notify the Construction Manager to verify the above items when the existing utilities are exposed.
  2. Coordinate with all utility companies to field locate all underground lines before start of construction.

- B. EXPOSURE IN ADVANCE OF TRENCHING:
1. Expose all utility mains ("pothole") that must be crossed or closely paralleled in accordance with the provisions stated in the pothole note and other notes on the Plans.
  2. In addition to the provisions stated on the pothole note and other notes on the Plans, expose all utility mains that must be crossed or closely paralleled within 3 working days of commencing construction in accordance with the guidelines or encroachment permits per the owners of the crossing utility facilities.
  3. Contractor shall field locate and determine the location and depth of "potholed" utilities in the presence of the Construction Manager.
  4. Expose all service and sewer lateral connections during the potholing work.
  5. Provide all required traffic control to accomplish the potholing necessary to locate the existing utilities in conformance with the Manual on Uniform Traffic Control Devices (MUTCD) Standards, latest edition.
  6. All costs incurred in exposing utilities shall be borne by the Contractor.
- C. RIGHTS TO MINOR ADJUSTMENTS IN DESIGN: The Construction Manager reserves the right to make minor adjustments in pipeline alignment and grade, to avoid utility conflicts.
- D. COMPLIANCE: Failure of the Contractor to comply with the provisions described herein will result in an order to suspend work until these provisions are complied with, and no additional compensation or additional time will be allowed as a result of such suspension.

### 1.03 ADVANCE NOTIFICATION OF UTILITY AGENCIES

- A. Determine and notify those agencies requiring advance notification for inspection or other purposes before beginning construction in any area of concern to said agency. This includes, but is not limited to, the Imperial Irrigation District, County of Imperial, Seeley County Water District, Southern California Gas Company, AT&T, USA Communications, and other utility purveyors.
- B. Provide agencies with 14 calendar days minimum advance notice.

### 1.04 CROSSING PROTECTION AND/OR RELOCATION OF UTILITIES

- A. GENERAL: Utilities for the purpose of these specifications shall be considered as including, but not limited to, and irrespective of ownership; water pipelines, sanitary sewer pipelines, stormwater pipelines, irrigation pipelines, water services, canals, drains, electrical conduits, electrical transmission lines, telephone cables, sewer laterals, fiber optic cables and appurtenances of Public Utilities" (as defined in the Public Utilities Act of the State of California) and those of private industry, business, or individuals solely for their own use or for use of their tenants; including stormwater facilities, water facilities, sanitary sewer facilities, street lighting, traffic signal systems,

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### EXISTING UNDERGROUND UTILITIES

duct banks, telephone cables, fiber optic lines, gas pipelines, underground television line, transmission cables, and buried structures.

**B. UTILITIES INDICATED ON DRAWINGS:**

1. Indicated utilities are based upon the information provided by the utility company to the County or Construction Manager; and the accuracy and completeness of the utilities shown is not guaranteed.
2. The depth indicated in profile, unless a specific elevation is shown, is based on general practice and is not guaranteed at any specific location.
3. No service connections are shown on the Drawings. The Contractor shall determine the exact location of all existing utilities and their service connections. This includes existing sanitary sewer pipelines and existing water pipelines. All costs of determining the location of existing utilities, existing water pipelines and existing sanitary sewer pipelines is to be included in the cost of potholing and included with the potholing item on the Bid Proposal Forms.

**C. FIELD LOCATING:**

1. Contractor shall coordinate with the utility companies to field locate their utilities prior to the potholing process.
2. Field location, excavation and documentation of existing canals, ditches, drains, laterals, services, pipelines and utilities shall be compensated to the Contractor per the "potholing" item on the Bid Form.
3. The Contractor shall notify the Construction Manager as to any utility located which has been incorrectly shown or omitted from the drawings immediately after the conclusion of potholing activities.

**D. UTILITIES ON PLANS AND NOT IN CONFLICT:**

1. Where utilities cross or parallel the pipeline trench but do not conflict with the permanent work to be constructed, the Contractor shall protect the utility in place unless otherwise indicated on the plans.
2. Unless otherwise provided in the Specifications, full compensation for protecting the crossing or paralleling of utilities as illustrated on the plans shall be included in the contract unit price or lump sum cost for which such work is appurtenant thereto and no additional allowance will be made, therefor.

**E. SPECIAL WATER/SEWER CROSSINGS:**

1. At the locations illustrated on the plans or if the vertical separation between the outside of the sewer pipe and the outside of existing/new potable water pipes at

crossings is less than one (1) foot vertically (water pipeline above sewer pipeline) or 10 feet horizontally, and when

directed by the Construction Manager, the Contractor shall provide the special construction required per the County of Imperial, Seeley County Water District and per the State of California Regional Water Control Board, Division of Drinking Water – Water and Sewer Separation Construction requirements. The special construction will not be required at locations shown if the vertical separation is 1 foot or greater (water pipeline above sewer pipeline) and the horizontal separation is 10 feet or greater.

- F. **RELOCATION OF UTILITIES BY THE CONTRACTOR FOR HIS/HER OWN CONVENIENCE:** The temporary relocation or the alteration of any utility desired by the Contractor solely for the Contractor's convenience in the performance of the contract work, to a position or condition other than that provided for in the Specifications or shown on the drawings, shall be the Contractor's responsibility. The Contractor shall make all arrangements with the property owners regarding such work. Any costs of such work for the Contractor's convenience shall be incurred at the Contractor's expense. Relocation of existing utilities for the Contractor's convenience shall only be allowed with the written consent of the Construction Manager.
- G. **UTILITY CONFLICTS WITH PROPOSED IMPROVEMENTS**
1. If a utility, whether shown on the plans or not, should intersect the proposed improvement at grade anywhere along the line of the improvement, the Contractor shall immediately notify the Construction Manager.
  2. Contractor shall notify the Construction Manager in writing, stating the nature of the conflict, location by schedule, plan sheet number, name of the street or location of easement and the station at which the conflict occurred. The Construction Manager will, within a reasonable time, make the necessary arrangements to resolve the conflict.
  3. When a utility shown on the plans conflicts with the proposed improvements, the Construction Manager may arrange for the relocation or alteration of said utility or require the Contractor to do same as "Extra Work". Work required in connection with the relocation of unknown utilities will be performed and paid for as specified in the following paragraphs. It shall be clarified that the Construction Manager may decide to relocate the new pipeline, in which case the existing utility would be maintained in the location in which it was found.
- H. **UNKNOWN UTILITIES DISCOVERED DURING THE PROJECT CONSTRUCTION:** In the event that a utility is discovered during the project construction and was not illustrated on the plans or the appropriate utility agency plans, then the discovered utility relocation or "utility support and protection in place" may be accomplished as follows below; except that the Construction Manager may require the new pipeline be re-routed. In the case the new pipelines are re-routed, the existing utility would be maintained in its discovered location:



1. When said utility is found to occupy the space required to be occupied by a part of the permanent works to be constructed under the Contract, the Construction Manager may arrange for the relocation or alteration of said utility or require the Contractor to do same as "Extra Work". As an alternative to relocating the discovered utility, the Construction Manager may require the contractor relocate the new pipeline from the location, alignment and grade illustrated on the plans. The relocation of the pipeline may or may not involve additional construction costs.
  2. When the said utility is found to lie parallel to the permanent work and within the trench prism defined by the minimum allowable trench excavation illustrated on the plans; the Construction Manager may arrange for the relocation, protection or alteration of said utility, or require the Contractor to do same as "Extra Work". As an alternative to relocating the discovered utility, the Construction Manager may require the contractor relocate the new pipeline from the location, alignment and grade illustrated on the plans. The relocation of the pipeline may or may not involve additional construction costs.
  3. When said utility is more or less parallel with the permanent work, and any portion of it does not lie within the trench prism as illustrated on the plans, the Contractor shall advise the Construction Manager thereof, and in cooperation with the utility purveyor, provide and place the necessary support, if any, for proper protection to ensure continuous and safe operation of the utility. All costs of such work shall be borne by the Contractor.
  4. If utilities are found to cross the new pipeline excavation after potholing but are not directly intersecting the permanent works to be constructed, then the Contractor will be required to protect the existing facility in place and construct the proposed facility under or over the discovered utility. The costs of such work will be borne by the Contractor.
  5. Upon discovering a utility in the course of potholing that was not indicated on the plans or marked in the field, the Contractor shall protect it in place. The Contractor shall immediately investigate if it is abandoned or active and notify the Construction Manager and appropriate utility company.
- I. RESPONSIBILITY OF THE CONTRACTOR:
1. The Contractor shall be responsible for all costs for the repair of any and all damage to the contract work or to any utility (whether previously known or disclosed during the work), as may be caused by his/her operations.
  2. Utilities not shown on the drawings to be relocated or altered by others, shall be maintained in place by the Contractor.
  3. At the completion of the contract work, the Contractor will leave all utilities and appurtenances in a condition satisfactory to the utility purveyors and the County of Imperial.

