# City of Holtville Water Treatment Plant Improvements

CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

CITY of HOLTVILLE 1908

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

## CONTRACT DOCUMENTS, GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, SPECIAL CONDITIONS, AND TECHNICAL SPECIFICATIONS

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EXP. 03-31-2021
CIVIL
STATE OF CALIFORNIA

**September 11, 2020**

**CITY / SWRCB PROJECT No. SWRCB0000000000d180200500**

**THG PROJECT No. 116.455E**

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## 1. ADVERTISEMENT FOR BIDS

**City of Holtville**
**121 West Fifth Street**
**Holtville, California 92250**

Separate sealed BIDS for the construction of the **City of Holtville – Water Treatment Plant Improvements Project** will be received by the **City of Holtville at 121 West Fifth Street, Holtville, California 92250** until **2:00 pm** (prevailing local time) on **Thursday, November 5, 2020,** and then at said office will be publicly opened and read aloud.

Project Description: The City of Holtville's Water Treatment Plant Improvements include the following: Install a shade structure over the clarifier/mix media filters; Replacement of Finish Water Pump Station Motors; Install a baffling system in the 1.5 MG Water Storage Tank; Finish water piping alignment to allow the water storage tanks to operate in series; Rehabilitate the 2.4 MG Water Storage Tank with the addition of a Cathodic Protection System, TTHM System, and recoat of the tank; Replacement of two emergency standby generators; and Electrical and Controls for Automation.

The work is located in the County of Imperial, State of California. Proposals shall conform to the requirements of this Advertisement for Bids, Bidding documents and any addenda thereto issued in advance of the proposal opening date.

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

| | |
|---|---|
| City of Holtville | The Holt Group, Inc. |
| 121 West Fifth Street | 1601 North Imperial Avenue |
| Holtville, CA 92250 | El Centro, CA 92243 |
| Phone: (760) 356-2912 | Phone: (760) 337-3883 |
| Fax: (760) 356-1863 | Fax: (760) 337-5997 |

Copies of the CONTRACT DOCUMENTS may be obtained at the office of **The Holt Group located at 1601 North Imperial Avenue, El Centro, CA 92243** upon the nonrefundable payment of **$100.00** for each set. This includes shipping charges. Technical questions shall be addressed to The Holt Group – El Centro Office.

A **Mandatory** Pre-bid Conference for prospective BIDDERS will be held at **Water Treatment Plant**, located at **180 E Fourth Street, Holtville, California 92250** at **10:00 am** (prevailing local time), on **Thursday, October 1, 2020.** To become a qualified Bidder, all contract documents shall be attained from ***The Holt Group***, and a representative of the Bidder shall be required to attend and sign the official attendance sheet at the **Mandatory** Pre-bid Conference. Due to COVID-19 safety concerns only General Contractors can attend the Pre-bid conference, and only one (1) representative for each General Contractor can attend the Pre-bid meeting. All others are to contact The Holt Group to schedule a site visit at a separate time.

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 A California Contractor's license.

Bid Security: Each Bid must be prepared and submitted in accordance with the Instruction to Bidders and must be accompanied by a bid bond in the amount of 10% of the bid value.

Disadvantage Business Enterprise: This project is subject to Disadvantaged Business Enterprise (DBE) Program requirements in accordance with State of California Drinking Water State Revolving Fund (DWSRF) requirements of this Advertisement for Bids and other documents listed herein. All EPA funded or assisted projects performed in the United States, must comply with the "Good Faith Efforts" described in 40 CFR Part §33.301, and §33.211; whether by a recipient, sub-recipient, contractor, and/ or sub-contractor; for design, construction, equipment, services and supplies. The Contractor is cautioned that whenever possible, posting solicitations for DBE bids or

proposals for a minimum of 30 calendar days before the bid or proposal closing date is required. The Contractor shall carry out applicable requirements of 40 CRF part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the Contractor to carry out these requirements is a material breach of this contract which may result in termination of this contract or other legally available remedies.

The Contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of the contract.

The Contractor acknowledges to and for the benefit of the Purchaser (City of Holtville) and the State of California that it understands the goods and services under this Agreement are being funded with monies made available by the Drinking Water State Revolving Fund and/or Drinking Water State Revolving Fund that have statutory requirements commonly known as "American Iron and Steel;" that requires all of the iron and steel products used in the project to be produced in the United States ("American Iron and Steel Requirement") including iron and steel products provided by the Contractor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the State. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

Davis-Bacon and Related Acts: 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) CA140002, dated 08/08/2014, 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 is 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.

This is a Public Works Project subject to the rate of prevailing wages as established by the California Department of Industrial Relations. Bidders are notified that the higher of either the Davis-Bacon or the State prevailing wage rate shall apply. All contractors and subcontractors who bid or work on a public works project must register and pay an annual fee to the State of California, Department of Industrial Relations (DIR) per SB 854. No contractor or subcontractor may be listed on a bid proposal for a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)]. No contractor or subcontractor may be awarded a contract for public work on a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. All contractors and subcontractors must furnish electronic certified payroll records directly to the Labor Commissioner (aka California Division of Labor Standards Enforcement).

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.)

September 11, 2020 _____

(Date) (Owner's Signature)

# 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: **The Holt Group, 1601 North Imperial Avenue, El Centro, CA 92243, P: (760) 337-3883, F: (760) 337-5997.**

## ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents in the number and for the payment, of **one hundred dollars ($100.00)** may be obtained from the Issuing Office. **The payment is nonrefundable**.

2.02 Complete sets of Bidding Documents must be purchased from ***The Holt Group*** pursuant to the preparation of Bids. The Owner nor the City Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.03 The Owner and the City 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 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.

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

4.01 *Subsurface and Physical Conditions*

A. No reports of exploration and/or tests of subsurface conditions at or contiguous to the Site were used in preparing the Bidding Documents. 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 Conditions*

A. No reports of exploration and/or tests of hazardous environmental conditions at or contiguous to the Site were used in preparing the Bidding Documents. 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 4.01, 4.02, and 4.03 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 General 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 Paragraph 4.01 of the General Conditions, if any; and (2) reports and drawings of Hazardous Environmental Conditions at the Site which have been identified in the Supplementary Conditions as provided in paragraph 4.03 of the General Conditions, if any;

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 Owner 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 Owner 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 Owner written notice of all conflicts, errors, ambiguities, and discrepancies that the Bidder has discovered in Bidding Documents and the written resolutions thereof by the Owner 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 **Mandatory** Pre-bid Conference for prospective BIDDERS will be held at **Water Treatment Plant**, located at **180 E Fourth Street, Holtville, California 92250** at **10:00 am** (prevailing local time), on **Thursday, October 1, 2020.** To become a qualified Bidder, all contract documents shall be attained from ***The Holt Group***, and a representative of the Bidder shall be required to attend and sign the official attendance sheet at the **Mandatory** Pre-bid Conference. Due to COVID-19 safety concerns only General Contractors can attend the Pre-bid conference, and only one (1) representative for each General Contractor can attend the Pre-bid meeting. All others are to contact The Holt Group to schedule a site visit at a separate time.

The City Engineer will transmit to all prospective Bidders of record such Addenda as the City 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 received less than **seven (7) days** prior to the date for opening of Bids may not be answered. 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 City 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) 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 **fifteen (15) 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 TIMES**

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 City Engineer. 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 City Engineer as a substitute unless it conforms to Paragraph 6.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon the Bidder. The City Engineer's decision of approval or disapproval of a proposed item will be final.

**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 City 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 City Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to the Owner and the City Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.07 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 General Conditions 6.07.

**ARTICLE 13 - PREPARATION OF BID**

13.01 The Bid Form is included with the Bidding Documents. Additional copies may be obtained from City 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 From. 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 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 "A" 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/or Lump Sum

A. Bidders shall submit a Bid on a unit price basis or lump sum for each item of Work listed in the Schedule of Values.

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 or the sum of each bid items lump sum value. 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 Owner at the address in Article 1.01 of the Bid Form.

**Project Title: City of Holtville – Water Treatment Plant Improvement Project**

**Owner's Address: 121 West Fifth Street, Holtville, California 92250**

## 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 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 **fifteen (15) days** thereafter, 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 "Conformed" Specifications and Conceptual Drawings with appropriate identification.**

21.02 This Contract is expected to be funded in part with funds provided by the State of California Drinking Water State Revolving Fund (DWSRF) and Federally Funded Resources.

21.03 Concurrence by the State Water Resources Control Board in the award of the contract is required before the contract is effective.

## ARTICLE 22 - SALES AND USE TAXES

22.01 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."

## 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 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 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 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 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 – SWRCB REQUIREMENTS

25.01 Bidders are to base their bids on the project funding being provided in whole or in part by the State Water Resources Control Board 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."

25.03 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.

## 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 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 2019-2 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).

**Prevailing Wage Rates are as follows to this page.**

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

## CRAFT: ASBESTOS AND LEAD ABATEMENT (LABORER)

**DETERMINATION**: SC-102-882-1-2019-1
**ISSUE DATE**: February 22, 2019
**EXPIRATION DATE OF DETERMINATION**: February 29, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY**: All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara and Ventura Counties

| | | Employer Payments | | | | | Straight-Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Classification (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension | Vacation/ Holiday[a] | Training | Other[b] | Hours | Total Hourly Rate | Daily 1 1/2X | Saturday[c] 1 1/2X | Sunday/ Holiday 2X |
| Asbestos and Lead Abatement Worker | $34.69 | 7.32 | 8.03 | 4.84 | 0.75 | 0.49 | 8 | $56.12 | $73.465 | $73.465 | $90.81 |

[a] Includes an amount for supplemental dues.
[b] Includes amounts for Center for Contract Compliance, Contract Administration Fund, Industry Fund, and Laborers' Trust Administrative Trust Fund.
[c] Saturdays in the same work week may be worked at straight-time if the job is shut down during the normal work week due to inclement weather, or reasons beyond the control of the employer.

**NOTE:** Asbestos Abatement must be trained and the work conducted according to the Code of Federal Regulations 29 CFR 1926.58, the California Labor Code 6501.5 and the California Code of Regulations Title 8, Section 5208. Contractors must be certified by the Contractors' State License Board and registered with the Division of Occupational Safety and Health (DOSH). For further information, contact the Asbestos Contractors Abatement Registration Unit, DOSH at (916) 574-2993.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director - Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the Travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or Subsistence provisions for current or superseded determinations may be obtained by contacting the Office of the Director - Research Unit at (415) 703-4774.

**STATE OF CALIFORNIA** Gavin Newsom, *Governor*

DEPARTMENT OF INDUSTRIAL RELATIONS
Office of the Director – Research Unit
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

*MAILING ADDRESS:*
*P. O. Box 420603*
*San Francisco, CA 94142-0603*

PREDETERMINED INCREASE FOR

# ASBESTOS AND LEAD ABATEMENT (LABORER) (SC-102-882-1-2019-1)

IN ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN DIEGO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

This predetermined increase for the above named craft applies only to the above referenced determination for work being performed on public works projects with bid advertisement dates on or after **March 4, 2019** until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination that was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

**ASBESTOS AND LEAD ABATEMENT WORKER (LABORER)**
Determination SC-102-882-1-2019-1 is currently in effect and expires on February 29, 2020**.

**Effective March 1, 2020,** there will be an increase of $2.86 to be allocated to wages and/or fringe benefits.
**Effective March 1, 2021,** there will be an increase of $2.91 to be allocated to wages and/or fringe benefits.

There will be no further increases applicable to this determination.

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Issued 2/22/2019, Effective 3/4/2019 until superseded.

This page will be updated when wage rate breakdown becomes available
**Last Updated**: March 4, 2019.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

## CRAFT: #BUILDING/CONSTRUCTION INSPECTOR AND FIELD SOILS AND MATERIAL TESTER

**DETERMINATION:** SC-23-63-2-2019-1D
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

| | | Employer Payments | | | | | Straight – Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASSIFICATION (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension (d) | Vacation/ Holiday (a) | Training | Other Payments | Hours | Total Hourly Rate | Daily (b) | Saturday (c) | Sunday/ Holiday |
| | | | | | | | | | 1 1/2X | 1 1/2X | 2X |
| Classification Groups | | | | | | | | | | | |
| Group 1 | $47.83 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $75.57 | $99.485 | $99.485 | $123.40 |
| Group 2 | $49.61 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.35 | $102.155 | $102.155 | $126.96 |
| Group 3 | $51.61 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.35 | $105.155 | $105.155 | $130.96 |

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Includes an amount withheld for supplemental dues.

[b] Rate applies to the first 4 overtime hours. All other daily overtime is paid at the Sunday rate.

[c] Rate applies to the first 12 hours worked. All other time is paid at the Sunday rate.

[d] Includes an amount for Annuity

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TTRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**CLASSIFICATIONS:**

**GROUP I**
Field Soils and Materials Tester
Field Asphaltic Concrete (Soils and Materials Tester)
Field Earthwork (Grading Excavation and Filling)
Roof Inspector
Water Proofer

**GROUP II**
AWS-CWI Welding Inspector
Building / Construction Inspector
Licensed Grading Inspector
Reinforcing Steel
Reinforced Concrete
Pre-Tension Concrete
Post-Tension Concrete
Structural Steel and Welding Inspector
Glue-Lam and truss Joints
Truss-Type Joint Construction
Shear Wall and Floor System used as diaphragms
Concrete batch Plant
Spray-Applied Fireproofing
Structural masonry

**Group III**
Nondestructive Testing (NDT)

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

## CRAFT: #BUILDING/CONSTRUCTION INSPECTOR AND FIELD SOILS AND MATERIAL TESTER (SPECIAL SHIFT)

**DETERMINATION:** SC-23-63-2-2019-1D1
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

| | | Employer Payments | | | | | Straight – Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASSIFICATION (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension (d) | Vacation/ Holiday (a) | Training | Other Payments | Hours | Total Hourly Rate | Daily (b) 1 1/2X | Saturday (c) 1 1/2X | Sunday/ Holiday 2X |
| Classification Groups | | | | | | | | | | | |
| Group 1 | $48.33 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $76.07 | $100.235 | $100.235 | $124.40 |
| Group 2 | $50.11 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.85 | $102.905 | $102.905 | $127.96 |
| Group 3 | $52.11 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.85 | $105.905 | $105.905 | $131.96 |

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Includes an amount withheld for supplemental dues.