#### **1.05 PROTECTION OF FACILITIES OTHER THAN UTILITIES**

Contractor shall protect in place or remove and replace to its original condition all existing facilities encountered during the construction excavation process. It shall be the Contractor's responsibility to familiarize himself/herself with the conditions of proposed work and to identify by field investigation those above-grade features, whether or not illustrated on the Plans, which require removal and replacement or protection in place. These features include, but are not limited to, fences, cross gutters, roads, sidewalks, driveways, curbs and gutters, power poles, signs, mail boxes, drainage structures, canals, laterals, ditches, trees, street lights, landscaping and similar items.

**END OF SECTION**

## SECTION 33 14 00

### PVC PIPELINES

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. The Contractor shall furnish and install all Polyvinyl Chloride (PVC) plastic pipe, fittings, transitions, connections and appurtenant work, complete and in accordance with the requirements of the Contract Documents.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 31 23 00 - Earthwork
- B. Section 31 23 50 – Trenching and Backfilling – Water and Sewer Pipelines
- C. Section 33 14 50 – Hydrostatic Pressure Testing

##### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards:

ASTM D 1784 and ASTM D 1785	Specifications for Polyvinyl Chloride (PVC) Plastic Pressure Pipe
ASTM D 3034	Specifications for Polyvinyl Chloride (PVC) Plastic Gravity Sewer Pipe
AWWA C 900	Specifications for Polyvinyl Chloride (PVC) Plastic Water Pressure Pipe
ASTM D 2321	Standard Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe
NSF / ASNI 61	Drinking Water System Components – Health Effects

##### 1.04 CONTRACTOR SUBMITTALS

- A. Contractor shall submit copies of the manufacturer's product specifications according to the requirements of Section 01 33 00 - Submittals.

**PART 2 - PRODUCTS**

**2.01 PVC (POLYVINYL CHLORIDE) PRESSURE PIPE, 4 INCHES AND SMALLER SOLVENT-WELDED**

- A. All PVC pressure pipe 4 inches and smaller shall be made from all new rigid unplasticized polyvinyl chloride and shall be Normal Impact Class 12454-B, Schedule 80, to conform to ASTM D 1785, unless otherwise shown. Elbows and tees shall be of the same material and schedule as the pipe. Unless otherwise shown, joint design shall be for solvent-welded construction.

**2.02 AWWA C 900 WATER PIPELINE WITH BELL AND SPIGOT JOINTS**

This Specification designates general requirements for unplasticized polyvinyl chloride (PVC) plastic class water pipe with integral bell and spigot joints for the conveyance of water. Pipe shall meet the requirements of AWWA C 900 "Polyvinyl Chloride (PVC) Water Distribution".

All pipe shall be suitable for use as pressure conduit, provisions must be made for expansion and contraction at each joint with an elastomeric ring. The bell shall consist of an integral wall section with a factory installed, solid cross-section elastomeric ring which meets the requirements of ASTM F 477. The bell section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of AWWA C 900. Sizes and dimensions shall be as shown in this Specification. Joint design shall meet qualification requirements of ASTM F 3139. Each pipe shall be tested to four times the pressure class of the pipe for a maximum of 5 seconds. The integral bell shall be tested with the pipe. Standard laying lengths shall be 20 feet ( $\pm 1"$ ) for all sizes.

The pipe stiffness using  $F/\Delta Y$  for PVC class water pipe is contained in the table below:

<u>CLASS</u>	<u>DR</u>	<u>F<math>\Delta</math>y (PSI)</u>
100	25	129
150	18	364
200	14	815

Pipe shall withstand, without failure at 73°F, an impact of a falling missile, TUP C, at the following levels (per ASTM D 2444):

<u>Pipe Size (IN.)</u>	<u>Impact (FT./LBS.)</u>
4	100
6	100
8	100
10	120
12	120

There shall be no visible evidence of shattering or splitting when the energy is imposed.

Randomly selected samples tested in accordance with ASTM D 1599 shall withstand, without failure, pressures listed below when applied in 60-70 seconds.

<u>Class</u>	<u>Minimum Burst Pressure</u> <u>At 73°F (PSI)</u>
100	535
150	755
200	985

Pipe for this Project shall conform with the specifications for AWWA C 900, DR 18 PVC pipe material unless otherwise indicated on the Plans.

### 2.03 PVC (POLYVINYL CHLORIDE) GRAVITY PIPE

- A. Pipe shall conform to the requirements of ASTM D 3034 for SDR 26 gravity pipe, unless otherwise indicated on the Plans.
- B. All pipe joints shall be of the bell and spigot type with electrometric seals and conform to the requirements of ASTM D 3212. Gaskets shall be factory installed and chemically bonded to the bell end of the pipe. Gasket material shall conform to the requirements of ASTM F 477.
- C. All fittings shall be fabricated from pipe meeting the requirements of these standards. Fabricated miter joints shall be reinforced by fusion heat welding. All fittings shall be approved for use by the pipe manufacturer and shall be capable of accepting bell and spigot connections.
  - 1. There shall be no sign of flaking or disintegration when immersed in anhydrous acetone for 20 minutes as described in ASTM D 2152.
- D. All pipe shall be from quality PVC resin, compounded to provide physical and mechanical properties that equal or exceed cell class 12454 as defined in ASTM 1784.
- E. Minimum pipe stiffness at 5 percent deflection shall be 46 PSI for all sizes when tested in accordance with ASTM D 2412, External Loading Properties of Plastic Pipe by Parallel-Plate Loading”.
- F. Each pipe shall be identified with the name of manufacturer, nominal size, cell classification, ASTM designation F 1803, the pipe stiffness designation “PS-46” and manufacturer’s date code.

### 2.04 NSF / ANSI STANDARD 61

Piping, fittings, and appurtenances in contact with potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61 as being suitable for contact with potable water.

## PART 3 - EXECUTION

### 3.01 INSTALLATION OF PIPE

- A. All pipe, fittings, etc., shall be carefully handling and protected against damage, impact shocks and free fall. All pipe handling equipment shall be acceptable to the Construction Manager. Pipe shall not be placed directly on rough ground, but shall be

supported in a manner which will protect the pipe against injury whenever stored at the Site. All pipe damaged prior to Substantial Completion shall be repaired or replaced by the Contractor.

- B. The Contractor shall inspect each pipe and fitting prior to installation to ensure that there are no damaged portions of the pipe. Damaged pipe shall be replaced with new undamaged sections of pipe.
- C. Before placement of the pipe in the trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance which may have collected thereon and shall be kept clean at all times thereafter. For this purpose, the openings of all pipes and fittings in the trench shall be closed during any interruption to the Work. As pipe laying progresses, the Contractor shall keep the pipe interior free of all debris. The Contractor shall completely clean the interior of the pipe of all sand, dirt, rocks and any other debris following completion of pipe laying prior to testing, disinfecting and placing the completed pipeline in service.
- D. Pipe shall be laid directly on the imported bedding material. No blocking will be permitted and the bedding shall be such that it forms a continuous, solid bearing for the full length of the pipe. Bell holes shall be formed at the ends of the pipe to prevent joint loading at the bells or couplings.
- E. Where necessary to raise or lower the pipe grade due to unforeseen obstructions or other causes, the Construction Manager may change the alignment and/or the grades. Such change shall be made by the deflection of joints or by the use of additional fittings. However, in no case shall the deflection in the joint exceed the maximum deflection recommended by the pipe manufacturer.
- F. No pipe shall be installed upon a foundation into which frost has penetrated or any time that there is a danger of the formation of ice or penetration of frost at the bottom of the excavation. No pipe shall be laid unless it can be established that the trench will be backfilled before the formation of ice and frost occurs.
- G. Immediately before jointing bell and spigot pipe, both the bell and spigot end of the pipe shall be thoroughly cleaned and lubricated with an approved vegetable-based lubricant. The spigot end of the pipe section shall then be inserted into the bell of the previously laid joint and telescoped into its proper alignment. Tilting of the pipe to insert the spigot into the bell will not be permitted.
- H. Solvent-welded and heat-fused joints shall be carefully and thoroughly cleaned immediately before jointing the pipe. Particular care shall be taken in making solvent-welded joints to ensure a uniform, homogeneous and complete bond.
- I. Pipe installation shall conform with Technical Specification Section 31 23 50 – Trenching and Backfilling – Water and Sewer Pipelines. If the pipe installation in this Section and Section 31 23 50 conflict, the most stringent specification shall apply.