[b] Rate applies to the first 4 overtime hours. All other daily overtime is paid at the Sunday rate.

[c] Rate applies to the first 12 hours worked. All other time is paid at the Sunday rate.

[d] Includes an amount for Annuity

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**CLASSIFICATIONS:**

**GROUP I**
Field Soils and Materials Tester
Field Asphaltic Concrete (Soils and Materials Tester)
Field Earthwork (Grading Excavation and Filling)
Roof Inspector
Water Proofer

**GROUP II**
AWS-CWI Welding Inspector
Building / Construction Inspector
Licensed Grading Inspector
Reinforcing Steel
Reinforced Concrete
Pre-Tension Concrete
Post-Tension Concrete
Structural Steel and Welding Inspector
Glue-Lam and truss Joints
Truss-Type Joint Construction
Shear Wall and Floor System used as diaphragms
Concrete batch Plant
Spray-Applied Fireproofing
Structural masonry

**Group III**
Nondestructive Testing (NDT)

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

## CRAFT: #BUILDING/CONSTRUCTION INSPECTOR AND FIELD SOILS AND MATERIAL TESTER (MULTI-SHIFT)

**DETERMINATION:** SC-23-63-2-2019-1D2
**Issue Date:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

| | | Employer Payments | | | | | Straight – Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASSIFICATION (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension (e ) | Vacation/ Holiday (a) | Training | Other Payments | Hours (d) | Total Hourly Rate | Daily (b) 1 1/2X | Saturday (c) 1 1/2X | Sunday/ Holiday 2X |
| Classification Groups | | | | | | | | | | | |
| Group 1 | $48.83 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $76.57 | $100.985 | $100.985 | $125.40 |
| Group 2 | $50.61 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.35 | $103.655 | $103.655 | $128.96 |
| Group 3 | $52.61 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $80.35 | $106.655 | $106.655 | $132.96 |

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Includes an amount withheld for supplemental dues.

[b] Rate applies to the first 4 overtime hours. All other daily overtime is paid at the Sunday rate.

[c] Rate applies to the first 12 hours worked. All other time is paid at the Sunday rate.

[d] The Third Shift shall work 6.5 hours, exclusive of meal period, for which 8 hours straight-time shall be paid at the non-shift rate, Monday thorugh Friday.

[e] Includes an amount for Annuity

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**CLASSIFICATIONS:**

**GROUP I**
Field Soils and Materials Tester
Field Asphaltic Concrete (Soils and Materials Tester)
Field Earthwork (Grading Excavation and Filling)
Roof Inspector
Water Proofer

**GROUP II**
AWS-CWI Welding Inspector
Building / Construction Inspector
Licensed Grading Inspector
Reinforcing Steel
Reinforced Concrete
Pre-Tension Concrete
Post-Tension Concrete
Structural Steel and Welding Inspector
Glue-Lam and truss Joints
Truss-Type Joint Construction
Shear Wall and Floor System used as diaphragms
Concrete batch Plant
Spray-Applied Fireproofing
Structural masonry

**Group III**
Nondestructive Testing (NDT)

**STATE OF CALIFORNIA** Gavin Newsom, *Governor*

DEPARTMENT OF INDUSTRIAL RELATIONS
Office of the Director – Research Unit
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

*MAILING ADDRESS:*
*P. O. Box 420603*
*San Francisco, CA 94142-0603*

PREDETERMINED INCREASES FOR

**OPERATING ENGINEER (SC-23-63-2-2019-2)**
**OPERATING ENGINEER (MULTI-SHIFT) (SC-23-63-2-2019-2)**
**OPERATING ENGINEER (SPECIAL SHIFT) (SC-23-63-2-2019-2)**

**CRANES, PILE DRIVER AND HOISTING EQUIPMENT (OPERATING ENGINEER) (SC-23-63-2-2019-1B)**

**CRANES, PILE DRIVER AND HOISTING EQUIPMENT (OPERATING ENGINEER, SPECIAL SHIFT) (SC-23-63-2-2019-1B1)**

**CRANES, PILE DRIVER AND HOISTING EQUIPMENT (OPERATING ENGINEER, MULTI-SHIFT) (SC-23-63-2-2019-1B2)**

**TUNNEL (OPERATING ENGINEER) (SC-23-63-2-2019-1C)**

**TUNNEL (OPERATING ENGINEER) (SC-23-63-2-2019-1C1) (MULTI-SHIFT)**

**BUILDING/CONSTRUCTION INSPECTOR, FIELD SOILS AND MATERIAL TESTER, AND NON-DESTRUCTIVE TESTING (SC-23-63-2-2019-1D)**

**BUILDING/CONSTRUCTION INSPECTOR, FIELD SOILS AND MATERIAL TESTER, AND NON-DESTRUCTIVE TESTING (SPECIAL SHIFT) (SC-23-63-2-2019-1D1)**

**BUILDING/CONSTRUCTION INSPECTOR, FIELD SOILS AND MATERIAL TESTER, AND NON-DESTRUCTIVE TESTING (MULTI-SHIFT) (SC-23-63-2-2019-1D2)**

ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

These predetermined increases for the above named crafts apply only to the current determinations for work being performed on public works projects with bid advertisement dates on or after **September 1, 2019,** until the determination(s) is/are superseded by a new determination(s) or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination which was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

**OPERATING ENGINEER: All Classifications and All Shifts**

The above Determinations are currently in effect and will expire on June 30, 2020**.

**Effective on July 1, 2020,** there will be an increase of $2.45 to be allocated to wages and/or fringes.
**Effective on July 1, 2021,** there will be an increase of $2.45 to be allocated to wages and/or fringes.

There will be no further increases applicable to these determinations.

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Issued 8/22/2019, Effective 9/1/2019 until superseded.
This page will be updated when wage rate breakdown information becomes available.
**Last Updated:** September 1, 2019

**CRAFT: # CARPENTER AND RELATED TRADES**

**DETERMINATION**: SC-23-31-2-2019-1
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION**: June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director - Research Unit for specific rates at (415) 703-4774.
**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

| | | Employer Payments | | | | | Straight-Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Classification (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension | Vacation/ Holiday | Training | Other | Hours | Total Hourly Rate | Daily [g] 1 1/2X | Saturday [b] 1 1/2X | Sunday and Holiday |
| **[a] AREA 1** | | | | | | | | | | | |
| Carpenter[c, h], Cabinet Installer, Insulation Installer, Hardwood Floor Worker, Acoustical Installer | $43.33 | $7.75 | $5.16 | $7.02[f] | $0.62 | $0.44 | 8 | $64.32 | $85.985 | $85.985 | $107.65 |
| Pile Driverman [i], Derrick Bargeman, Rockslinger, Bridge or Dock Carpenter, Cable Splicer | 43.46 | 7.75 | 5.16 | 7.02[f] | 0.57 | 0.49 | 8 | 64.45 | 86.18 | 86.18 | 107.91 |
| Bridge Carpenter[c] | 43.46 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 64.45 | 86.18 | 86.18 | 107.91 |
| Shingler[c] | 43.46 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 64.45 | 86.18 | 86.18 | 107.91 |
| Saw Filer | 43.42 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 64.41 | 86.12 | 86.12 | 107.83 |
| Table Power Saw Operator | 43.43 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 64.42 | 86.135 | 86.135 | 107.85 |
| Pneumatic Nailer or Power Stapler | 43.58 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 64.57 | 86.36 | 86.36 | 108.15 |
| Roof Loader of Shingles | 30.70 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 51.69 | 67.04 | 67.04 | 82.39 |
| Scaffold Builder | 34.53 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 55.52 | 72.785 | 72.785 | 90.05 |
| Millwright[c] | 43.83 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.64 | 8 | 65.02 | 86.935 | 86.935 | 108.85 |
| Head Rockslinger | 43.56 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 64.55 | 86.33 | 86.33 | 108.11 |
| Rock Bargeman or Scowman | 43.36 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 64.35 | 86.03 | 86.03 | 107.71 |
| Diver, Wet (Up To 50 Ft. Depth) [d] | [e]94.92 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 115.91 | 163.37 | 163.37 | 210.83 |
| Diver, (Stand-By) [d] | [e]47.46 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 68.45 | 92.18 | 92.18 | 115.91 |
| Diver's Tender [d] | 46.46 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 67.45 | 90.68 | 90.68 | 113.91 |
| Assistant Tender (Diver's) [d] | 43.46 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 64.45 | 86.18 | 86.18 | 107.91 |
| **[a] AREA 2** | | | | | | | | | | | |
| Carpenter[c h], Cabinet Installer, Insulation Installer, Hardwood Floor Worker, Acoustical Installer | 42.76 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 63.75 | 85.13 | 85.13 | 106.51 |
| Shingler[c] | 42.90 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 63.89 | 85.34 | 85.34 | 106.79 |
| Saw Filer | 42.76 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 63.75 | 85.13 | 85.13 | 106.51 |
| Table Power Saw Operator | 43.86 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 64.85 | 86.78 | 86.78 | 108.71 |
| Pneumatic Nailer or Power Stapler | 43.02 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 64.01 | 85.52 | 85.52 | 107.03 |
| Roof Loader of Shingles | 30.65 | 7.75 | 5.16 | 7.02[f] | 0.62 | 0.44 | 8 | 51.64 | 66.965 | 66.965 | 82.29 |

**DETERMINATION**: SC-31-741-1-2019-1
**ISSUE DATE**: August 22, 2019
**EXPIRATION DATE OF DETERMINATION**: May 31, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director - Research Unit for specific rates at (415) 703-4774.
**LOCALITY**: All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

| | | Employer Payments | | | | Straight-Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Classification (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension | Vacation and Holiday | Training | Hours | Total Hourly Rate | Daily 1 1/2X | Saturday/ [j] 1 1/2X | Holiday 2X |
| Terrazzo Installer | $40.03 | 7.75 | 5.16 | 4.55[f] | 0.57 | 8 | 58.06 | 78.075 | 78.075 | 98.09 |
| Terrazzo Finisher | 33.53 | 7.75 | 5.16 | 4.55[f] | 0.57 | 8 | 51.56 | 68.325 | 68.325 | 85.09 |

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

a. **AREA 1** - Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara and Ventura counties.
**AREA 2** - Inyo, Kern, and Mono counties. For Bridge Carpenter, Scaffold Builder, Pile Driverman, Derrick Bargeman, Rockslinger, Bridge or Dock Carpenter, Cable Splicer, Millwright, Head Rockslinger, Rock Bargeman or Scowman, Diver, Wet (Up to 50 Ft. Depth), Diver (Stand-By), Diver's Tender, and Assistant Tender (Diver's) rates, please see **Area 1** as this rate applies to **Area 2** as well. Basic Hourly Rates for **Area 2** include an additional amount deducted for vacation/holiday.
b. First eight (8) hours worked paid at 1 1/2 times the straight time rate, all hours after that paid at double (2x) the straight time rate. Saturdays in the same work week may be worked at straight-time rates if a job is shut down during the normal work week due to inclement weather, major mechanical breakdown or lack of materials beyond the control of the Employer.
c. When performing welding work requiring certification, classification will receive an additional $1.00 per hour.
d. Shall receive a minimum of 8 hours pay for any day or part thereof.
e. For specific rates over 50 ft depth, contact the Office of the Director – Research Unit. Rates for Technicians, Manifold Operators, Pressurized Submersible Operators, Remote Control Vehicle Operators, and Remote Operated Vehicle Operators, as well as rates for Pressurized Bell Diving and Saturation Diving are available upon request.
f. Includes an amount for supplemental dues.
g. All overtime worked Mon - Fri shall be paid at 1 1/2 times the straight time rate for the first four (4) hours and double (2x) the straight time for work performed after twelve (12) hours.
h. A Carpenter who performs work of forming in the construction of open cut sewers or storm drains shall receive a premium of thirteen cents ($0.13) per hour in addition to his Carpenter's scale. This premium shall apply only on an operation 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 pile drivers.
i. When performing welding work requiring certification, classification will receive an additional $1.00 per hour. An additional $0.50 per hour when handling or working with new pressure-treated creosote piling or timber, or driving of used pressure-treated creosote piling.
j. Saturdays in the same work week may be worked at straight-time rates if a job is shut down during the normal work week due to inclement weather, major mechanical breakdown or lack of materials beyond the control of the Employer. Work on Sunday, if it is the 7th consecutive workday, shall be paid at double (2x) the straight-time rate.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**STATE OF CALIFORNIA** Gavin Newsom, *Governor*

DEPARTMENT OF INDUSTRIAL RELATIONS
Office of the Director – Research Unit
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

*MAILING ADDRESS:*
*P. O. Box 420603*
*San Francisco, CA 94142-0603*

PREDETERMINED INCREASE FOR

# CARPENTER AND RELATED TRADES
# (SC-23-31-2-2019-1)

IN ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

This predetermined increase for the above named craft applies only to the current determination for work being performed on public works projects with bid advertisement dates on or after **September 1, 2019,** until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination which was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

**CARPENTER: All classifications:**
Determination SC-23-31-2-2019-1 is currently in effect and expires on June 30, 2020**.

**Effective on July 1, 2020,** there will be an increase of $2.00 to be allocated to wages and/or employer payments.

**Effective on July 1, 2021,** there will be an increase of $2.00 to be allocated to wages and/or employer payments.

There will be no further increases applicable to this determination.