**END OF SECTION**

## SECTION 33 14 50 HYDROSTATIC PRESSURE TESTING

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

- A. The Contractor shall perform flushing and hydrostatic and leak testing of all pipelines and appurtenant piping complete, including conveyance of test water from Construction Manager-designated source to point of use and disposal thereof after testing, in accordance with the requirements of the Contract Documents. The disposal method of the water shall be reviewed and approved by the Construction Manager and Seeley County Water District General Manager prior to the commencement of the test.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 31 23 50 – Trenching and Backfilling – Water and Sewer Pipelines
- B. Section 33 14 00 - PVC Pipelines

### PART 2 – PRODUCTS

#### 2.01 MATERIAL REQUIREMENTS

- A. All test equipment, fuel, electrical connections, temporary valves, bulkheads, compressors, water pumps, water gauges and other water control equipment support systems and required materials for hydrostatic or pneumatic air testing shall be furnished by the Contractor subject to the Construction Manager's review.

### PART 3 – EXECUTION

#### 3.01 GENERAL

- A. The Contractor shall notify the Construction Manager and Seeley County Water District General Manager at least four (4) days in advance of any planned testing and shall review the testing procedures with the Construction Manager and Seeley County Water District General Manager. The source of testing water and disposal of the testing water shall be reviewed.
- B. ***Unless otherwise provided herein, water for testing pipelines shall be furnished by the Contractor***, and, the Contractor shall make all necessary provisions for conveying the water from the water source to the points of use. The Contractor shall provide inlet hoses, fittings, pressure gauges pumping equipment, meters, backflow preventers and other required items.

- C. The Contractor shall provide a double bronze service saddle, brass corporation stop, inlet pipeline and blowoff pipeline at the beginning and end of the pipeline section to be tested to allow water to be directed into the pipeline and air to be purged from the pipeline while the pipeline is filling with water. The fittings and pipe shall be used during the chlorination and disinfection of the pipeline. After the hydrostatic pipe testing and disinfection of the pipeline are satisfactorily completed remove the corporation stop from the brass service saddle. Place a brass plug in the service saddle inlet. The blowoff pipeline and fittings shall be removed or abandoned in place.
- D. All pipelines shall be hydrostatically tested and disinfected including the fire hydrant assemblies and water services up to the angle meters. The pipeline shall be successfully hydrostatically tested prior to disinfecting the water pipeline. Disinfection testing shall be accomplished in accordance with Technical Condition Specification Section 33 14 75. All testing operations shall be performed in the presence of the Construction Manager and Seeley County Water District Representative.
- E. The disposal or release of test water from pipelines, after testing, shall be acceptable to the Construction Manager and Seeley County Water District Representative. The conveyance items to dispose of the testing water and the disposal location shall be provided by the Contractor. The Contractor shall investigate and identify an acceptable disposal location for the test water during the bidding period prior to the opening of proposals.

### **3.02 HYDROSTATIC TESTING OF PIPELINES**

- A. Prior to hydrostatic testing, all pipelines shall be thoroughly flushed of all sand, dirt and material to the satisfaction of the Construction Manager and Seeley County Water District Representative. The Contractor shall test all pipelines either in sections. The Contractor shall be responsible to ensure all test bulkheads are suitably restrained to resist the thrust of the test pressure without damage to, or movement of, adjacent pipe or structures. Care shall be exercised to ensure that all air vents are open during filling.
- B. The pipeline shall be filled at a rate which will not result in surges or exceed the rate at which the air can be released through the air valves at a reasonable velocity and all the air within the pipeline shall be properly purged. After the pipeline or section thereof has been filled it shall be allowed to stand under a slight pressure for at least 24 hours to allow the concrete or mortar lining, if applicable, to absorb water and allow the escape of air from the pipeline. During this period, bulkheads, valves and connections shall be examined for leaks. If leaks are found, corrective measures shall be initiated and completed to the satisfaction of the Construction Manager and Seeley County Water District Representative.
- C. The hydrostatic test shall consist of holding the test pressure within the pipeline for a period of 4 hours. The test pressure for pipelines shall be 165 PSI. All leaks shall be repaired. The hydrostatic pressure shall be relieved from the pipeline prior to initiating leak repair.
- D. Pipe leaks, as evidenced by water loss from the basin from which water is pumped into the pipeline, shall be allowed after the hydrostatic test begins. Hydrostatic test pressures shall be held at 165 PSI for at least two (2) hours without additional pumping during the four (4) hour hydrostatic test. Approved gauges shall be provided by the

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### **HYDROSTATIC PRESSURE TESTING**



Contractor. Gauge range shall not exceed 50 PSI above test pressure. In the event leaks occur after the hydrostatic test commences, the Contractor shall determine the

cause of the leakage and take corrective measures necessary to repair the leaks. After the leaks are satisfactorily repaired the pipeline shall be re-tested. No additional compensation shall be allowed for repairs of the pipeline system during hydrostatic testing. No additional compensation shall be allowed for performing iterative hydrostatic tests.

**3.03 COMPENSATION**

- A. **The contractor shall include all costs for the hydrostatic testing of pipelines in the water pipeline installation cost.**

**END OF SECTION**

## SECTION 33 14 75 DISINFECTION TESTING

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

Newly installed potable pipelines within the water distribution system and other areas are to be disinfected prior to being connected to other existing active pipelines and placed in service. The new pipelines are to be isolated from the existing active pipelines (usually by means of a closed valve) until the pipeline has been satisfactorily hydrostatically tested, leak tested (if required) and disinfected. The pipelines shall be hydrostatically and leak tested as a separate procedure prior to the pipeline disinfection.

#### 1.02 PURPOSE

The purpose of this standard is to define the minimum requirements for the disinfection of water mains, including the preparation of water mains, application of chlorine, and sampling and testing for the presence of coliform and e-coli bacteria.

#### 1.03 REFERENCE SECTIONS

Reference sections pertaining to the disinfection testing are as follows:

Section 33 14 00	PVC Pipelines
Section 33 14 50	Hydrostatic Pressure Testing
ANSI/AWWA C 651-05	American National Standards Institute/ American Water Works Association
ANSI/AWWA B 300	Hypochlorites
ANSI/AWWA B 301	Liquid Chlorine
AWWA Manual M 12	<i>Simplified Procedures for Water Examination</i> , AWWA: Denver, Colorado

## SECTION 2 - PRODUCTS

### 2.01 GENERAL

A. Construction of Pipeline, Associated Fittings, Valves and Components:

The Contractor shall train pipe crews to be aware of the need to maintain clean pipes, fittings, etc and avoid contamination. While bacteriological testing is used to verify the absence of coliform organisms and is generally accepted as verification that disinfection of the pipeline has been accomplished, following sanitary practices for handling and installation of pipe, valves, fittings, and accessories, coupled with adequate flushing of the line before disinfection, is necessary to ensure that the disinfected pipeline will be ready for connection to the water system. Failure to pass the bacteriological test shall require that the flushing or disinfection process be repeated. The final water quality test is not the primary means for certifying the sanitary condition of a main. The sanitary handling of materials, the practices during construction, and the continual inspection of the work are the primary means for ensuring the sanitary condition of the water main.

B. Methods of Disinfecting Newly Constructed Water Pipelines and the Acceptable Method of Disinfecting Pipelines:

1. The three methods of disinfecting newly constructed water mains are the tablet method, the continuous-feed method and the slug method. Factors considered when selecting a method include the length and diameter of the main, type of joints present, availability of materials, equipment required for disinfection, training of the personnel who will perform the disinfection, and safety concerns.
2. The tablet method shall not be used unless the main can be kept clean and dry. It shall not be used in large-diameter mains if it is necessary for a worker to enter the main to grout joints or perform inspection, because the tablets may release toxic fumes after exposure to moist air. When using the tablet method, the chlorine concentration is not uniform throughout the main, because the hypochlorite solution is dense and tends to concentrate at the bottom of the pipe. The use of the tablet method precludes preliminary flushing. The tablet method is convenient to use in mains having diameters up to 24 inches, and it requires no special equipment.
3. The continuous-feed method is suitable for general application. Preliminary flushing removes light particulates from the main but not from the pipe-joint spaces. The chlorine concentration is uniform throughout the main.
4. The slug method is suitable for use in large-diameter mains where the volume of water makes the continuous-feed method impractical and difficult to achieve for short attachments. The slug method results in appreciable savings of chemicals used to disinfect long, large-diameter mains. Also, this method reduces the volume of heavily chlorinated water to be flushed to waste.
5. ***This Project shall allow chlorination of pipelines by the continuous feed method unless otherwise approved by the Construction Manager.*** The tablet method and slug method shall not be allowed.

C. Forms of Chlorine for Disinfection:

The forms of chlorine that may be used in the disinfection operations are liquid chlorine, sodium hypochlorite solution, and calcium hypochlorite granules or tablets. ***For this Project, liquid chlorine shall be used unless otherwise approved by the Construction Manager.***

1. **LIQUID CHLORINE:** Liquid chlorine conforming to ANSI/AWWA B301 contains 100 percent available chlorine and is packaged in steel containers usually of 100-lb., 150-lb., or 1-ton net chlorine weight. Liquid chlorine shall be used only (1) in combination with appropriate gas-flow chlorinators and ejectors to provide a controlled high-concentration solution feed to the water to be chlorinated; (2) under the direct supervision of personnel familiar with the biological, chemical and physical properties of liquid chlorine and who are trained and equipped to handle any emergency that may arise; and (3) when appropriate safety practices are observed to protect working personnel and the public.
2. **SODIUM HYPOCHLORITE:** Sodium hypochlorite conforming to ANSI/AWWA B300 is available in liquid form in glass, rubber-lined, or plastic containers typically ranging in size from 1 quart to 5 gallons. Containers of 30 gallons or larger may be available in some areas. Sodium hypochlorite contains approximately 5 percent to 15 percent available chlorine, and the storage conditions and time must be controlled to minimize its deterioration. (Available chlorine is expressed as a percent of weight when the concentration is 5 percent or less, and usually as a percent of volume for higher concentrations. Percent x 10 = grams of available chlorine per liter of hypochlorite.)
3. **CALCIUM HYPOCHLORITE:** Calcium hypochlorite conforming to ANSI/AWWA B300 is available in granular form or in 5-g tablets, and must contain approximately 65 percent available chlorine by weight. The material should be stored in a cool, dry, and dark environment to minimize its deterioration.

**CAUTION:** Tablets dissolve in approximately 7 hours and must be given adequate contact time. Do not use calcium hypochlorite intended for swimming pool disinfection, as this material has been sequestered and is extremely difficult to eliminate from the pipe after the desired contact time has been achieved.

D. Preventative and Corrective Measures to be Implemented during the Construction of Pipelines:

Heavy particulates (dirt, soil, rocks, etc.) generally contain bacteria and prevent even very high chlorine concentrations from contacting and killing organisms. Therefore, the procedures of this Section shall be stringently implemented by the Contractor and enforced by the Construction Manager to ensure that water pipelines, fittings, etc., have been thoroughly cleaned before flushing the pipeline for the final disinfection by chlorination. Also, any connection of a new water main to the active distribution system prior to the receipt of satisfactory bacteriological samples constitute a cross-connection in violation of the State Water Resources Control Board, Division of Drinking Water requirements. The new main shall be isolated until bacteriological tests described later in this Section are satisfactorily completed. The Contractor shall complete the following

tasks or observe the following precautionary measures during the installation of the water pipeline:

1. The interiors of pipes, fittings and valves shall be protected from contamination by dirt, debris, rocks, concrete residue, water and similar items.
2. Openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Rodent-proof plugs may be used when watertight plugs are not practicable and when thorough cleaning will be performed by flushing or other means.
3. Delay in placement of delivered pipe invites contamination. Pipe delivered to the site shall be covered with tarps. The tarps shall be placed over the pipes and end of the pipes to minimize the entrance of dirt, dust and construction debris.
4. Sealing Materials: No contaminated material or any material capable of supporting growth of microorganisms shall be used for sealing joints. Sealing material or gaskets shall be handled in a manner that avoids contamination. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water and shall not contribute odors. It shall be delivered to the job in closed containers and shall be kept clean and applied with dedicated, clean applicator brushes.
5. If dirt or other contaminants enter a pipeline, fitting, transition coupling, valve or any other pipeline, it shall be swept from the interior of the pipeline, fitting, etc. The contaminated area shall be wiped clean with an ammonia solution disinfectant. After each pipe section is installed the end of the pipe shall be inspected for the entrance of dirt and other contaminants. If dirt or contaminants are identified the dirt and contaminants shall be removed prior to the installation of the next pipe length. Correspondingly, the pipe end to be "stabbed" into the previously installed pipe segment shall be checked for dirt contamination and cleaned and disinfected accordingly.
6. Flooding by Storm or Accident during Construction: If the pipeline is flooded during construction, it shall be cleared of the floodwater by draining and flushing with potable water until the main is clean. The section exposed to the floodwater shall then be filled with a chlorinated potable water that, at the end of a 24 hour holding period, shall have a free chlorine residual of not less than 25 mg/L. The chlorinated water shall then be drained or flushed from the main. After construction is completed, the main shall be disinfected for a second time using the continuous-feed method.

## PART 3 - EXECUTION

### 3.01 GENERAL

The water pipeline shall be thoroughly flushed with potable water prior to the chlorination of the pipeline. Prior to the flushing of the water pipeline it may be necessary to construct temporary

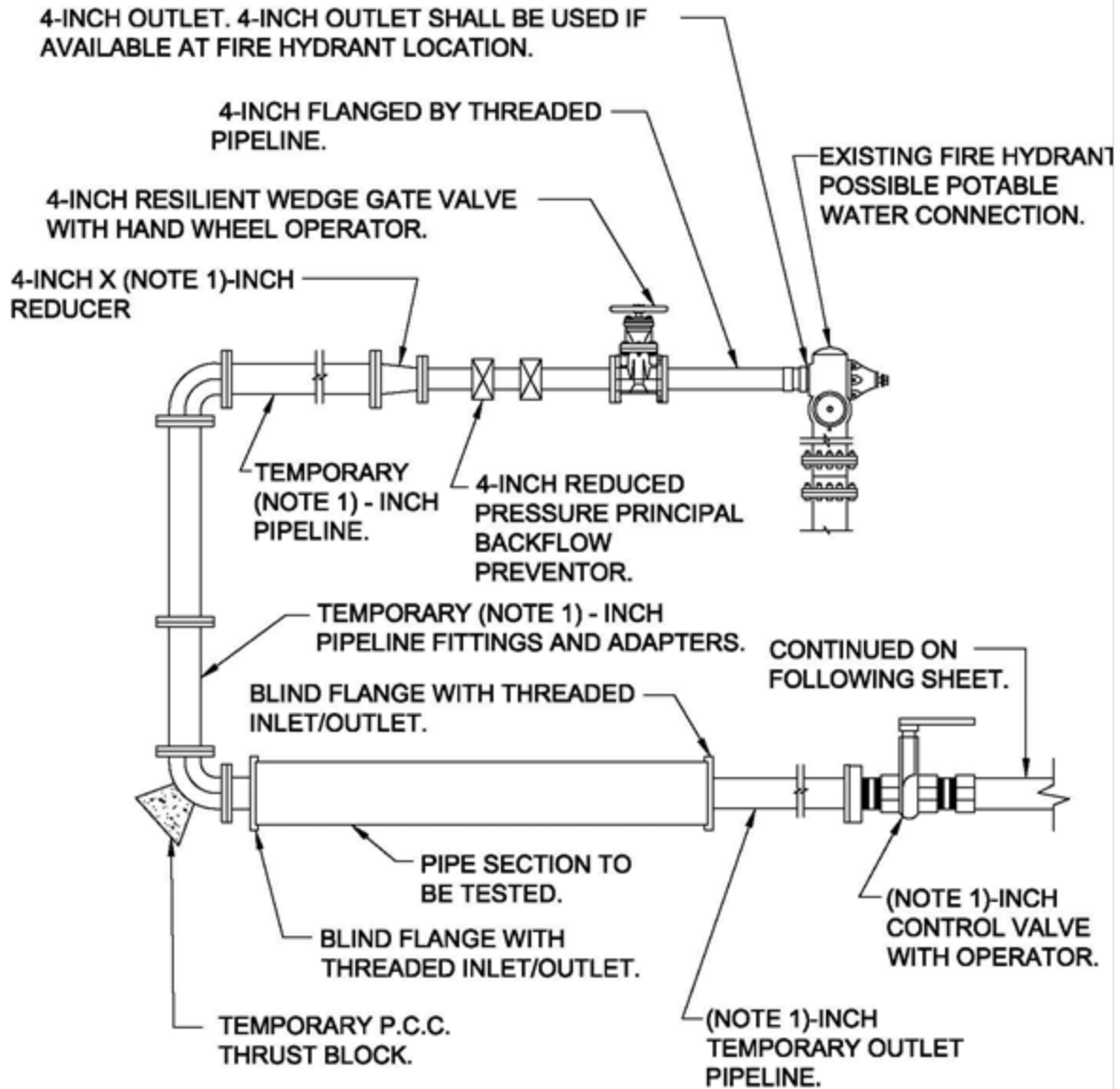
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#### DISINFECTION TESTING

flushing and testing connections at the upstream and downstream ends of the pipelines to be tested. If new pipelines are to be connected to existing in-service pipelines with new valves installed at the connection fittings between the new and existing pipelines which reliably isolate the new pipeline from the existing in-service pipeline, then blowoffs and/or properly positioned fire hydrants shall be installed for the adequate flushing of the pipeline and to also allow for the dispersion of chlorine by the continuous-feed method.