Issued 8/22/2019, Effective 9/1/2019 until superseded.

This page will be updated when wage rate breakdown becomes available.
**Last Updated:** September 1, 2019.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: # CEMENT MASON**

**DETERMINATION:** SC-23-203-2-2019-1
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION**: June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director - Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura Counties.

| | | Employer Payments | | | | | Straight-Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASSIFICATION (JOURNEYPERSON) | Basic Hourly Rate | Health and Welfare | Pension | Vacation/ Holiday | Training | Other Payments | Hours | Total Hourly Rate | Daily 1 1/2X | Saturday[a] 1 1/2X | Sunday/ Holiday 2X |
| Cement Mason, Curb and Gutter Machine Operator; Clary and Similar Type of Screed Operator (Cement only); Grinding Machine Operator (all types); Jackson Vibratory, Texas Screed and Similar Type Screed Operator; Scoring Machine Operator | $37.00 | 8.17 | 9.68 | 7.04[b] | 0.64 | 0.27 | 8 | 62.80 | 81.30[c] | 81.30[c] | 99.80 |
| Magnesite, magnesite-terrazzo and mastic composition, Epoxy,. Urethanes and exotic coatings, Dex-O-Tex | $37.12 | 8.17 | 9.68 | 7.04[b] | 0.64 | 0.27 | 8 | 62.92 | 81.48[c] | 81.48[c] | 100.04 |
| Floating and Troweling Machine Operator | $37.25 | 8.17 | 9.68 | 7.04[b] | 0.64 | 0.27 | 8 | 63.05 | 81.675[c] | 81.675[c] | 100.30 |

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Saturday in the same work week may be worked at straight-time rate, up to 8 hours on Saturday or when the employee has worked a total of 40 hours in the work week, if it is not reasonably possible for any individual employee on a particular job site to complete 40 hours of work on a 8 hour day, Monday through Friday, due to inclement weather or similar act of God or a situation beyond the control of the contractor.

[b] Includes an amount for supplemental dues.

[c] Rate applies to the first 4 daily overtime hours and the first 12 hours worked on Saturday. All other time is paid at the double time (2X) rate.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

STATE OF CALIFORNIA GAVIN NEWSOM., *Governor*
DEPARTMENT OF INDUSTRIAL RELATIONS
Office of the Director – Research Unit
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

ADDRESS REPLY TO:
*P.O. Box 420603*
*San Francisco CA 94142-0603*

PREDETERMINED INCREASE FOR

# CEMENT MASON
# (SC-23-203-2-2019-1)

IN ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

This predetermined increase for the above named craft applies only to the current determination for work being performed on public works projects with bid advertisement dates on or after **September 1, 2019**, until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination which was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

**Cement Mason**
Determination SC-23-203-2-2019-1 is currently in effect and expires on June 30, 2020**.

**Effective on July 1, 2020**, there will be an increase of $1.85 allocated as follows: $0.15 to Pension, and $1.70 to Wages and/or fringes.

There will be no further increases applicable to this determination.

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Issued 8/22/2019, Effective 9/1/2019.

This page will be updated when wage rate breakdown information becomes available.
**Last Updated:** September 1, 2019

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: #Cranes, Pile Driver and Hoisting Equipment (Operating Engineer)**

**DETERMINATION:** SC-23-63-2-2019-1B
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

| | | Employer Payments | | | | | Straight – Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASSIFICATION (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension (e ) | Vacation/ Holiday (a) | Training | Other Payments | Hours | Total Hourly Rate | Daily (c ) | Saturday (d) | Sunday/ Holiday |
| | | | | | | | | | 1 1/2X | 1 1/2X | 2X |
| Classification Groups (b) | | | | | | | | | | | |
| Group 1 | $48.40 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $76.14 | $100.340 | $100.340 | $124.54 |
| Group 2 | $49.18 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $76.92 | $101.510 | $101.510 | $126.10 |
| Group 3 | $49.47 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.21 | $101.945 | $101.945 | $126.68 |
| Group 4 | $49.61 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.35 | $102.155 | $102.155 | $126.96 |
| Group 5 | $49.83 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.57 | $102.485 | $102.485 | $127.40 |
| Group 6 | $49.94 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.68 | $102.650 | $102.650 | $127.62 |
| Group 7 | $50.06 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.80 | $102.830 | $102.830 | $127.86 |
| Group 8 | $50.23 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.97 | $103.085 | $103.085 | $128.20 |
| Group 9 | $50.40 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.14 | $103.340 | $103.340 | $128.54 |
| Group 10 | $51.40 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.14 | $104.840 | $104.840 | $130.54 |
| Group 11 | $52.40 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $80.14 | $106.340 | $106.340 | $132.54 |
| Group 12 | $53.40 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $81.14 | $107.840 | $107.840 | $134.54 |
| Group 13 | $54.40 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $82.14 | $109.340 | $109.340 | $136.54 |

• # Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Includes an amount withheld for supplemental dues.

[b] For classifications within each group, see page 10B.

[c] Rate applies to the first 4 overtime hours. All other daily overtime is paid at the Sunday rate.

[d] Rate applies to the first 12 hours worked. All other time is paid at the Sunday rate.

[e] Includes an amount for Annuity

**NOTE**: For Special Shift and Multi-Shift, see pages 10A-1 and 10A-2.

**RECOGNIZED HOLIDAYS**: Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT**: In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**Determination: SC-23-63-2-2019-1B; SC-23-63-2-2019-1B1; SC-23-63-2-2019-1B2**

**CLASSIFICATIONS:**

**GROUP 1**

Engineer Oiler

**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
Snobble Unit (pin-n-go or similar type)

**GROUP 5**

Hydraulic Boom Truck/Knuckleboom
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
Prentice Self-Loader
Self Climbing Scaffold (or similar type)
Shovel, Dragline, Clamshell Operator (over 3/4 yd and up to 5 cu yds, M.R.C.)
Silent Piler
Tugger Hoist Operator (2 drum)

**GROUP 7**

Pedestal Crane Operator
Shovel, Dragline, Clamshell Operator (over 5 cu yds, M.R.C.)
Tower Crane Repairman
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, Dragline, Clamshell Operator (over 7 cu yds M.R.C.)

**GROUP 9**

Crane Operator (over 25 tons, up to and including 50 ton M.R.C.)
Derrick Barge Operator (over 25 tons, up to and including 50 ton M.R.C.)
Highline Cableway Operator
Hoist Operator, Stiff Legs, Guy Derrick or similar type (over 25 tons, up to and including 50 ton M.R.C.)
K-Crane
Polar Crane Operator
Self Erecting Tower Crane Operator Maximum Lifting Capacity ten (10) tons.

**GROUP 10**

ABI/Fundex Machine
Crane Operator (over 50 tons, up to and including 100 ton M.R.C.)
Derrick Barge Operator (over 50 tons, up to and including 100 ton M.R.C.)
Hoist Operator, Stiff Legs, Guy Derrick or similar type (over 50 tons, up to and including 100 ton M.R.C.)
Mobile Tower Crane Operator (over 50 tons, up to and including 100 ton M.R.C.)
Shovel, Dragline, Clamshell Operator (over 10 cu. yrds.)

**GROUP 11**

Crane Operator (over 100 tons, up to and including 200 ton M.R.C.)
Derrick Barge Operator (over 100 tons, up to and including 200 tons M.R.C.)
Hoist Operator, Stiff Legs, Guy Derrick or similar type (over 100 tons, up to and including 200 ton M.R.C.)
Mobile Tower Crane Operator (over 100 tons, up to and including 200 ton M.R.C.)
Tower Crane Operator and Tower Gantry

**GROUP 12**

Crane Operator (over 200 tons, up to and including 300 tons M.R.C.)
Derrick Barge Operator (over 200 tons, up to and including 300 tons M.R.C.)
Hoist Operator, Stiff Legs, Guy Derrick or similar type (over 200 tons, up to and including 300 ton M.R.C.)
Mobile Tower Crane Operator (over 200 tons, up to and including 300 ton M.R.C.)

**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)
Hydraulically Controlled Lift Gantry Operator BCR Lift System (over 300 tons)
Mobile Tower Crane Operator (over 300 tons)

## MISCELLANEOUS PROVISIONS:

1. Operators on hoists with three drums shall receive fifteen cents (15¢) per hour additional pay to the regular rate of pay. The additional pay shall be added to the regular rate and become the base rate for the entire shift.

2. All heavy duty repairman and heavy duty combination shall receive one dollar ($1.00) per hour tool allowance in addition to their regular rate of pay and this shall become their base rate of pay.

3. Employees required to suit up and work in a hazardous material environment, shall receive Two Dollars ($2.00) per hour in addition to their regular rate of pay, and that rate shall become the basic hourly rate of pay.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

## CRAFT: #Cranes, Pile Driver and Hoisting Equipment (Operating Engineer, Special Shift)

**DETERMINATION:** SC-23-63-2-2019-1B1
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

| | | Employer Payments | | | | | Straight – Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASSIFICATION (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension (e ) | Vacation/ Holiday (a) | Training | Other Payments | Hours | Total Hourly Rate | Daily (c ) 1 1/2X | Saturday (d) 1 1/2X | Sunday/ Holiday 2X |
| Classification Groups (b) | | | | | | | | | | | |
| Group 1 | $48.90 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $76.64 | $101.090 | $101.090 | $125.54 |
| Group 2 | $49.68 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.42 | $102.260 | $102.260 | $127.10 |
| Group 3 | $49.97 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.71 | $102.695 | $102.695 | $127.68 |
| Group 4 | $50.11 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.85 | $102.905 | $102.905 | $127.96 |
| Group 5 | $50.33 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.07 | $103.235 | $103.235 | $128.40 |
| Group 6 | $50.44 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.18 | $103.400 | $103.400 | $128.62 |
| Group 7 | $50.56 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.30 | $103.580 | $103.580 | $128.86 |
| Group 8 | $50.73 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.47 | $103.835 | $103.835 | $129.20 |
| Group 9 | $50.90 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.64 | $104.090 | $104.090 | $129.54 |
| Group 10 | $51.90 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.64 | $105.590 | $105.590 | $131.54 |
| Group 11 | $52.90 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $80.64 | $107.090 | $107.090 | $133.54 |
| Group 12 | $53.90 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $81.64 | $108.590 | $108.590 | $135.54 |
| Group 13 | $54.90 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $82.64 | $110.090 | $110.090 | $137.54 |

• # Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Includes an amount withheld for supplemental dues.

[b] For classifications within each group, see page 10B.

[c] Rate applies to the first 4 overtime hours. All other daily overtime is paid at the Sunday rate.

[d] Rate applies to the first 12 hours worked. All other time is paid at the Sunday rate.

[e] Includes an amount for Annuity

**RECOGNIZED HOLIDAYS**: Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT**: In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: #Cranes, Pile Driver and Hoisting Equipment (Operating Engineer, Multi-Shift)**

**DETERMINATION:** SC-23-63-2-2019-1B2
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

| | | Employer Payments | | | | | Straight – Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASSIFICATION (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension (f) | Vacation/ Holiday (a) | Training | Other Payments | Hours (e) | Total Hourly Rate | Daily (c ) 1 1/2X | Saturday (d) 1 1/2X | Sunday/ Holiday 2X |
| Classification Groups (b) | | | | | | | | | | | |
| Group 1 | $49.40 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.14 | $101.840 | $101.840 | $126.54 |
| Group 2 | $50.18 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.92 | $103.010 | $103.010 | $128.10 |
| Group 3 | $50.47 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.21 | $103.445 | $103.445 | $128.68 |
| Group 4 | $50.61 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.35 | $103.655 | $103.655 | $128.96 |
| Group 5 | $50.83 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.57 | $103.985 | $103.985 | $129.40 |
| Group 6 | $50.94 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.68 | $104.150 | $104.150 | $129.62 |
| Group 7 | $51.06 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.80 | $104.330 | $104.330 | $129.86 |
| Group 8 | $51.23 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.97 | $104.585 | $104.585 | $130.20 |
| Group 9 | $51.40 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.14 | $104.840 | $104.840 | $130.54 |
| Group 10 | $52.40 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $80.14 | $106.340 | $106.340 | $132.54 |
| Group 11 | $53.40 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $81.14 | $107.840 | $107.840 | $134.54 |
| Group 12 | $54.40 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $82.14 | $109.340 | $109.340 | $136.54 |
| Group 13 | $55.40 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $83.14 | $110.840 | $110.840 | $138.54 |

• # Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Includes an amount withheld for supplemental dues.

[b] For classifications within each group, see page 10B.

[c] Rate applies to the first 4 overtime hours. All other daily overtime is paid at the Sunday rate.

[d] Rate applies to the first 12 hours worked. All other time is paid at the Sunday rate.

[e] The Third Shift shall work 6.5 hours, exclusive of meal period, for which 8 hours straight-time shall be paid at the non-shift rate, Monday thorugh Friday.