If new pipelines are to be connected to existing in-service pipelines, concrete structures or reservoirs with no reliable valve at the connection point of the new pipeline to isolate the new pipeline from the existing in-service pipelines, concrete structures or reservoirs, then temporary caps or plugs (blind flanges), supply hoses, control valves, backflow devices, discharge/flushing lines and sampling faucets shall be constructed. This pipeline condition often occurs within water treatment plants. The pipelines within water treatment plants in the condition described within the proceeding section of this paragraph shall be flushed, chlorinated and tested while physically separated from existing in-service pipelines, reservoirs and concrete structures. The physically separated pipeline section shall be hydrostatically tested prior to the flushing, chlorination and testing of the pipeline section. Potable water from an outside source shall be required to be conveyed to the new pipeline for flushing and disinfecting via a temporary connection supplied and installed by the Contractor. The temporary connection shall be disconnected (physically separated) from the new pipeline during the hydrostatic pressure test. The temporary connection shall include a reducer fitting from the fire hydrant, control valve, backflow preventer based upon a reduced pressure principal, supply hose or pipeline, temporary testing block, blind flange with threaded outlet, discharge piping, discharge control valve and smooth, unthreaded sampling faucet. It shall be necessary for the Contractor to provide all other necessary fittings, adapters, hardware and other components. ***Discharge/blowoff pipelines for water distribution systems shall extend to a discharge point acceptable to the Construction Manager. If the discharge/blowoff pipelines extend through on-site roadways or into the public right of way then the Contractor shall place the temporary discharge/blowoff pipeline below grade. The Contractor shall perform all cutting, demolition and replacement of A.C. pavement and P.C.C. infrastructure as required and include the expense in the various water pipeline related bid proposal items. At the conclusion of the pipeline disinfection all upstream and downstream pipelines, supply hoses, valves, check valves, fittings, blind flanges and components shall be removed from the Project Site. Below grade discharge/blowoff piping and fittings shall be allowed to be abandoned in place at the option of the contractor within the County Right-of-Way.***

A schematic of the temporary flushing/testing connection and schematic of the discharge blowoff/sampling tap pipeline follows. The schematic drawings are intended to illustrate the concept and major components required for the disinfection of the pipeline. The schematics do not illustrate each fitting, adapter and component required for the flushing/testing connection pipeline or the discharge blowoff/sampling tap pipeline nor do the schematics illustrate the lengths of pipelines required, number of fittings, number of valves, etc. The schematics do not illustrate where the source of water is to be obtained or the discharge point the blowoff pipeline is to extend to. It is the responsibility of the Contractor to determine the source of the potable water, length of the connection pipeline, exact number and type of fittings, valves and adapters, length of the blowoff pipeline, exact number and type of fittings, valves and adapters, paving and concrete demolition and replacement requirements and similar logistical placement, pipe mechanic and civil infrastructure issues. Following are the Temporary Flushing/Testing Connection Schematic and Blowoff Sampling Point Discharge Pipeline Schematic Drawings.

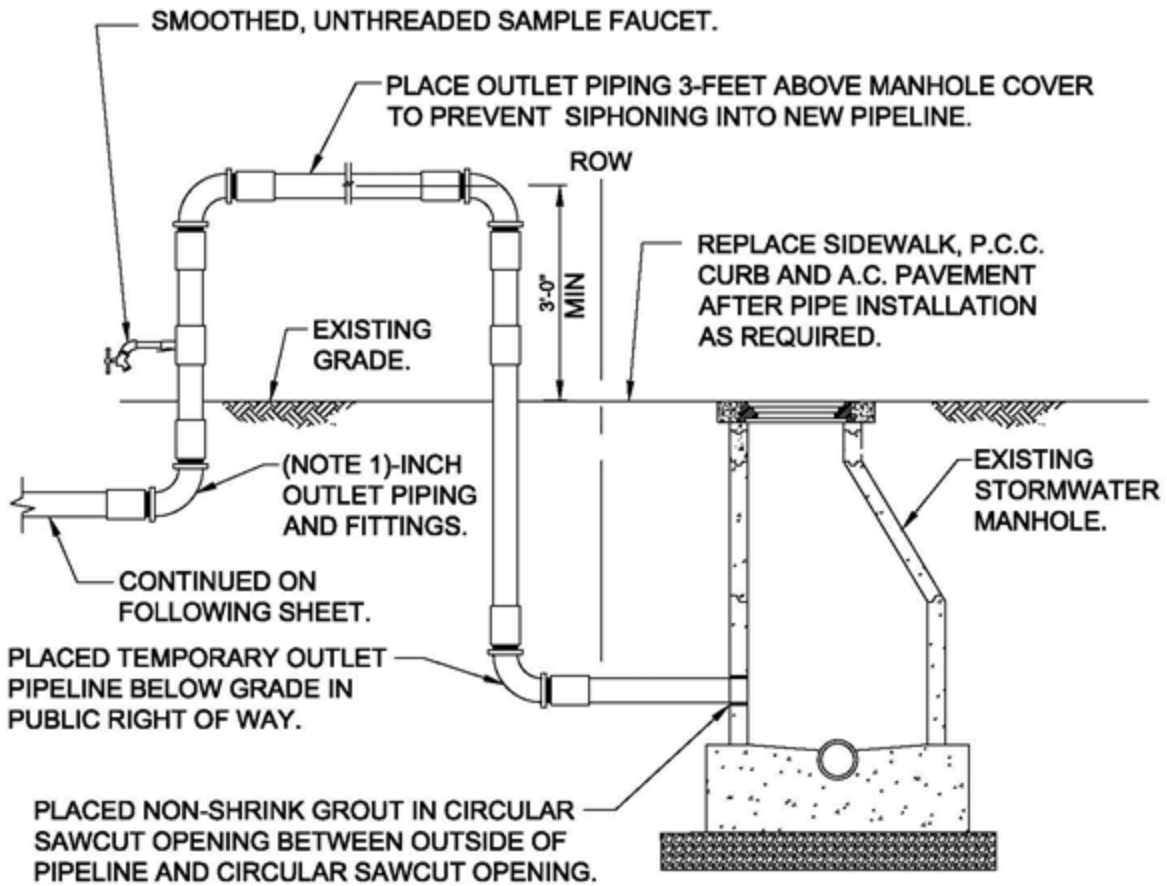


NOTE:

1. DIAMETER SIZE OF THE DOWNSTREAM AND UPSTREAM BLOW-OFF LINE SHALL BE 1/2 OF THE PIPE SECTION BEING INSTALLED.

**TEMPORARY FLUSHING/ TESTING AND BLOWOFF/  
SAMPLING FITTINGS AND PIPING SCHEMATIC**

**SHEET 1 OF 2**



**NOTE:**

1. DIAMETER SIZE OF THE DOWNSTREAM AND UPSTREAM BLOW-OFF LINE SHALL BE 1/2 OF THE PIPE SECTION BEING INSTALLED.

**TEMPORARY FLUSHING/ TESTING AND BLOWOFF/  
SAMPLING FITTINGS AND PIPING SCHEMATIC**

**SHEET 2 OF 2**



### 3.02 CHLORINATION PROCEDURE

- A. Pipeline shall be thoroughly flushed prior to the commencement of the introduction of chlorine disinfectant.

Pipelines within a distribution system or a network of pipelines shall be flushed at each hydrant, blowoff, or service pipeline. It shall be necessary to install sampling/blowoff assemblies at the termination ends of pipe segments to allow the extremities of the pipeline to be flushed and for chlorinated water to be dispersed throughout the new water pipeline section in the event blowoffs or fire hydrants are not placed at the extremities of the pipeline to be tested. At least one (1) blowoff/sampling point assembly shall be placed at the extremities of the pipe section to be tested for sampling purposes. Sampling shall not be allowed through fire hydrants or water fittings with threaded ends. The Contractor shall install at least one (1) blowoff/sampling assembly at the end of each pipeline section to be tested; even if the blowoff/sampling assembly is not illustrated on the Plans. The Contractor shall be required to install the blowoff/sampling assembly as a requirement of this pipeline disinfection specification section. The Contractor shall not be compensated for the costs of the blowoff/sampling assembly. The cost of the installation of the blowoff/sampling assembly shall be incidental to the costs of disinfecting the pipeline.

Pipelines physically separated from existing in-service pipelines, reservoirs and concrete structures (as is often the case at Water Treatment Plants), shall be flushed with temporary pipeline connections upstream and downstream of the pipeline section to be disinfected as described in Section 3.01 of this specification.

***Flushing of pipelines within a distribution system shall occur through fire hydrants, blowoffs, water services and blowoff/sampling points for a minimum of 10 minutes with the potable water source placed at maximum flow and maximum pressure unless otherwise determined by the Construction Manager.*** Flushing shall continue until no evidence of dirt is evident from the discharge water. Flushing shall be accomplished through fire hydrants or blowoffs if possible. Flushing of the water pipeline shall occur through a blowoff/sampling point assembly as a last resort. The pipeline contractor shall take necessary precautions to avoid damage to existing structures and utilities.

Flushing of physically separated pipelines shall be accomplished for a minimum of 10 minutes with the potable water source placed at maximum flow and maximum pressure. Flushing of the pipeline shall continue until no evidence of dirt is visible from the discharge water entering the downstream deposition point. The pipeline contractor shall take necessary precautions to avoid damage to existing structures and utilities.

- B. After flushing of the water pipelines is satisfactorily accomplished and approved by the Construction Manager, chlorinated water shall be introduced to the pipeline. The pipelines shall be chlorinated in accordance with AWWA C 651.

***The continuous-feed method of chlorine application shall be employed. The use of chlorine tablets or granules shall not be allowed.***

Direct-feed chlorinators, which operate solely from gas pressure in the chlorine cylinder, shall not be used for the application of liquid chlorine. (The danger of using direct-feed chlorinators is that water pressure in the main can exceed gas pressure in the chlorine cylinder. This allows a backflow of water into the cylinder, resulting in severe cylinder corrosion and the escape of chlorine gas.) The preferred equipment for applying liquid chlorine is a solution-feed, vacuum-operated chlorinator and a booster pump. The vacuum-operated chlorinator mixes the chlorine gas in solution water; the booster pump injects the chlorine-gas solution into the main to be disinfected. Hypochlorite solutions may be applied to the water main with a fuel or electrically powered chemical-feed pump designed for feeding chlorine solutions. Feed lines shall be made of material capable of withstanding the corrosion caused by the concentrated chlorine solutions and the maximum pressures that may be created by the pumps. All connections shall be checked for tightness before the solution is applied to the pipeline.

***Chlorine shall be dispersed through the pipeline at 100 ppm. Chlorine shall be flushed through all fire hydrants, blowoffs, water services and blowoff/sampling assemblies. Chlorine shall continue to be flushed through the above listed items until the chlorine concentration is measured at 100 ppm or greater.***

The chlorinated water shall remain in the pipeline for a minimum 24-hour period and not longer than 48 hours. The chlorine residual shall be a minimum of 50 ppm after the 24-hour period; or prior to flushing the heavily chlorinated water from the pipeline. The heavily chlorinated water shall not remain in the pipeline over 48 hours as prolonged exposure to the heavily chlorinated water may damage (corrode) pipelines, fittings, valves and other piping components. The heavily chlorinated water shall be flushed from the pipeline, pipeline fittings, water services, fire hydrants, blowoffs, blowoff/sampling assemblies and all other pipe connections. The heavily chlorinated water shall be flushed until chlorine samples of the flushed water confirm that the chlorine concentration is no higher than the water in the in-service distribution system or the water source used for the disinfection process.

**A neutralizing chemical shall be added to the water to be wasted (prior to discharge) to remove chlorine from the discharge water. Neutralizing chemicals may be sulfur dioxide, sodium bisulfite, sodium sulfite, sodium thiosulfate or ascorbic acid. Appendix "C" of ANSI/AWWA C 651-05 lists the neutralizing chemicals and the suggested neutralizing chemical concentrations per 100,000 gallons of water. Dechlorination shall be accomplished according to AWWA C 655.**

**The Contractor shall be responsible for removing the chlorine from the water prior to discharging the water into the sanitary sewer collection system. The Contractor shall provide all piping, fittings, etc. to convey the de-chlorinated discharge water from the disinfected pipeline per Item 3.01 of this Specification.**

- C. After final flushing and before the disinfected water pipeline is connected to the distribution system or in-service pipeline system, two (2) consecutive sets of acceptable samples, obtained a minimum of 24 hours apart, shall be collected from the disinfected pipeline.

One (1) set of samples shall be collected from every 1,200 feet of new water pipeline and one (1) set shall be obtained from the end point(s) of the disinfected water pipeline(s). If disinfected water pipelines terminate (dead-end) at cul-de-sacs, a sample

shall be obtained from the termination point of the pipelines. As was noted by the previous sections, The Contractor shall install blowoff/sampling point assemblies at pipeline termination points as required.

Samples shall be tested for bacteriological (chemical and physical) quality in accordance with *Standard Methods for the Examination of Water and Wastewater* and shall show the absence of coliform and e-coli organisms; and chlorine residual. Turbidity, pH, and a standard heterotrophic plate count (HPC) test shall be required. Newly disinfected pipelines do not typically contain coliform bacteria but do typically contain HPC bacteria.

Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate, as required by *Standard Methods for the Examination of Water and Wastewater*. No hose, fire hydrant or threaded fitting outlet shall be used in the collection of samples. There should be no water in the trench up to the connection for sampling. The sampling pipe must be dedicated and clean and disinfected and flushed prior to sampling.

If sample results from the lab indicate a measured HPC greater than 500 colony-forming units (cfu) per ml, flushing should be resumed and another coliform and HPC set of samples shall be obtained until no coliforms are present and the HPC is less than 500 cfu/ml.

The record of disinfection compliance shall be the bacteriological test results certifying that the water sampled from the disinfected water main is free of coliform bacteria contamination and is equal to or better than the bacteriologic water quality in the distribution system.

If the initial disinfection fails to produce satisfactory bacteriological results or if other water quality is affected, the disinfected pipeline may be reflushed and shall be resampled. If succeeding samples also fail to produce acceptable results, the disinfected pipeline shall be rechlorinated by the continuous-feed method until satisfactory results are obtained, satisfactory results being derived from two (2) consecutive sets of acceptable samples taken 24 hours apart.

**The Contractor shall be responsible for all expenses relative to the chlorination and disinfection of the pipelines except for obtaining the tests and the costs of the laboratory testing. The costs of re-testing shall also be borne by the Contractor. *The Seeley County Water District Representative shall coordinate obtaining the tests and select the testing laboratory to perform the tests. The Construction Manager shall take the lead in communicating with the State Department of Water Resources Control Board, Division of Drinking Water and Seeley County Water District and receiving approval to connect the disinfected pipelines to the water distribution system. The Contractor shall be responsible for all expenses relative to the laboratory testing.***

***The disinfected pipeline shall not be placed in service until evidence that the bacteriological tests have proved negative and successfully met the testing requirements and are presented to the Construction Manager and Seeley County Water District Representative. The Seeley County Water District Representative shall allow the disinfected pipeline(s) to be connected to the in-service pipeline after the evidence is presented to the Seeley County Water District***

**Representative by the Contractor.** The evidence shall consist of the original laboratory report document certifying the laboratory test results comply with the disinfection requirements of this document.

### **3.03 DISINFECTION PROCEDURES WHEN CUTTING AND CONNECTING TO EXISTING PIPELINES**

If approved by the Construction Manager and Seeley County Water District Representative, final connection pipe segments (measuring less than 20 feet) at new fittings and valves connected to or near existing pipelines may be spray disinfected or swabbed with a minimum 1-5 percent solution of chlorine prior to final installation. The installation of the final connection pipe segment shall be witnessed by the Construction Manager and Seeley County Water District Representative. If dirt, debris or any contaminating substances enter the pipe section between the disinfection process and pipeline and fitting installation then, the pipe section, fittings, valves and all other pipeline components shall be removed and re-disinfected. The Contractor shall immediately remove the pipe section and pipe components from the pipe trench and re-disinfect the pipe section if required by the Construction Manager and Seeley County Water District Representative. The disinfection of the pipeline shall require that all dirt, construction residue, dust and contaminants be thoroughly pressure washed from the interior of the pipeline, valve, fitting, transition coupling and other pipe component interior surfaces. The interior surfaces shall be dried clean with a cloth or paper towels. The interior surfaces shall then be disinfected with the minimum 1-5 percent solution of chlorine. The pipe section shall not be allowed to be set in place for connection to the existing in-service pipeline until the Seeley County Water District Representative approves the witnessed disinfection of the pipeline section.

### **3.04 COMPENSATION**

The Contractor shall include all costs for the pipeline disinfection in the water pipeline installation bid item. The cost to complete the pipeline disinfection is considered incidental to the water pipeline installation. The Contractor shall be responsible for all expenses relative to the disinfection sample laboratory testing. The Contractor shall be responsible for removing the chlorine from the disinfection water prior to discharging the water into the sanitary sewer collection system.