[f] Includes an amount for Annuity

**RECOGNIZED HOLIDAYS**: Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT**: In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**STATE OF CALIFORNIA** Gavin Newsom, *Governor*

DEPARTMENT OF INDUSTRIAL RELATIONS
Office of the Director – Research Unit
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

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*P. O. Box 420603*
*San Francisco, CA 94142-0603*

PREDETERMINED INCREASES FOR

**OPERATING ENGINEER (SC-23-63-2-2019-2)**
**OPERATING ENGINEER (MULTI-SHIFT) (SC-23-63-2-2019-2)**
**OPERATING ENGINEER (SPECIAL SHIFT) (SC-23-63-2-2019-2)**

**CRANES, PILE DRIVER AND HOISTING EQUIPMENT (OPERATING ENGINEER) (SC-23-63-2-2019-1B)**

**CRANES, PILE DRIVER AND HOISTING EQUIPMENT (OPERATING ENGINEER, SPECIAL SHIFT) (SC-23-63-2-2019-1B1)**

**CRANES, PILE DRIVER AND HOISTING EQUIPMENT (OPERATING ENGINEER, MULTI-SHIFT) (SC-23-63-2-2019-1B2)**

**TUNNEL (OPERATING ENGINEER) (SC-23-63-2-2019-1C)**

**TUNNEL (OPERATING ENGINEER) (SC-23-63-2-2019-1C1) (MULTI-SHIFT)**

**BUILDING/CONSTRUCTION INSPECTOR, FIELD SOILS AND MATERIAL TESTER, AND NON-DESTRUCTIVE TESTING (SC-23-63-2-2019-1D)**

**BUILDING/CONSTRUCTION INSPECTOR, FIELD SOILS AND MATERIAL TESTER, AND NON-DESTRUCTIVE TESTING (SPECIAL SHIFT) (SC-23-63-2-2019-1D1)**

**BUILDING/CONSTRUCTION INSPECTOR, FIELD SOILS AND MATERIAL TESTER, AND NON-DESTRUCTIVE TESTING (MULTI-SHIFT) (SC-23-63-2-2019-1D2)**

ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

These predetermined increases for the above named crafts apply only to the current determinations for work being performed on public works projects with bid advertisement dates on or after **September 1, 2019,** until the determination(s) is/are superseded by a new determination(s) or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination which was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

**OPERATING ENGINEER: All Classifications and All Shifts**

The above Determinations are currently in effect and will expire on June 30, 2020**.

**Effective on July 1, 2020,** there will be an increase of $2.45 to be allocated to wages and/or fringes.
**Effective on July 1, 2021,** there will be an increase of $2.45 to be allocated to wages and/or fringes.

There will be no further increases applicable to these determinations.

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Issued 8/22/2019, Effective 9/1/2019 until superseded.
This page will be updated when wage rate breakdown information becomes available.
**Last Updated:** September 1, 2019

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1 FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

## CRAFT: DRIVER (ON/OFF-HAULING TO/FROM CONSTRUCTION SITE)

**Determination:** C-DT-830-261-10-2016-1
**Issue Date:** August 22, 2016
**Expiration date of determination:** September 30, 2016* Effective until superseded by a new determination issued by the Director of Industrial Relations. Contact the Division of Labor Statistics and Research at (415) 703-4774 for the new rates after 10 days from the expiration date, if no subsequent determination is issued.
**Localities:** All localities within Imperial, Inyo, Los Angeles, Mono, Orange, Riverside, San Bernardino and San Diego Counties.

| | | Employer Payments | | | | | Straight-Time | | Overtime Hourly Rate | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Classification** | Basic Hourly Rate | Health And Welfare[a] | Pension | Vacation And Holiday[b] | Training | Other | Hours | Total Hourly Rate | Daily (1½ X)[c] | Sunday/ Holiday (1½ X) |
| Driver: Dump Truck | $17.00 | $2.05 | $0.085 | $0.33 | - | - | 8.0 | $19.465 | $27.965 | $27.965 |

[a] The contribution applies to all work up to $355.00 per month.
[b] $0.65 after 2 years of service
$0.98 after 5 years of service
$1.31 after 9 years of service
[c] Rate applies to work in excess of eight (8) hours daily and forty (40) hours weekly.
*There is no predetermined increase applicable to this determination.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Holiday provisions for current or superseded determinations may be obtained by contacting the Prevailing Wage Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence requirements for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Prevailing Wage Unit at (415) 703-4774.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1 FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: FENCE BUILDER (CARPENTER)**

**DETERMINATION:** SC-23-31-20-2019-1
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.
**LOCALITY**: All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura counties.

| | | Employer Payments | | | | | Straight-Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Classification (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension | Vacation and Holiday | Training | Other | Hours | Total Hourly Rate | Daily 1 1/2X[a] | Saturday[b] 1 1/2X | Sunday and Holiday |
| Fence Builder | $39.23 | $7.75 | $5.00 | $6.02 | $0.62 | $0.26 | 8 | $58.88 | $78.495 | $78.495 | $98.11 |

[a]Rate applies to the first 4 overtime hours. All other time is paid at the Sunday and Holiday overtime hourly rate.
[b]Saturdays in the same work week may be worked at straight-time for the first 8 hours if the job is shut down during the normal work week due to inclement weather, or reasons beyond the control of the employer.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**STATE OF CALIFORNIA** Gavin Newsom, *Governor*

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*P. O. Box 420603*
*San Francisco, CA 94142-0603*

PREDETERMINED INCREASE FOR

# FENCE BUILDER (CARPENTER)

IN ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN DIEGO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

This predetermined increase for the above named craft applies only to the above referenced determination for work being performed on public works projects with bid advertisement dates on or after September 1, 2019, until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination that was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

**FENCE BUILDER (CARPENTER)**
Determination SC-23-31-20-2019-1 is currently in effect and expires on June 30, 2020**.

**Effective on July 1, 2020,** there was an increase of $2.10 to be allocated to wages and/or fringes.

**Effective on July 1, 2021,** there was an increase of $2.15 to be allocated to wages and/or fringes.

There are no further increases applicable to this determination.

Issued 8/22/2019, Effective 9/1/2019 until superseded.

This page will be updated when wage rate breakdown becomes available
**Last Updated**: September 1, 2019.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: # IRON WORKER**

**DETERMINATION**: C-20-X-1-2019-2
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020* Effective until superseded by a new determination issued by the Director of Industrial Relations. Contact the Office of the Director – Research Unit (415) 703-4774 for the new rates after 10 days from the expiration date, if no subsequent determination is issued.
**LOCALITY:** All localities within the State of California

| | | Employer Payments | | | | | Straight-Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASSIFICATION (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension | Vacation/ Holiday | Training | Other Payments | Hours | Total Hourly Rate | [c]Daily 1 1/2X | [c]Saturday 1 1/2X | Sunday/ Holiday |
| **AREA 1[a]** | | | | | | | | | | | |
| Iron Worker (Ornamental, Reinforcing, Structural) | $41.50 | 9.95 | 13.32 | [b]5.25 | 0.72 | 4.465 | 8 | 75.205 | 95.955 | 95.955 | 116.705 |
| Fence Erector | $35.08 | 7.78 | 8.99 | [b]3.87 | 0.51 | 3.585 | 8 | 59.815 | 77.355 | 77.355 | 94.895 |
| **AREA 2[a]** | | | | | | | | | | | |
| Iron Worker (Ornamental, Reinforcing, Structural) | $40.00 | 9.95 | 13.32 | [b]5.25 | 0.72 | 4.465 | 8 | 73.705 | 93.705 | 93.705 | 113.705 |
| Fence Erector | $33.58 | 7.78 | 8.99 | [b]3.87 | 0.51 | 3.585 | 8 | 58.315 | 75.105 | 75.105 | 91.895 |

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet at http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] **AREA 1 –** Alameda, Contra Costa, San Francisco, San Mateo, And Santa Clara Counties.
**AREA 2 -** Alpine, Amador, Butte, Calaveras, Colusa, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Imperial, Inyo, Kern, Kings, Lake, Lassen, Los Angeles, Madera, Marin, Mariposa, Mendocino, Merced, Modoc, Mono, Monterey, Napa, Nevada, Orange, Placer, Plumas, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Joaquin, San Luis Obispo, Santa Barbara, Santa Cruz, Shasta, Sierra, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Tuolumne, Ventura, Yolo, and Yuba Counties.

[b] Includes supplemental dues.

[c] Rate applies to the first 2 daily overtime hours and the first 8 hours on Saturday. All other overtime is at the Sunday/Holiday rate.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: #LABORER AND RELATED CLASSIFICATIONS**

**DETERMINATION:** SC-23-102-2-2019-2
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

| | | Employer Payments | | | | | Straight-Time | | Overtime Hourly Rates | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Classification [a] (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension | Vacation/ and Holiday[d] | Training | Other Payment | Hours | Total Hourly Rate | Daily[b] 1 1/2X | Saturday[bc] 1 1/2X | Sunday and Holiday |
| CLASSIFICATION GROUPS | | | | | | | | | | | |
| Group 1 | $35.24 | 7.47 | 8.90 | 4.87 | 0.69 | 0.61 | 8 | 57.78 | 75.400 | 75.400 | 93.02 |
| Group 2 | 35.79 | 7.47 | 8.90 | 4.87 | 0.69 | 0.61 | 8 | 58.33 | 76.225 | 76.225 | 94.12 |
| Group 3 | 36.34 | 7.47 | 8.90 | 4.87 | 0.69 | 0.61 | 8 | 58.88 | 77.050 | 77.050 | 95.22 |
| Group 4 | 37.89 | 7.47 | 8.90 | 4.87 | 0.69 | 0.61 | 8 | 60.43 | 79.375 | 79.375 | 98.32 |
| Group 5 | 38.24 | 7.47 | 8.90 | 4.87 | 0.69 | 0.61 | 8 | 60.78 | 79.900 | 79.900 | 99.02 |

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] For classification within each group, see page 14.
[b] Any hours worked over 12 hours in a single workday are double (2) time.
[c] Saturdays in the same work week may be worked at straight-time if job is shut down during work week due to inclement weather or similar Act of God, or a situation beyond the employers control.
[d] Includes an amount per hour worked for supplemental dues

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

CLASSIFICATION GROUPS

**GROUP 1**

Boring Machine Helper (Outside)
Certified Confined Space Laborer
Cleaning and Handling of Panel Forms
Concrete Screeding for Rough Strike-Off
Concrete, Water Curing
Demolition Laborer, the cleaning of brick if performed by an employee performing any other phase of demolition work, and the cleaning of lumber
Fiberoptic Installation, Blowing, Splicing, and Testing Technician on public right-of- way only
Fire Watcher, Limbers, Brush Loaders, Pilers and Debris Handlers
Flagman
Gas, Oil and/or Water Pipeline Laborer
Laborer, Asphalt-Rubber Material Loader
Laborer, General or Construction
Laborer, General Cleanup
Laborer, Jetting
Laborer, Temporary Water and Air Lines
Plugging, Filling of Shee-Bolt Holes; Dry Packing of Concrete and Patching
Post Hole Digger (Manual)
Railroad Maintenance, Repair Trackman and Road Beds; Streetcar and Railroad Construction Track Laborers
Rigging and Signaling
Scaler
Slip Form Raisers
Tarman and Mortar Man
Tool Crib or Tool House Laborer
Traffic Control by any method
Water Well Driller Helper
Window Cleaner
Wire Mesh Pulling - All Concrete Pouring Operations

**GROUP 2**

Asphalt Shoveler
Cement Dumper (on 1 yard or larger mixer and handling bulk cement)
Cesspool Digger and Installer
Chucktender
Chute Man, pouring concrete, the handling of the chute from readymix trucks, such as walls, slabs, decks, floors, foundations, 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 Man
Guinea Chaser
Headerboard Man-Asphalt
Installation of all Asphalt Overlay Fabric and Materials used for Reinforcing Asphalt
Laborer, Packing Rod Steel and Pans
Membrane Vapor Barrier Installer
Power Broom Sweepers (small)
Riprap, Stonepaver, placing stone or wet sacked concrete
Roto Scraper and Tiller
Sandblaster (Pot Tender)
Septic Tank Digger and Installer (leadman)

**GROUP 2 (continued)**

Tank Scaler and Cleaner
Tree Climber, Faller, Chain Saw Operator, Pittsburgh Chipper and similar type Brush Shredders
Underground Laborer, including Caisson Bellower

**GROUP 3**

Asphalt Installation of all fabrics
Buggymobile Man
Compactor (all types including Tampers, Barko, Wacker)
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-inch pipe and over by any method, inside and out
Impact Wrench, Multi-Plate
Kettlemen, Potmen and Men applying asphalt, lay-kold, creosote, lime caustic and similar type materials
Laborer, Fence Erector
Material Hoseman (Walls, Slabs, Floors and Decks)
Operators of Pneumatic, Gas, Electric Tools, Vibrating Machines, Pavement Breakers, Air Blasting, Come-Alongs, and similar mechanical tools not separately classified herein; operation of remote controlled robotic tools in connection with Laborers work
Pipelayer's backup man, coating, grouting, making of joints, sealing, caulking, diapering and including rubber gasket joints, pointing and any and all other services
Power Post Hole Digger
Rock Slinger
Rotary Scarifier or Multiple Head Concrete Chipping Scarifier
Steel Headerboard Man and Guideline Setter
Trenching Machine, Hand Propelled

**GROUP 4**

Any Worker Exposed to Raw Sewage
Asphalt Raker, Luteman, Ironer, Asphalt Dumpman, and Asphalt Spreader Boxes (all types)
Concrete Core Cutter (walls, floors or ceilings), Grinder or Sander
Concrete Saw Man, Cutting Walls or Flat Work, Scoring old or new concrete
Cribber, Shorer, Lagging, Sheeting and Trench Bracing, Hand-Guided Lagging Hammer
Head Rock Slinger
High Scaler (including drilling of same)
Laborer, Asphalt-Rubber Distributor Bootman
Laser Beam in connection with Laborer's work
Oversize Concrete Vibrator Operator, 70 pounds and over
Pipelayer
Prefabricated Manhole Installer
Sandblaster (Nozzleman), Water Blasting, Porta Shot-Blast
Subsurface Imaging Laborer
Traffic Lane Closure, certified

**GROUP 5**

Blasters Powderman
Driller
Toxic Waste Removal
Welding, certified or otherwise in connection with Laborers' work

**STATE OF CALIFORNIA** Gavin Newsom, *Governor*

DEPARTMENT OF INDUSTRIAL RELATIONS
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*San Francisco, CA 94142-0603*

PREDETERMINED INCREASES FOR

# LABORER AND RELATED CLASSIFICATIONS (SC-23-102-2-2019-2)

ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

These predetermined increases for the above named craft applies only to the current determination for work being performed on public works projects with bid advertisement dates on or after **September 1, 2019**, until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination which was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

## LABORER

Determination SC-23-102-2-2019-2 is currently in effect and expires on June 30, 2020**.

**Effective July 1, 2020**, there will be an increase of $2.10 to be allocated to wages and/or fringes.

**Effective July 1, 2021**, there will be an increase of $2.15 to be allocated to wages and/or fringes.

There will be no further increases applicable to this determination.

Issued 8/22/2019, Effective 9/1/2019 until superseded.

This page will be updated when wage rate breakdown becomes available.
**Last Updated:** September 1, 2019

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1
FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: #LANDSCAPE/IRRIGATION LABORER/TENDER**

**DETERMINATION:** SC-102-X-14-2019-1
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** July 31, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara and Ventura counties.

| | | Employer Payments | | | | | Straight-Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASSIFICATION (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension | Vacation and Holiday | Training | Other | Hours | Total Hourly Rate | Daily[b] 1 1/2X | Saturday[b] 1 1/2X | Sunday/ Holiday 2X |
| Landscape/Irrigation Laborer | $33.43 | $7.47 | $8.90 | $4.87[a] | $0.69 | $0.48 | 8 | $55.84 | $72.555 | $72.555 | $89.27 |
| Landscape Hydro Seeder | $34.53 | $7.47 | $8.90 | $4.87[a] | $0.69 | $0.48 | 8 | $56.94 | $74.205 | $74.205 | $91.47 |

**DETERMINATION:** SC-102-X-14-2019-1A
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** July 31, 2020* Effective until superseded by a new determination issued by the Director of Industrial Relations. Contact the Office of the Director – Research Unit at (415) 703-4774 for new rates after 10 days from the expiration date, if no subsequent determination is issued.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara and Ventura counties.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Landscape/Irrigation Tender[c] | $15.30 | $2.45 | $1.25 | $1.03[a] | -- | -- | 8 | $20.03 | $27.68 | $27.68 | $35.33 |

#Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet at http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' Website at http://www.dir.ca.gov/das/das.html.
[a] Includes an amount per hour worked for Supplemental Dues.
[b] Rate applies to first 4 daily overtime hours and the first 12 hours on Saturday. All other time is paid at the Sunday and Holiday double-time rate.
[c] The first employee on the jobsite shall be a Landscape/Irrigation Laborer; the second employee on the jobsite must be an Apprentice or a Landscape/Irrigation Laborer; and the third and fourth employees may be Tenders. The fifth employee on the jobsite shall be a Landscape/Irrigation Laborer; the sixth employee must be an Apprentice or a Landscape/Irrigation Laborer ; and the seventh and eight employees may be Tenders. Thereafter, Tenders may be employed with Landscape/Irrigation Laborers in a 50/50 ratio on each jobsite. However, plant establishment may be performed exclusively by Landscape/Irrigation Tenders without the supervision of a Journeyman.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the Travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or Subsistence provisions for current or superseded determinations may be obtained by contacting the Office of the Director - Research Unit at (415) 703-4774.

**STATE OF CALIFORNIA** Gavin Newsom, *Governor*

DEPARTMENT OF INDUSTRIAL RELATIONS
Office of the Director – Research Unit
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

*MAILING ADDRESS:*
*P. O. Box 420603*
*San Francisco, CA 94142-0603*

PREDETERMINED INCREASE FOR

**LANDSCAPE/IRRIGATION LABORER/TENDER**
**(SC-102-X-14-2019-1, SC-102-X-14-2019-1A)**
LANDSCAPE /IRRIGATION LABORER
LANDSCAPE HYDRO SEEDER
LANDSCAPE/IRRIGATION TENDER

IN ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

This predetermined increase for the above named craft applies only to the current determination for work being performed on public works projects with bid advertisement dates on or after **September 1, 2019**, until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination which was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

**LANDSCAPE/IRRIGATION LABORER and LANDSCAPE HYDRO SEEDER**
Determination SC-102-X-14-2019-1 is currently in effect and expires on July 31, 2020**.

**Effective August 1, 2020**, there will be an increase of $2.10 to be allocated to wages and/or fringes.

**Effective August 1, 2021**, there will be an increase of $2.15 to be allocated to wages and/or fringes.

There will be no further increases applicable to this determination.

**LANDSCAPE/IRRIGATION TENDER**
Determination SC-102-X-14-2019-1A is currently in effect and expires on July 31, 2020*.

There are no predetermined increases applicable to this determination.

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Issued 8/22/2019, Effective 9/1/2019 until superseded.

This page will be updated when wage rate breakdown information becomes available.
**Last Updated:** September 1, 2019

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

**CRAFT: ## LANDSCAPE MAINTENANCE LABORER**
(APPLIES ONLY TO ROUTINE LANDSCAPE MAINTENANCE WORK NOT NEW LANDSCAPE CONSTRUCTION)[1]

**DETERMINATION:** SC-LML-2019-1
**ISSUE DATE:** February 22, 2019
**EXPIRATION DATE OF DETERMINATION:** March 31, 2019* Effective until superseded by a new determination issued by the Director of Industrial Relations. Contact the Office of the Director – Research Unit at (415) 703-4774 for the new rates after 10 days from the expiration date, if no subsequent determination is issued.

| | | Employer Payments | | | | | Straight-Time | | Overtime |
|---|---|---|---|---|---|---|---|---|---|
| **LOCALITY:** | Basic Hourly Rate | Health and Welfare | Pension | Vacation | Holiday | Training | Hours | Total Hourly Rate | 1 1/2X |
| Imperial | $12.00 | - | - | [a] 0.115 | 0.17 | - | 8 | [b]12.285 | [b]18.285 |
| Inyo, Mono and San Bernardino | 12.00 | - | - | 0.30 | 0.17 | - | 8 | 12.47 | 18.47 |
| Kern | 12.00 | - | - | [c] 0.16 | 0.17 | - | 8 | [b]12.33 | [b]18.33 |
| | 12.00 | - | - | [d] 0.27 | 0.46 | - | 8 | [b]12.73 | [b]18.73 |
| Los Angeles | 12.00 | 0.89 | - | [e] 0.115 | 0.14 | - | 8 | [b]13.145 | [b]19.145 |
| Orange | 12.00 | - | - | [f] 0.11 | 0.11 | - | 8 | [b]12.22 | [b]18.22 |
| Riverside | 12.00 | - | - | [g] 0.20 | 0.16 | - | 8 | [b]12.36 | [b]18.36 |
| San Diego | 12.00 | - | - | 0.22 | 0.115 | - | 8 | 12.335 | 18.335 |
| | 12.00 | - | - | 0.24 | 0.12 | - | 8 | 12.36 | 18.36 |
| San Luis Obispo | 12.00 | - | - | [k] 0.15 | 0.15 | - | 8 | 12.30 | 18.30 |
| | 12.00 | - | - | [l] 0.16 | 0.16 | - | 8 | 12.32 | 18.32 |
| Santa Barbara | 12.00 | - | - | [h] 0.12 | 0.12 | - | 8 | [b]12.24 | [b]18.24 |
| | 12.00 | - | - | [i] 0.13 | 0.13 | - | 8 | [b]12.26 | [b]18.26 |
| Ventura | 12.00 | - | - | 0.115 | 0.16 | - | 8 | 12.275 | 18.275 |
| | 12.00 | 2.97 | - | [j] 0.19 | 0.26 | - | 8 | [b]15.42 | [b]21.42 |

## Craft is not apprenticeable.
**NOTE**: If there are two rates, the first rate is for routine work, the second rate is for complex work.

[a] $0.22 after 3 years of service.
[b] Computation is based on the first years of employment. This rate should be increased by any applicable vacation increase as stated in other footnotes.
[c] $0.31 after 2 years of service.
[d] $0.54 after 2 years of service: $0.81 after 3 years of service.
[e] $0.24 after 3 years of service: $0.37 after 7 years of service.
[f] $0.22 after 4 years of service.
[g] $0.40 after 3 years of service.
[h] $0.23 after 2 years of service.
[i] $0.27 after 2 years of service.
[j] $0.38 after 3 years of service.
[k] $0.29 after 2 years of service.
[l] $0.31 after 2 years of service.

[1] This determination does not apply to work of a landscape laborer employed on landscape construction (work incidental to construction or post-construction maintenance during the plant installation and establishment period). The following is a description of the landscape work cover under this determination:

*ROUTINE* – mowing, watering, pruning, trimming, weeding, spraying, occasional planting and replacement of plants and janitorial work incidental to such landscape maintenance.
*COMPLEX* – servicing of irrigation and sprinkler systems, repairing of equipment use in such landscape maintenance.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1
FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: # LANDSCAPE OPERATING ENGINEER**

**DETERMINATION:** SC-63-12-33-2019-1
**ISSUE DATE:** February 22, 2019
**EXPIRATION DATE OF DETERMINATION:** October 31, 2019* Effective until superseded by a new determination issued by the Director of Industrial Relations. Contact the Office of the Director – Research Unit at (415) 703–4774 for the new rates after 10 days from the expiration date, if no subsequent determination is issued.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura Counties.

| CLASSIFICATION (JOURNEYPERSON) | Basic Hourly Rate | Employer Payments: Health and Welfare | Pension[d] | Vacation and Holiday[a] | Training | Other | Straight-Time: Hours | Total Hourly Rate | Overtime Hourly Rate: Daily/ Saturday[b] 1½X | Sunday[c] 2X | Holiday[c] 3X |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Landscape Operating Engineer | | | | | | | | | | | |
| Backhoe Operators | | | | | | | | | | | |
| Forklifts-Tree Planting Equipment (jobsite) | | | | | | | | | | | |
| HDR Welder-Landscape, Irrigation, Operating Engineers' Equipment | | | | | | | | | | | |
| Roller Operators | | | | | | | | | | | |
| Rubber-tired & Track Earthmoving Equipment | | | | | | | | | | | |
| Skiploader Operators | | | | | | | | | | | |
| Trencher-31 horsepower and up | $38.41 | $11.45 | $10.65 | $3.55 | $1.00 | $0.15 | 8.0 | $65.21 | $84.415 | $103.62 | $142.03 |

[#] Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet at http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.
[a] Includes an amount per hour worked for supplemental dues.
[b] Rate applies to the first four overtime hours daily and the first twelve hours on Saturday. Thereafter use the Sunday overtime rate.
[c] All work performed on a Dewatering Operation on holidays and all other work on holidays except Labor Day and the 1st Saturday following the 1st Friday in the months of June and December is paid at Sunday rate.
[d] Includes an amount for the Defined Contribution Plan (Annuity).

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/ OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1 FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

## CRAFT: DRIVER (ON/OFF-HAULING TO/FROM CONSTRUCTION SITE)

**Determination:** C-MT-261-36-95-2019-1
**Issue Date:** February 22, 2019
**Expiration date of determination:** October 31, 2019* Effective until superseded by a new determination issued by the Director of Industrial Relations. Contact the Division of Labor Statistics and Research at (415) 703-4774 for the new rates after 10 days from the expiration date, if no subsequent determination is issued.
**Localities:** All localities within Imperial and San Diego Counties.

| | | Employer Payments | | | | | Straight-Time | | Overtime Hourly Rate | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Classification** | Basic Hourly Rate | Health And Welfare | Pension | Vacation And Holiday | Training | Other | Hours | Total Hourly Rate | Daily (1½ X) | Sunday/ Holiday (2 X) |
| Mixer Driver | $28.10 | $8.37[a] | $5.06 | $1.48[b] | - | - | 8.0 | $43.01 | $57.06[c] | $71.11 |

[a] The contribution applies to all hours until $1,450.00 is paid for the month.
[b] $2.02 after one year of service
$2.56 after 7 years of service.
$3.10 after 14 years of service.
[c] Rate applies to work in excess of eight (8) hours daily and forty (40) hours weekly. All work in excess of 12 hours daily shall be paid the Sunday/Holiday (2X) rate.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/oprl/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director - Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence requirements for the current determinations on the Internet at http://www.dir.ca.gov/oprl/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director - Research Unit at (415) 703-4774.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

## CRAFT: #OPERATING ENGINEER

**DETERMINATION:** SC-23-63-2-2019-2
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

| | | Employer Payments | | | | | Straight – Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASSIFICATION (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension (e) | Vacation/ Holiday (a) | Training | Other Payments | Hours | Total Hourly Rate | Daily (c ) | Saturday (d) | Sunday/ Holiday |
| | | | | | | | | | 1 1/2X | 1 1/2X | 2X |
| Classification Groups (b) | | | | | | | | | | | |
| Group 1 | $47.05 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $74.79 | $98.315 | $98.315 | $121.84 |
| Group 2 | $47.83 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $75.57 | $99.485 | $99.485 | $123.40 |
| Group 3 | $48.12 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $75.86 | $99.920 | $99.920 | $123.98 |
| Group 4 | $49.61 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.35 | $102.155 | $102.155 | $126.96 |
| Group 6 | $49.83 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.57 | $102.485 | $102.485 | $127.40 |
| Group 8 | $49.94 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.68 | $102.650 | $102.650 | $127.62 |
| Group 10 | $50.06 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.80 | $102.830 | $102.830 | $127.86 |
| Group 12 | $50.23 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.97 | $103.085 | $103.085 | $128.20 |
| Group 13 | $50.33 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.07 | $103.235 | $103.235 | $128.40 |
| Group 14 | $50.36 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.10 | $103.280 | $103.280 | $128.46 |
| Group 15 | $50.44 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.18 | $103.400 | $103.400 | $128.62 |
| Group 16 | $50.56 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.30 | $103.580 | $103.580 | $128.86 |
| Group 17 | $50.73 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.47 | $103.835 | $103.835 | $129.20 |
| Group 18 | $50.83 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.57 | $103.985 | $103.985 | $129.40 |
| Group 19 | $50.94 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.68 | $104.150 | $104.150 | $129.62 |
| Group 20 | $51.06 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.80 | $104.330 | $104.330 | $129.86 |
| Group 21 | $51.23 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.97 | $104.585 | $104.585 | $130.20 |
| Group 22 | $51.33 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.07 | $104.735 | $104.735 | $130.40 |
| Group 23 | $51.44 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.18 | $104.900 | $104.900 | $130.62 |
| Group 24 | $51.56 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.30 | $105.080 | $105.080 | $130.86 |
| Group 25 | $51.73 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.47 | $105.335 | $105.335 | $131.20 |

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Includes an amount withheld for supplemental dues.