**END OF SECTION**

## SECTION 33 15 00

### PIPE FITTINGS, TRANSITION COUPLINGS, RESTRAINED JOINT FITTINGS, FLANGED COUPLING ADAPTERS AND HARDWARE

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

The Contractor shall provide and install pipe fittings, reducers, transition couplings, restrained joint fittings, flanged coupling adapters and hardware for the connection of PVC, ductile iron and other pipeline material. Other connecting items may also be required. This section includes the specifications and requirements for the prior listed pipe connection items. ***The hardware for this specification section shall include the hardware for pipe or any other fittings or items located along a pipeline.*** Material shall be new and free from defects.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 33 14 00 - PVC Pipelines

##### 1.03 REFERENCE DOCUMENTS

- A. Comply with the applicable reference specifications as specified in the General Requirements.
- B. Unless otherwise indicated, the current editions of the following reference standards and specifications apply to the Work described herein, and are considered part of this Specification.
- C 104/A 21.4-03 American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
- C 105/A 21.5-99 American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems
- C 110/A 21.10-03 American National Standard for Ductile-Iron and Gray-Iron Fittings, 3-In. through 48-In. (76 mm through 1,219 mm), for Water
- C 111/A 21.11-00 American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
- C 115/A 21.15-99 American National Standard for Flanged Ductile Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges

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**PIPE FITTINGS, TRANSITION COUPLINGS, RESTRAINED  
JOINT FITTINGS, FLANGED COUPLING ADAPTERS AND  
HARDWARE**

C 116/A 21.16-03	American National Standard for Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service
C 153/A 21.53-00	American National Standard for Ductile-Iron Compact Fittings, 3-In. (76 mm) through 64-In. (1,600 mm), for Water Service
ASTM A 536	American Standards for Testing and Materials - High Strength Ductile Iron for Sleeve and Flanges of Transition Coupling and Flanged Coupling Adapter
NSF / ANSI 61	Drinking Water System Components – Health Effects
ASTM A 536-80, Grade 65-45-12	American Standard Testing and Material - Ductile Iron Mechanical Joint Restraint Fitting
UNI-B-13-92	As listed Underwriters Laboratories - Restraining Glands for Mechanical Restrained Joint Fittings
ASTM B 117	American Standard Testing Materials - Salt Spray Testing for Bolts

#### 1.04 CONTRACTOR SUBMITTALS

- A. The Contractor shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications and as specified in the referenced standards. Certification shall include physical and chemical properties of pipe materials and hydrostatic test reports.
- B. All expenses incurred in sampling and testing for certifications shall be borne by the Contractor.

#### 1.05 QUALITY ASSURANCE

- A. Ductile iron fittings shall be manufactured with the material, have the dimensions, be within the tolerances and meet the testing requirements set forth in ANSI A 21.53-00 and ANSI A 21.10-03.
- B. All fittings shall be subject to inspection at the place of manufacture in accordance with the provisions of the referenced standards, as supplemented by the requirements herein.
- B. In addition to those tests specifically required, the Construction Manager may request additional samples of any material including lining and coating samples for testing by

the Owner. The additional samples shall be furnished at no additional cost to the Owner.

## PART 2 - PRODUCTS

The Technical Requirements for Ductile Iron Fittings, Transition Couplings, Mechanical Restrained Joint Fittings, Flanged Coupling Adapters and Hardware follow:

### 2.01 DUCTILE IRON FITTINGS

Fittings and reducers for the water mains shall be composed of ductile iron. The ductile iron fittings shall conform to ASTM A 536. Mechanical joint fittings shall conform with AWWA C 153 C 350 PSI. Flanged fittings shall conform with AWWA C 110 C 250 PSI. **Flange fittings shall have standard wall thickness not compact thickness.** The fittings shall be cement-mortar lined in accordance with ANSI/AWWA C 104/A 21.4, Standard for Cement-Mortar Lining for Ductile Iron and Gray Iron Pipe Fittings for Water, latest revision. Asphaltic seal coating shall be applied to the interior and exterior of the below-grade fittings in accordance with ANSI/AWWA C 104/A 21.4, asphaltic seal coating shall be applied to the interior of the above-grade fittings. The exterior surfaces of above-grade ductile iron fittings shall be thoroughly cleaned and then given a shop coat of rust inhibitive primer compatible with a high solids epoxy overcoat. This exposed piping shall not be coated with the bituminous coating by the manufacturer prior to delivery.

### 2.02 FLANGED COUPLING ADAPTERS

Flanged coupling adapters shall be used to join plain end pipe with flanged ductile iron fittings and valves. Adapters shall conform to AWWA Specification C 153. Bodies shall be composed of ductile iron and conform with ASTM A 536. The flanged coupling adapter shall be cement lined in accordance with AWWA C 104 (ANSI A 21.4). The flanged coupling adapter shall withstand a working pressure of 350 PSI.

### 2.03 TRANSITION COUPLING

The transition couplings shall be installed as required. The center rings shall be constructed of ductile iron conforming to ASTM A 536-80, Grade 65-45-12. the end rings shall be constructed of ductile iron conforming to ASTM A 536, Grade 65-45-12. Gaskets shall be composed of virgin styrene butadiene rubber (SBR) compounded for water and sewer service in accordance with ASTM D 2000 MBA 810. **The coating for the ductile iron transition coupling shall be fusion bonded epoxy.** The transition coupling shall be capable of sustaining a working pressure of 250 PSI.

### 2.04 RESTRAINED JOINT FITTINGS

Mechanical joint restraint shall be incorporated into the design for the follower gland. The gripping or restraining mechanism shall transmit uniform restraining pressure around the circumference of the pipe, thus avoiding point loading or pipe distortion. This restraining process shall be kept separate from the mechanical joint sealing process and **not** a part of the sealing function. All components shall be manufactured of ductile iron conforming to ASTM A 536-80, Grade 65-45-12.

The restrained twist-off nut bolt system shall have a torque limiting feature designed to break off at 75 to 90 FT-LBS of torque to insure proper actuating of restraining devices. Both the twist-off nut and the removal nut shall be the same size as tee-bolt nut. **Hardware shall be composed of 316 stainless steel.**

The gland shall be such that it can replace the standardized mechanical joint gland and can be used with the standardized mechanical joint bell conforming to ANSI/AWWA C 111/A 21.11, C 110/A 21.10 and C 153/A 21.53 of the latest revision.

The device shall restrain all classes of ductile iron, C 900 PVC, C 905 PVC and high-density polyethylene (HDPE) with the use of a standard mechanical joint gasket. The same device without any field modification shall additionally restrain IPS PVC, IPS steel and IPS HDPE with the use of a transition gasket.

The restraining glands shall have a pressure rating equal to twice (2:1) that of the pipe on which it is used. The restraining glands shall have been tested to UNI-B-13-92, be listed by Underwriters Laboratories and be approved by factory mutual. The mechanical joint restraint device shall be UNI-Bell, EBBA Series 2000, Sigma One-Lock or equal.

Restrained joint fittings shall be placed at termination points, tees, bends, angle points and connection points, or existing connection points as illustrated in the Plans. Pipeline-to-pipeline connections shall not be required to have restraint harness assemblies unless noted in the Plans."

## 2.05 HARDWARE

Hardware for ductile iron fittings shall conform with ANSI/AWWA C 111/A 21.11-07, Appendix "C", Section C.1 entitled "Bolts and Nuts". The size, length and number of bolts are illustrated in Tables 2 and 3 of ANSI/AWWA C 115/A 21.15.

~~Hardware for transition couplings and mechanical restrained joint fittings shall comply with the manufacturer's recommendation for stainless steel, steel or ductile iron bolts and nuts.~~

~~All steel or ductile iron nuts and bolts shall be coated with a flouropolymer using Xylan/014 as a primary coating. The coating shall be electrostatically applied to the hardware after all surfaces are chemically cleaned, abrasive blasted and primed with a nickel phosphate primer. Multiple coats of the Xylan/014 shall be applied to the steel or ductile iron hardware and baked at 425°F for one (1) hour. Hardware protected with this coating system shall exhibit no signs of corrosion after salt spray testing up to 3,000 hours. The coating system shall be a Tripac 2000 Blue or an approved equal.~~

***Hardware for ductile iron fittings, reducers, valves, restrained joint fittings and transition couplings shall be 316 stainless steel unless otherwise specified for a given fitting, restrained joint fitting, valve or transition coupling on the plans or within the contents of this document. It should be clarified that the bolts for the valve bonnets shall be 316 stainless steel. 316 stainless steel hardware shall be used if specified for a given fitting, reducer, restrained joint fitting, transition coupling or similar pipeline component on the plans or within the contents of this document.***



## 2.06 POLYETHYLENE ENCASEMENT

All ductile iron or gray iron fittings, transition couplings, mechanical restrained joint fittings and coupling adapters shall be polyethylene encased at the time of installation. Polyethylene encasement and installation shall be in accordance with ANSI/AWWA C 105.

## 2.07 NSF / ANSI STANDARD 61

Piping, fittings, and appurtenances in contact with potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61 as being suitable for contact with potable water.