[b] For classifications within each group, see pages 8 and 9.

[c] Rate applies to the first 4 overtime hours. All other daily overtime is paid at the Sunday rate.

[d] Rate applies to the first 12 hours worked. All other time is paid at the Sunday rate.

[e] Includes an amount for Annuity

**NOTE**: For Special Shift and Multi-Shift, see pages 9A and 9B.

**RECOGNIZED HOLIDAYS**: Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT**: In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**DETERMINATION: SC-23-63-2-2019-2**

**CLASSIFICATIONS:**

**GROUP 1**

Bargeman
Brakeman
Compressor Operator
Ditchwitch, 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
Heavy Duty Repairman Helper
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
RJU Side Dump Jack
Rotary Drill Helper (Oilfield)
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, with all attachments)
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
Boring System Electronic Tracking Locator
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 Economatic, or similar types - Hughes 100 or 200, or similar types - drilling depth of 30 maximum)
Equipment Greaser (grease truck)
Excavator Track/Rubber-Tired- with all attachments (Operating weight under 21,000 lbs)
Guard Rail Post Driver Operator
Highline Cableway Signalman
Hydra-Hammer-Aero Stomper
Hydraulic Casing Oscillator Operator – drilling depth of 30' maximum
Micro Tunneling Operator (above ground tunnel)
Power Concrete Curing Machine Operator
Power Concrete Saw Operator
Power - Driver Jumbo Form Setter Operator
Power Sweeper Operator
Rock Wheel Saw/Trencher
Roller Operator (compacting)
Screed Operator (asphalt or concrete)
Trenching Machine Operator (up to 6ft.)
Vacuum or Muck Truck

**GROUP 5 (for multi-shift rate, see page 9B)**

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 Placer Operator
Concrete Planer Operator
Dandy Digger
Deck Engine Operator
Deck Engineer
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 (including water wells)
Force Feed Loader
Hydraulic Casing Oscillator Operator – drilling depth of 45' maximum
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 Operator (below ground)
Pavement Breaker Operator
Railcar Mover
Road Oil Mixing Machine Operator
Roller Operator (asphalt or finish)
Rubber-Tired Earthmoving 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 yds. 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. flyweel 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
Volume Mixer Operator
Welder – General

**GROUP 7 (for multi-shift rate, see page 9B)**

Welder – General (Multi-Shift)

**GROUP 8**

Asphalt or Concrete Spreading Operator (tamping or finishing)
Asphalt Paving Machine Operator (barber greene or similar type, one (1) Screedman)
Asphalt-Rubber Distributor Operator
Backhoe Operator (up to and including 3/4 yds.) small ford, case or similar
Backhoe Operator (over 3/4 yd. and up to 5 cu. yds. M.R.C.)
Barrier Rail Mover (BTM Series 200 or similar types)
Cast in Place Pipe Laying Machine Operator
Cold Foamed Asphalt Recycler
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
Excavator Track/Rubber-Tired- with all attachments (Operating Weight 21,000 lbs - 100,000 lbs)
Global Positioning System/GPS (or Technician)
Grade Checker
Gradall Operator
Grouting Machine Operator
Heavy Duty Repairman/Pump Installer
Heavy Equipment Robotics Operator
Hydraulic Casing Oscillator Operator – drilling depth of 60' maximum
Hydraulic Operated Grout Plant (excludes hand loading)
Kalamazoo Ballast Regulator or similar type
Klemm Drill Operator or similar types
Kolman Belt Loader and similar type
Le Tourneau Blob Compactor or similar type
Lo Drill
Loader Operator (Athey, Euclid, Sierra and similar types)
Master Environmental Maintenance Mechanic
Mobark Chipper or similiar types
Ozzie Padder or similar types
P.C. 490 Slot Saw
Pneumatic Concrete Placing Machine Operator (Hackley-Presswell or similar type)
Prentice 721E Hydro-Ax
Pumpcrete Gun Operator
Rock Drill or Similiar Types (see Miscellaneous Provision #4 for additional information regarding this classification)
Rotary Drill Operator (excluding caison type)
Rubber-Tired Earth Moving Equipment Operator (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 (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 (CMI, Envirotech or Similar)
Soil Stabilizer and Reclaimer (WR-2400)
Somero SXP Laser Screed
Speed Swing Operator
Surface Heaters and Planer Operator
Tractor Compressor Drill Combination Operator

**DETERMINATION: SC-23-63-2-2019-2**

**GROUP 8 CONT.**

Tractor Operator (any type larger than D-5 - 100 flyweel 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 6ft. depth capacity, manufacturer's rating - Oiler or Journeyman Trainee required)

Ultra High Pressure Waterjet Cutting Tool System Mechanic

Water Pull (compaction)

**GROUP 9 (for multi-shift rate, see page 9B)**

Heavy Duty Repairman (Multi-Shift)

**GROUP 10**

Backhoe Operator (over 5 cu. yds. M.R.C.)

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

Heavy Duty Repairman-Welder combination

Hydraulic Casing Oscillator Operator – drilling depth of 105' maximum

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.)

Pneumatic Pipe Ramming Tool and similar types

Pre-stressed Wrapping Machine Operator (2 Operators required)

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.)

Welder - Certified

Woods Mixer Operator (and similar pugmill equipment)

**GROUP 11 (for multi-shift rate, see page 9B)**

Heavy Duty Repairman – Welder Combination (Multi-Shift)

Welder – Certified (Multi-Shift)

**GROUP 12**

Auto Grader Operator

Automatic Slip Form Operator

Backhoe Operator (over 7 cu. yds. M.R.C.)

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)

Excavator Track/Rubber Tired- with all attachments (Operating Weight 100,000 lbs. - 200,000 lbs)

Hoe Ram or similar with compressor

Hydraulic Casing Oscillator Operator – drilling depth of 175' maximum

Mass Excavator Operator - less than 750 cu. yds.

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 the Push-Pull System (single engine, up to and including 25 yds. struck)

**GROUP 14**

Canal Liner Operator

Canal Trimmer 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 300' maximum)

Remote Controlled Earth Moving Operator ($1.00 per hour additional to base rate)

Wheel Excavator Operator (over 750 cu. yds. per hour)

**GROUP 15**

Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the 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 cu. yds. struck)

Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Push-Pull System (multiple engine - up to and including 25 yds. struck)

**GROUP 16**

Excavator Track/Rubber Tired- with all attachments (Operating Weight exceeding 200,000 lbs.)

Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Push-Pull System (single engine, over 50 yds. struck)

Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the 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 the Push-Pull System (multiple engine, euclid, caterpillar, and similar type, 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

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 engines, 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)

Drilling Machine Operator, Bucket or Auger types (Calweld, auger 200 CA or similar types - watson,

**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 cu. yds. struck)

Rubber-Tired Earth Moving Equipment Operator, Operating Equipment 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

Pedestal Concrete Pump Operator

Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Tandem Push-Pull System (multiple engine, euclid, caterpillar and similar over 50 cu. yds struck)

**MISCELLANEOUS PROVISIONS:**

1. Operators on hoists with three drums shall receive fifteen cents (15¢) per hour additional pay to the regular rate of pay. The additional pay shall be added to the regular rate and become the base rate for the entire shift.
2. All heavy duty repairman and heavy duty combination shall receive one dollar ($1.00) per hour tool allowance in addition to their regular rate of pay and this shall become their base rate of pay.
3. Employees required to suit up and work in a hazardous material environment, shall receive Two Dollars ($2.00) per hour in addition to their regular rate of pay, and that rate shall become the basic hourly rate of pay.
4. A review of rock drilling is currently pending. The minimum acceptable rate of pay for this classification or type of work on public works projects is Laborer and Related Classifications/Group 5 (Driller) as published on pages 13 and 14 of the Director's General Prevailing Wage Determinations. However, the published rate for the craft/classification of Operating Engineer/Group 8 (Rock Drill or Similar Types) may be used by contractors to perform rock drilling on public works projects.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: #OPERATING ENGINEER (Special Shift)**

**DETERMINATION:** SC-23-63-2-2019-2
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

| | | Employer Payments | | | | | Straight – Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASSIFICATION (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension (e) | Vacation/ Holiday (a) | Training | Other Payments | Hours | Total Hourly Rate | Daily (c ) | Saturday (d) | Sunday/ Holiday |
| | | | | | | | | | 1 1/2X | 1 1/2X | 2X |
| Classification Groups (b) | | | | | | | | | | | |
| Group 1 | $47.55 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $75.29 | $99.065 | $99.065 | $122.84 |
| Group 2 | $48.33 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $76.07 | $100.235 | $100.235 | $124.40 |
| Group 3 | $48.62 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $76.36 | $100.670 | $100.670 | $124.98 |
| Group 4 | $50.11 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $77.85 | $102.905 | $102.905 | $127.96 |
| Group 6 | $50.33 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.07 | $103.235 | $103.235 | $128.40 |
| Group 8 | $50.44 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.18 | $103.400 | $103.400 | $128.62 |
| Group 10 | $50.56 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.30 | $103.580 | $103.580 | $128.86 |
| Group 12 | $50.73 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.47 | $103.835 | $103.835 | $129.20 |
| Group 13 | $50.83 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.57 | $103.985 | $103.985 | $129.40 |
| Group 14 | $50.86 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.60 | $104.030 | $104.030 | $129.46 |
| Group 15 | $50.94 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.68 | $104.150 | $104.150 | $129.62 |
| Group 16 | $51.06 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.80 | $104.330 | $104.330 | $129.86 |
| Group 17 | $51.23 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.97 | $104.585 | $104.585 | $130.20 |
| Group 18 | $51.33 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.07 | $104.735 | $104.735 | $130.40 |
| Group 19 | $51.44 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.18 | $104.900 | $104.900 | $130.62 |
| Group 20 | $51.56 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.30 | $105.080 | $105.080 | $130.86 |
| Group 21 | $51.73 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.47 | $105.335 | $105.335 | $131.20 |
| Group 22 | $51.83 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.57 | $105.485 | $105.485 | $131.40 |
| Group 23 | $51.94 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.68 | $105.650 | $105.650 | $131.62 |
| Group 24 | $52.06 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.80 | $105.830 | $105.830 | $131.86 |
| Group 25 | $52.23 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.97 | $106.085 | $106.085 | $132.20 |

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Includes an amount withheld for supplemental dues.

[b] For classifications within each group, see pages 8 and 9.

[c] Rate applies to the first 4 overtime hours. All other daily overtime is paid at the Sunday rate.

[d] Rate applies to the first 12 hours worked. All other time is paid at the Sunday rate.

[e] Includes an amount for Annuity

**RECOGNIZED HOLIDAYS**: Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT**: In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

## CRAFT: #OPERATING ENGINEER (Multi-Shift)

**DETERMINATION:** SC-23-63-2-2019-2
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

| | | Employer Payments | | | | | Straight – Time | | Overtime Hourly Rate | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASSIFICATION (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension (f) | Vacation/ Holiday (a) | Training | Other Payments | Hours (e) | Total Hourly Rate | Daily (c ) | Saturday (d) | Sunday/ Holiday |
| | | | | | | | | | 1 1/2X | 1 1/2X | 2X |
| Classification Groups (b) | | | | | | | | | | | |
| Group 1 | $48.05 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $75.79 | $99.815 | $99.815 | $123.84 |
| Group 2 | $48.83 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $76.57 | $100.985 | $100.985 | $125.40 |
| Group 3 | $49.12 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $76.86 | $101.420 | $101.420 | $125.98 |
| Group 4 | $50.61 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.35 | $103.655 | $103.655 | $128.96 |
| Group 5 | $50.71 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.45 | $103.805 | $103.805 | $129.16 |
| Group 6 | $50.83 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.57 | $103.985 | $103.985 | $129.40 |
| Group 7 | $50.93 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.67 | $104.135 | $104.135 | $129.60 |
| Group 8 | $50.94 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.68 | $104.150 | $104.150 | $129.62 |
| Group 9 | $51.04 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.78 | $104.300 | $104.300 | $129.82 |
| Group 10 | $51.06 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.80 | $104.330 | $104.330 | $129.86 |
| Group 11 | $51.16 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.90 | $104.480 | $104.480 | $130.06 |
| Group 12 | $51.23 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $78.97 | $104.585 | $104.585 | $130.20 |
| Group 13 | $51.33 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.07 | $104.735 | $104.735 | $130.40 |
| Group 14 | $51.36 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.10 | $104.780 | $104.780 | $130.46 |
| Group 15 | $51.44 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.18 | $104.900 | $104.900 | $130.62 |
| Group 16 | $51.56 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.30 | $105.080 | $105.080 | $130.86 |
| Group 17 | $51.73 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.47 | $105.335 | $105.335 | $131.20 |
| Group 18 | $51.83 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.57 | $105.485 | $105.485 | $131.40 |
| Group 19 | $51.94 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.68 | $105.650 | $105.650 | $131.62 |
| Group 20 | $52.06 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.80 | $105.830 | $105.830 | $131.86 |
| Group 21 | $52.23 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $79.97 | $106.085 | $106.085 | $132.20 |
| Group 22 | $52.33 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $80.07 | $106.235 | $106.235 | $132.40 |
| Group 23 | $52.44 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $80.18 | $106.400 | $106.400 | $132.62 |
| Group 24 | $52.56 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $80.30 | $106.580 | $106.580 | $132.86 |
| Group 25 | $52.73 | $11.60 | $11.15 | $3.55 | $1.05 | $0.39 | 8 | $80.47 | $106.835 | $106.835 | $133.20 |

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Includes an amount withheld for supplemental dues.

[b] For classifications within each group, see pages 8 and 9.

[c] Rate applies to the first 4 overtime hours. All other daily overtime is paid at the Sunday rate.

[d] Rate applies to the first 12 hours worked. All other time is paid at the Sunday rate.

[e] The Third Shift shall work 6.5 hours, exclusive of meal period, for which 8 hours straight-time shall be paid at the non-shift rate, Monday thorugh Friday.

[f] Includes an amount for Annuity

**RECOGNIZED HOLIDAYS**: Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT**: In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**STATE OF CALIFORNIA** Gavin Newsom, *Governor*

DEPARTMENT OF INDUSTRIAL RELATIONS
Office of the Director – Research Unit
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

*MAILING ADDRESS:*
*P. O. Box 420603*
*San Francisco, CA 94142-0603*

PREDETERMINED INCREASES FOR

**OPERATING ENGINEER (SC-23-63-2-2019-2)**
**OPERATING ENGINEER (MULTI-SHIFT) (SC-23-63-2-2019-2)**
**OPERATING ENGINEER (SPECIAL SHIFT) (SC-23-63-2-2019-2)**

**CRANES, PILE DRIVER AND HOISTING EQUIPMENT (OPERATING ENGINEER) (SC-23-63-2-2019-1B)**

**CRANES, PILE DRIVER AND HOISTING EQUIPMENT (OPERATING ENGINEER, SPECIAL SHIFT) (SC-23-63-2-2019-1B1)**

**CRANES, PILE DRIVER AND HOISTING EQUIPMENT (OPERATING ENGINEER, MULTI-SHIFT) (SC-23-63-2-2019-1B2)**

**TUNNEL (OPERATING ENGINEER) (SC-23-63-2-2019-1C)**

**TUNNEL (OPERATING ENGINEER) (SC-23-63-2-2019-1C1) (MULTI-SHIFT)**

**BUILDING/CONSTRUCTION INSPECTOR, FIELD SOILS AND MATERIAL TESTER, AND NON-DESTRUCTIVE TESTING (SC-23-63-2-2019-1D)**

**BUILDING/CONSTRUCTION INSPECTOR, FIELD SOILS AND MATERIAL TESTER, AND NON-DESTRUCTIVE TESTING (SPECIAL SHIFT) (SC-23-63-2-2019-1D1)**

**BUILDING/CONSTRUCTION INSPECTOR, FIELD SOILS AND MATERIAL TESTER, AND NON-DESTRUCTIVE TESTING (MULTI-SHIFT) (SC-23-63-2-2019-1D2)**

ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

These predetermined increases for the above named crafts apply only to the current determinations for work being performed on public works projects with bid advertisement dates on or after **September 1, 2019,** until the determination(s) is/are superseded by a new determination(s) or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination which was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

**OPERATING ENGINEER: All Classifications and All Shifts**

The above Determinations are currently in effect and will expire on June 30, 2020**.

**Effective on July 1, 2020,** there will be an increase of $2.45 to be allocated to wages and/or fringes.
**Effective on July 1, 2021,** there will be an increase of $2.45 to be allocated to wages and/or fringes.

There will be no further increases applicable to these determinations.

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Issued 8/22/2019, Effective 9/1/2019 until superseded.
This page will be updated when wage rate breakdown information becomes available.
**Last Updated:** September 1, 2019

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: # PARKING AND HIGHWAY IMPROVEMENT**
**(STRIPING, SLURRY AND SEAL COAT OPERATIONS-LABORER)**

**DETERMINATION:** SC-23-102-6-2019-1
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara and Ventura counties.

| Classification (Journeyperson) | Basic Hourly Rate | Employer Payments: Health and Welfare | Pension | Vacation/ Holiday | Training | Other | Straight-Time Hours [b] | Total Hourly Rate | Overtime Hourly Rates: Daily 1 1/2X | 6th & 7th Day [c] 1 1/2X | Holiday 2X |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASSIFICATION GROUPS | | | | | | | | | | | |
| Group 1 | $37.91 | $7.47 | $5.85 | $5.11[a] | $1.31 | $0.50 | 8 | $58.15 | $77.105 | $77.105 | $96.06 |
| Group 2 | 39.21 | 7.47 | 5.85 | 5.11[a] | 1.31 | 0.50 | 8 | 59.45 | 79.055 | 79.055 | 98.66 |
| Group 3 | 41.22 | 7.47 | 5.85 | 5.11[a] | 1.31 | 0.50 | 8 | 61.46 | 82.070 | 82.070 | 102.68 |
| Group 4 | 42.96 | 7.47 | 5.85 | 5.11[a] | 1.31 | 0.50 | 8 | 63.20 | 84.680 | 84.680 | 106.16 |

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Includes an amount per hour worked for Supplemental Dues.
[b] Straight-time hours: 8 consecutive hours per day. 40 hours over 5 consecutive days, Monday through Sunday shall constitute a week's work at straight time.
[c] The sixth consecutive day in the same work week may be worked at straight-time if job is shut down during work week due to inclement weather.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**CLASSIFICATION GROUPS:**

**Group 1**
Protective coating, Pavement sealing (repairs and filling of cracks by any method to parking lots, game courts and playgrounds, and tracks, whether indoor or outdoor)
Installation of carstops
Traffic Control Person & Serviceman; including work of installing and protecting utility covers, traffic delineating devices, posting of no parking and notifications for public convenience
Asphalt Repair
Equipment Repair Technician
Truncated Dome Assitant
Decorative Asphalt Surfacing Applicator Assistant

**Group 2**
Traffic Surface Abrasive Blaster
Pot Tender
Traffic Control Person/Certified Traffic Control Person
Repairing and filling of cracks and surface cleaning on streets, highways, and airports by any means, and other work not directly connected with the application of slurry seal
Slurry Seal Squeegeeman (finisher)
Bob Cat/Skid Steer
Seal Roller
Forklift

**Group 3**
Traffic Delineating Device Applicator
Traffic Protective System Installer
Pavement Marking Applicator
Slurry Seal Applicator Operator (Line Driver-including self-contained distribution units, aggregate spreader truck)
Shuttleman (loader/slurry machine operations) operation of all related machinery and equipment; handling of related materials
Truncated Dome Technician
Decorative Asphalt Surfacing Applicator

**Group 4**
Traffic Striping Applicator
Slurry Seal Mixer Operator
Power Broom Sweeper (operation of all related trucks, machinery and equipment; Handling of related materials)

**STATE OF CALIFORNIA** Gavin Newsom, *Governor*

DEPARTMENT OF INDUSTRIAL RELATIONS
Office of the Director – Research Unit
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

*MAILING ADDRESS:*
*P. O. Box 420603*
*San Francisco, CA 94142-0603*

PREDETERMINED INCREASE FOR

# PARKING AND HIGHWAY IMPROVEMENT (STRIPING, SLURRY AND SEAL COAT OPERATIONS-LABORER) (SC-23-102-6-2019-1)

IN ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN DIEGO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

This predetermined increase for the above named craft applies only to the current determination for work being performed on public works projects with bid advertisement dates on or after **September 1, 2019**, until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination which was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

## PARKING AND HIGHWAY IMPROVEMENT (STRIPING, SLURRY AND SEAL COAT OPERATIONS-LABORER)

Determination SC-23-102-6-2019-1 is currently in effect and expires on June 30, 2020**.

**Effective July 1, 2020,** there will be an increase of $2.10 to be allocated to wages and/or fringes.

**Effective July 1, 2021,** there will be an increase of $2.15 to be allocated to wages and/or fringes.

There will be no further increases applicable to this determination.

Issued 8/22/2019, Effective 9/1/2019 until superseded.

This page will be updated when wage rate breakdown becomes available.
**Last Updated:** September 1, 2019

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: #TEAMSTER**
**(APPLIES ONLY TO WORK ON THE CONSTRUCTION SITE)**

**DETERMINATION:** SC-23-261-2-2019-1
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.
**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara and Ventura Counties

| | | | Employer Payments | | | | Straight-Time | | Overtime Hourly Rates | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Classification[c] (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension | Vacation/ Holiday | Training[e] | Other Payments | Hours | Total Hourly Rate | Daily[d] 1 1/2X | Saturday[d] 1 1/2X | Sunday/ Holiday 2X |
| Group I | 31.59 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 61.63 | 77.43 | 77.43 | 93.22 |
| Group II | 31.74 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 61.78 | 77.65 | 77.65 | 93.52 |
| Group III | 31.87 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 61.91 | 77.85 | 77.85 | 93.78 |
| Group IV | 32.06 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.10 | 78.13 | 78.13 | 94.16 |
| Group V | 32.09 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.13 | 78.18 | 78.18 | 94.22 |
| Group VI | 32.12 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.16 | 78.22 | 78.22 | 94.28 |
| Group VII | 32.37 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.41 | 78.60 | 78.60 | 94.78 |
| Group VIII | 32.62 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.66 | 78.97 | 78.97 | 95.28 |
| Group IX | 32.82 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.86 | 79.27 | 79.27 | 95.68 |
| Group X | 33.12 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.16 | 79.72 | 79.72 | 96.28 |
| Group XI | 33.62 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 63.66 | 80.47 | 80.47 | 97.28 |
| Subjourneyman[b] | | | | | | | | | | | |
| 0-2000 hours | 17.80 | 18.62 | 6.00 | 2.00[a] | 1.82 | .45 | 8 | 46.69 | 55.59 | 55.59 | 64.49 |
| 2001-4000 hours | 19.80 | 18.62 | 6.00 | 2.25[a] | 1.82 | .45 | 8 | 48.94 | 58.84 | 58.84 | 68.74 |
| 4001-6000 hours | 21.80 | 18.62 | 6.00 | 2.50[a] | 1.82 | .45 | 8 | 51.19 | 62.09 | 62.09 | 72.99 |
| Over 6000 hours and thereafter at journeyman rates | | | | | | | | | | | |

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp . To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Includes an amount for Supplemental Dues.

[b] Subjourneyman may be employed at a ratio of one subjourneyman for every five journeymen.

[c] For classifications within each group, see page 21A.

[d] Rate applies to the first 4 daily overtime hours on weekdays and the first 12 hours on Saturday. All other overtime is paid at the Sunday/Holiday double-time rate.

[e] Includes $0.60 for Apprentice Program Fund and $1.22 for Teamster Training and Upgrading Trust.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/oprl/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/oprl/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**DETERMINATION:** SC-23-261-2-2019-1

**Group I**
Warehouseman and Teamster

**Group II**
Driver of Vehicle or Combination of Vehicles - 2 axles
Traffic Control Pilot Car, excluding moving heavy equipment permit load
Truck Mounted Power Broom

**Group III**
Driver of Vehicle or Combination of Vehicles - 3 axles
Bootman
Cement Mason Distribution Truck
Fuel Truck Driver
Water Truck - 2 axles
Dump Truck of less than 16 yards water level
Erosion Control Driver

**Group IV**
Driver of Transit Mix Truck-Under 3 yds
Dumpcrete Truck Less than 6 1/2 yards water level
Truck Repairman Helper

**Group V**
Water Truck 3 or more axles
Warehouseman Clerk
Slurry Truck Driver

**Group VI**
Driver of Transit Mix Truck - 3 yds or more
Dumpcrete Truck 6 1/2 yds water level and over
Driver of Vehicle or Combination of Vehicles - 4 or more axles
Driver of Oil Spreader Truck
Dump Truck 16 yds to 25 yds water level
Side Dump Trucks
Flow Boy Dump Trucks

**Group VII**
A Frame, Swedish Crane or Similar
Forklift Driver
Ross Carrier Driver

**Group VIII**
Dump Truck of 25 yds to 49 yards water level
Truck Repairman
Water Pull Single Engine
Welder

**Group IX**
Truck Repairman Welder
Low Bed Driver, 9 axles or over

**Group X**
Working Truck Driver
Truck Greaser and Tireman - $0.50 additional for Tireman
Pipeline and Utility Working Truck Driver, including Winch Truck and Plastic Fusion, limited to Pipeline and Utility Work
Dump Truck and Articulating - 50 yards or more water level
Water Pull Single Engine with attachment

**Group XI**
Water Pull Twin Engine
Water Pull Twin Engine with attachments
Winch Truck Driver - $0.25 additional when operating a Winch or similar special attachments

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: #TEAMSTER (SPECIAL SHIFT)**
**(APPLIES ONLY TO WORK ON THE CONSTRUCTION SITE)**

**DETERMINATION:** SC-23-261-2-2019-1
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.
**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara and Ventura Counties

| | | Employer Payments | | | | | Straight-Time | | Overtime Hourly Rates | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Classification[c] (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension | Vacation/ Holiday | Training[e] | Other Payments | Hours | Total Hourly Rate | Daily[d] 1 1/2X | Saturday[d] 1 1/2X | Sunday/ Holiday 2X |
| Group I | 32.09 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.13 | 78.18 | 78.18 | 94.22 |
| Group II | 32.24 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.28 | 78.40 | 78.40 | 94.52 |
| Group III | 32.37 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.41 | 78.60 | 78.60 | 94.78 |
| Group IV | 32.56 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.60 | 78.88 | 78.88 | 95.16 |
| Group V | 32.59 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.63 | 78.93 | 78.93 | 95.22 |
| Group VI | 32.62 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.66 | 78.97 | 78.97 | 95.28 |
| Group VII | 32.87 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.91 | 79.35 | 79.35 | 95.78 |
| Group VIII | 33.12 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 63.16 | 79.72 | 79.72 | 96.28 |
| Group IX | 33.32 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 63.36 | 80.02 | 80.02 | 96.68 |
| Group X | 33.62 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 63.66 | 80.47 | 80.47 | 97.28 |
| Group XI | 34.12 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 64.16 | 81.22 | 81.22 | 98.28 |
| Subjourneyman[b] | | | | | | | | | | | |
| 0-2000 hours | 17.80 | 18.62 | 6.00 | 2.00[a] | 1.82 | .45 | 8 | 46.69 | 55.59 | 55.59 | 63.49 |
| 2001-4000 hours | 19.80 | 18.62 | 6.00 | 2.25[a] | 1.82 | .45 | 8 | 48.94 | 58.84 | 58.84 | 68.74 |
| 4001-6000 hours | 21.80 | 18.62 | 6.00 | 2.50[a] | 1.82 | .45 | 8 | 51.19 | 62.09 | 62.09 | 72.99 |
| Over 6000 hours and thereafter at journeyman rates | | | | | | | | | | | |

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#Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Includes an amount for Supplemental Dues.