## PART 3 - EXECUTION

### 3.01 INSTALLATION OF FITTINGS, TRANSITION COUPLINGS, MECHANICAL RESTRAINED JOINT FITTINGS, FLANGED COUPLING ADAPTERS AND HARDWARE

- A. All fittings, etc. shall be carefully handled and protected against damage, impact shocks and free fall. All fittings, etc. handling equipment shall be acceptable to the Engineer. Fittings, etc. shall not be placed directly on rough ground, but shall be supported in a manner which will protect the fittings, etc. against damage whenever stored at the trench site. All fittings, etc. damaged prior to Substantial Completion shall be repaired or replaced by the Contractor.
  
- B. ~~If during the course of fastening and securing the hardware (nuts and bolts) for the fittings, etc., the flouropolymer coated is scratched, chipped or otherwise removed from the hardware surface, then a coating system supplied by the manufacturer shall be applied to the damaged hardware surface.~~ The repair coating system shall be applied prior to the backfilling or covering of the fittings, etc. hardware.

END OF SECTION

**SECTION 33 31 00**  
**SANITARY SEWER GRAVITY PIPELINE SYSTEM TESTING**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. The Contractor shall furnish all tools, equipment, materials, and supplies and shall perform all labor required to complete the work as indicated on the Plans and specified herein.
- B. This Section covers the performance of all pipeline flushing and testing, complete, for sanitary sewer system piping as specified herein and in accordance with the requirements of the Contract Documents.

**1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 31 23 50 – Trenching and Backfilling – Water and Sewer Pipelines.

**1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS**

- A. Comply with the applicable reference specifications as specified in the General Requirements.

**1.04 CONTRACTOR SUBMITTALS**

- A. Submittals shall be made in accordance with the General Requirements.
- B. The Contractor shall submit in writing all proposed plans for testing, and for water conveyance, control and disposal. The Contractor shall also submit written notice four (4) days in advance of the proposed testing schedule for review and concurrence of the Seeley County Water District Representative.

**1.05 QUALITY ASSURANCE (NOT USED)**

**PART 2 - PRODUCTS**

**2.01 GENERAL**

- A. Temporary valves, plugs, bulkheads, and other air pressure testing and water control equipment and materials shall be provided by the Contractor subject to the Seeley County Water District Representative's review. No materials shall be used which will be injurious to pipeline structure and future function. Air test gauges shall be laboratory-calibrated annually test gauges and shall be recalibrated by a certified laboratory at the

Contractor's expense prior to the leakage test, only if required by the Seeley County Water District Representative.

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

- A. Unless otherwise specified, water for testing will be furnished by the Owner; however, the Contractor shall make all necessary provisions for conveying the water from the Owner-designated source to the points of use. The Contractor shall provide all double backflow reduced pressure principal check valves approved by the State of California Health Department, hand-operated valves, water meters and all related piping and fittings to be attached to the water source (in most cases a fire hydrant) as required by the Owner.
- B. Release of water from pipelines, after testing has been completed, shall be performed as reviewed by the Seeley County Water District Representative. The Contractor shall be responsible for the removal and deposition of the water. The Contractor shall be responsible for identifying the point of deposition of the water. The Contractor shall bear all expenses relative to the removal of the water.
- C. All testing operations shall be performed in the presence of the Engineer.

#### **3.02 TESTING OF PIPELINE**

- A. General: All gravity sewer pipes and service laterals shall be tested for exfiltration and/or infiltration and deflection, as specified. All manholes shall be tested for leakage, as specified. Manholes shall be tested prior to backfill placement, whereas all pipe shall be backfilled prior to testing. All leakage tests of sanitary sewer systems shall be in conformance with SSPWC Section 306-1.4.1. For pressure sewers (force main tests), the force mains shall be tested in accordance with the hydrostatic testing requirements of a potable water pipeline per Section 33 14 50 of this document.
- B. Water Exfiltration Test shall be in conformance with SSPWC Section 306-1.4.2.
- C. Water Infiltration Test shall be in conformance with SSPWC Section 306-1.4.3. Unless otherwise specified, infiltration will be measured by the Seeley County Water District Representative using measuring devices approved by the Seeley County Water District Representative.
- D. Air Pressure Test shall be accomplished by means of "Low Pressure Air Testing". Tests may be conducted by the Contractor or an independent testing firm. However, acceptance tests shall be made only in the presence of the Seeley County Water District Representative.

Test Procedure:

1. Before testing, the pipe shall be thoroughly cleaned.
2. The Contractor shall seal off the section of pipe to be tested at each manhole connection. Test plugs must be securely braced within the manholes.

3. A minimum of two (2) connection hoses to link the air inlet test plug with an above ground test monitoring panel must be provided.
  - a) One hose is to induce air through the test plug and into the test chamber.
  - b) The second hose is for the purpose of monitoring the test pressure from within the enclosed pipe.
4. Under no circumstances are workers to be allowed in the connecting manholes while a pressure test is being conducted.
5. Add air slowly into the test section. After an internal pressure of 4.0 PSI is obtained, allow internal air temperature to stabilize.
6. After stabilization period, adjust the internal air pressure to 3.5 PSI, disconnect the air supply and begin timing the test.
7. Refer to "Air Test Table", below, to determine the length of time (minutes) the pipeline section being tested must sustain air pressure while no losing in excess of 1 PSI as monitored by the test gauge. If the section of pipeline to be tested includes more than one pipe size, calculate the test time for each size and add the test times to arrive at the total test time for the section.
8. Sections so determined to have lost 1 PSI or less during the test period will have passed the leakage test. Those sections losing in excess of 1 PSI during the test period will have failed the leakage test.
9. Appropriate repairs must then be completed and the line re-tested for acceptance.

<b>AIR TEST TABLE</b>			
Minimum Test Time for Various Pipe Sizes*			
Nominal Pipe Size, In.	T (Time), Min/100 Ft.	Nominal Pipe Size, In.	T (Time), Min/100 Ft.
3	0.2	21	3.0
4	0.3	24	3.6
6	0.7	27	4.2
8	1.2	30	4.8
10	1.5	33	5.4
12	1.8	36	6.0
15	2.1	39	6.6
18	2.4	42	7.3

\*The time has been established using the formulas contained in ASTM C 828, Appendix

- E. At the Contractor's option, joints may be air tested individually, joint by joint, with the use of specialized equipment. The Contractor shall submit its joint testing procedure for the Seeley County Water District Representative's review and approval prior to testing. Prior to each test, the pipe at the joint shall be wetted with water. The maximum test

**SANITARY SEWER GRAVITY PIPELINE  
SYSTEM TESTING**

pressure shall be 3.0 PSI. The minimum allowable pressure drop shall be 1.0 PSI over a 30 second test period.

- F. Water Pressure Test shall be in conformance with SSPWC Section 306-1.4.5.
- G. Deflection Test: All flexible and semi-rigid main line pipe shall be tested in accordance with SSPWC Sections 306-1.2.12 and 306-1.2.13 for deflection, joint displacement, or any other obstruction by passing a rigid mandrel through the pipe by hand, not less than 30 days after completion of the trench backfill, but prior to permanent resurfacing. The mandrel shall be a full circle, solid cylinder, or a rigid, non-adjustable, odd-numbered leg (9 leg minimum) steel cylinder, accepted by the Seeley County Water District Representative as to design and manufacture. The circular cross section of the mandrel shall have a diameter of at least 95 percent of the specified average inside diameter of the pipe and the minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe. Obstructions encountered by the mandrel shall be corrected by the Contractor.

### 3.03 TESTING OF MANHOLES

- A. All sewer manholes shall be hydrostatically tested for leakage after installation, but prior to being backfilled. Prior to hydrostatic testing, all manholes shall be visually inspected for leaks. All leaks or cracks shall be repaired by the Contractor, prior to hydrostatic testing, to the satisfaction of the Engineer. All pipes entering the manhole shall be sealed at a point outside the manhole walls so as to include testing of the pipe/manhole joints. The manhole shall be filled with water to a level 2 inches below the top of the frame. Safety lines shall be secured to all plugs utilized. After a period of at least one (1) hour to allow the water level to stabilize and soak into the concrete interior surfaces, the manhole shall be refilled and the water level shall be checked and documented. The water level shall be checked after a period of 4 hours. Leakage in each manhole shall not exceed 0.05 gallon per hour per foot of head above the invert. The Contractor shall be required to make all necessary repairs and retest the manhole in the event the water test fails. The exterior of the manhole shall be inspected during this period for visible evidence of leakage. Visible moisture, sweating, or beads of water on the exterior of the manhole shall not be considered leakage, but any water running across the surface will be considered leakage and shall be repaired to the satisfaction of the Engineer regardless of the volume of water lost.

**END OF SECTION**