[b] Subjourneyman may be employed at a ratio of one subjourneyman for every five journeymen.

[c] For classifications within each group, see page 21A.

[d] Rate applies to the first 4 daily overtime hours and the first 12 hours on Saturday. All other overtime is paid at the Sunday/Holiday double-time rate.

[e] Includes $0.60 for Apprentice Program Fund and $1.22 for Teamster Training and Upgrading Trust.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/oprl/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/oprl/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: #TEAMSTER (SECOND SHIFT)**
**(APPLIES ONLY TO WORK ON THE CONSTRUCTION SITE)**

**DETERMINATION:** SC-23-261-2-2019-1
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.
**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara and Ventura Counties

| | | Employer Payments | | | | | Straight-Time | | Overtime Hourly Rates | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Classification[c] (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension | Vacation/ Holiday | Training[f] | Other Payments | Hours[d] | Total Hourly Rate | Daily[e] 1 1/2X | Saturday[e] 1 1/2X | Sunday/ Holiday 2X |
| Group I | 32.59 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.63 | 78.93 | 78.93 | 95.22 |
| Group II | 32.74 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.78 | 79.15 | 79.15 | 95.52 |
| Group III | 32.87 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 62.91 | 79.35 | 79.35 | 95.78 |
| Group IV | 33.06 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 63.10 | 79.63 | 79.63 | 96.16 |
| Group V | 33.09 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 63.13 | 79.68 | 79.68 | 96.22 |
| Group VI | 33.12 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 63.16 | 79.72 | 79.72 | 96.28 |
| Group VII | 33.37 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 63.41 | 80.10 | 80.10 | 96.78 |
| Group VIII | 33.62 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 63.66 | 80.47 | 80.47 | 97.28 |
| Group IX | 33.82 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 63.86 | 80.77 | 80.77 | 97.68 |
| Group X | 34.12 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 64.16 | 81.22 | 81.22 | 98.28 |
| Group XI | 34.62 | 18.62 | 6.00 | 3.15[a] | 1.82 | .45 | 8 | 64.66 | 81.97 | 81.97 | 99.28 |
| Subjourneyman[b] | | | | | | | | | | | |
| 0-2000 hours | 17.80 | 18.62 | 6.00 | 2.00[a] | 1.82 | .45 | 8 | 46.69 | 55.59 | 55.59 | 64.49 |
| 2001-4000 hours | 19.80 | 18.62 | 6.00 | 2.25[a] | 1.82 | .45 | 8 | 48.94 | 58.84 | 58.84 | 68.74 |
| 4001-6000 hours | 21.80 | 18.62 | 6.00 | 2.50[a] | 1.82 | .45 | 8 | 51.19 | 62.09 | 62.09 | 72.99 |
| Over 6000 hours and thereafter at journeyman rates | | | | | | | | | | | |

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#Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Includes an amount for Supplemental Dues.

[b] Subjourneyman may be employed at a ratio of one subjourneyman for every five journeymen.

[c] For classifications within each group, see page 21A.

[d] The third shift shall work 6.5 hours, exclusive of meal period, for which 8 hours straight-time shall be paid at the non-shift rate, Monday through Friday.

[e] Rate applies to the first 4 daily overtime hours and the first 12 hours on Saturday. All other overtime is paid at the Sunday/Holiday double-time rate.

[f] Includes $0.60 for Apprentice Program Fund and $1.22 for Teamster Training and Upgrading Trust.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/oprl/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/oprl/DPreWageDetermination.htm. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**STATE OF CALIFORNIA** Gavin Newsom, *Governor*

DEPARTMENT OF INDUSTRIAL RELATIONS
Office of the Director – Research Unit
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

*MAILING ADDRESS:*
*P. O. Box 420603*
*San Francisco, CA 94142-0603*

PREDETERMINED INCREASE FOR

# TEAMSTER (SC-23-261-2-2019-1)
# TEAMSTER (SECOND SHIFT) (SC-23-261-2-2019-1)
# TEAMSTER (SPECIAL SHIFT) (SC-23-261-2-2019-1)

IN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN LUIS OBISPO, SANTA BARBARA AND VENTURA COUNTIES

This predetermined increase for the above named craft applies only to the above-referenced determination for work being performed on public works projects with bid advertisement dates on or after **September 1, 2019**, until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination which was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

**Teamster: Groups I-XI (All Shifts)**
The predetermined increases applicable to Determination SC-23-261-2-2019-1 are as follows:

**Effective July 1, 2020**, $2.00 to be allocated to wages and/or employer payments.

**Effective July 1, 2021**, $2.00 to be allocated to wages and/or employer payments.

**Note:** Subjourneymen (0-6000 hours) receive no predetermined increases.

There will be no further increases applicable to this determination.

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Issued 8/22/2019, Effective 9/1/2019 until superseded.

This page will be updated when wage rate breakdown information becomes available.
**Last Updated:** September 1, 2019

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**CRAFT: TREE MAINTENANCE[1] (LABORER)**
**(APPLIES ONLY TO ROUTINE TREE MAINTENANCE WORK, NOT CONSTRUCTION AND/OR LANDSCAPE CONSTRUCTION[2])**

**DETERMINATION:** SC-102-X-20-2019-1
**ISSUE DATE:** August 22, 2019
**EXPIRATION DATE OF DETERMINATION:** June 30, 2020** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

**LOCALITY:** All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara and Ventura Counties.

| | | Employer Payments | | | | | Straight-Time | | Overtime Hourly Rate | |
|---|---|---|---|---|---|---|---|---|---|---|
| CLASSIFICATION[a] (Journeyperson) | Basic Hourly Rate | Health and Welfare | Pension | Vacation and Holiday | Training | Other | Hours | Total Hourly Rate | Daily 1 1/2X[b] | Sunday/ Holiday 2X |
| Senior Tree Trimmer | $20.40 | $2.45 | $1.75 | $2.17 | - | $0.30 | 8 | $27.07 | $37.27 | $47.47 |
| Tree Trimmer | $18.40 | $2.45 | $1.75 | $1.97 | - | $0.30 | 8 | $24.87 | $34.07 | $43.27 |
| Groundsperson | $15.65 | $2.45 | $1.75 | $1.82 | - | $0.30 | 8 | $21.97 | $29.795 | $37.62 |

[a] There shall be at least one Senior Tree Trimmer on crews of three or more.
[b] Monday thru Saturday shall constitute a workweek. Rate applies to first 4 overtime hours Monday thru Saturday, and all time worked in excess of forty (40) hours per workweek. All other time is paid at the Sunday and Holiday double-time rate.

[1] This determination does not apply to the work of a landscape laborer employed on landscape construction (work incidental to construction or post-construction maintenance during the plant installation and establishment period) or to tree trimming work involving line clearance.

[2] This determination does not apply to tree trimming, removal, or planting work performed on construction or landscape construction contracts.

**RECOGNIZED HOLIDAYS:** Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Travel and/or Subsistence provisions for current or superseded determinations may be obtained by contacting the Office of the Director - Research Unit at (415) 703-4774.

STATE OF CALIFORNIA GAVIN NEWSOM, *Governor*
DEPARTMENT OF INDUSTRIAL RELATIONS
Office of the Director – Research Unit
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

ADDRESS REPLY TO:
*P.O. Box 420603*
*San Francisco CA 94142-0603*

PREDETERMINED INCREASE FOR

# TREE MAINTENANCE (LABORER) (SC-102-X-20-2019-1)

IN ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN DIEGO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

This predetermined increase for the above named craft applies only to the current determination for work being performed on public works projects with bid advertisement dates on or after **September 1, 2019** until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination which was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

**TREE MAINTENANCE (LABORER):**
Determination SC-102-X-20-2019-1 is currently in effect and expires on June 30, 2020**.

**Effective July 1, 2020,** there will be an increase of $2.35 to be allocated as follows: $1.70 to the Basic Hourly Rate, $0.10 to Health and Welfare, $0.25 to Pension and $0.30 to Vacation.

**Effective July 1, 2021,** there will be an increase of $1.40 to be allocated to wages and/or fringes.

**Effective July 1, 2022,** there will be an increase of $1.40 to be allocated to wages and/or fringes.

**Effective July 1, 2023,** there will be an increase of $1.50 to be allocated to wages and/or fringes.

**Effective July 1, 2024,** there will be an increase of $1.50 to be allocated to wages and/or fringes.

**Effective July 1, 2025,** there will be an increase of $1.60 to be allocated to wages and/or fringes.

There will be no further increases applicable to this determination.

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Issued 8/22/2019, Effective 9/1/2019 until superseded.

This page will be updated when wage rate breakdown information becomes available.
**Last Updated:** September 1, 2019

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1
FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**LOCALITY: IMPERIAL COUNTY**
**DETERMINATION: IMP-2019-2**

| | | | | EMPLOYER PAYMENTS | | | | | | STRAIGHT-TIME | | OVERTIME HOURLY RATE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CRAFT (JOURNEY LEVEL) | ISSUE DATE | EXPIRATION DATE | BASIC HOURLY RATE | HEALTH AND WELFARE | PENSION | VACATION/ HOLIDAY | TRAINING | OTHER PAYMENTS | HOURS | TOTAL HOURLY RATE | DAILY | SATURDAY | SUNDAY AND HOLIDAY |
| # | **BRICKLAYER:** | 2/22/2019 | 10/31/2019** | A 48.110 | 8.250 | 8.230 | - | B 1.060 | 0.100 | C 8.0 | 65.750 | D 89.810 | D 89.810 | 113.860 |
| | MASON FINISHER | 2/22/2019 | 10/31/2019* | A 36.830 | 8.250 | 8.230 | - | B 0.940 | 0.100 | C 8.0 | 54.350 | D 72.760 | D 72.760 | 91.180 |
| # E | **BRICK TENDER** | 8/22/2019 | 06/30/2020** | 33.060 | 7.470 | 8.400 | F 4.380 | 0.650 | 0.440 | C 8.0 | 54.400 | 70.930 | 70.930 | 87.460 |
| # | **BRICK TENDER:** | | | | | | | | | | | | | |
| | FORKLIFT OPERATOR | 8/22/2019 | 06/30/2020** | 33.510 | 7.470 | 8.400 | F 4.380 | 0.650 | 0.440 | C 8.0 | 54.850 | 71.600 | 71.600 | 88.360 |
| # | **CARPET LAYER:** | | | | | | | | | | | | | |
| | RESILIENT TILE LAYER | 2/22/2019 | 12/31/2019* | 31.020 | 4.100 | 8.720 | 1.000 | 0.550 | 0.490 | 8.0 | 45.880 | G 61.390 | H 61.390 | 76.900 |
| I | MATERIAL HANDLER - FIRST SIX MONTHS | 2/22/2019 | 12/31/2019* | 12.000 | - | - | 0.500 | - | - | 8.0 | 12.500 | G 18.500 | H 18.500 | 24.500 |
| I | MATERIAL HANDLER - AFTER SIX MONTHS | 2/22/2019 | 12/31/2019* | 12.000 | 4.100 | 0.150 | 0.500 | 0.100 | - | 8.0 | 16.850 | G 22.850 | H 22.850 | 28.850 |
| # | **DRYWALL FINISHER** | | | | | | | | | | | | | |
| | DRYWALL FINISHER | 8/22/2019 | 09/30/2019** | J 40.180 | 8.850 | 6.630 | 3.070 | 0.670 | 0.770 | 8.0 | 60.170 | 80.260 | K 80.260 | 100.350 |
| # | **ELECTRICIAN:** | | | | | | | | | | | | | |
| | INSIDE WIREMAN, TECHNICIAN | 8/22/2019 | 05/31/2020* | 45.000 | 7.160 | L 6.850 | - | 0.870 | 0.240 | 8.0 | 61.470 | M 84.650 | M 84.650 | 107.820 |
| | CABLE SPLICER | 8/22/2019 | 05/31/2020* | 45.750 | 7.160 | L 6.850 | - | 0.870 | 0.240 | 8.0 | 62.240 | M 85.810 | M 85.810 | 109.370 |
| | TUNNEL WIREMAN | 8/22/2019 | 05/31/2020* | 50.630 | 7.160 | L 6.850 | - | 0.870 | 0.240 | 8.0 | 67.270 | M 93.350 | M 93.350 | 119.420 |
| | TUNNEL CABLE SPLICER | 8/22/2019 | 05/31/2020* | 51.380 | 7.160 | L 6.850 | - | 0.870 | 0.240 | 8.0 | 68.040 | M 94.500 | M 94.500 | 120.960 |
| | INSIDE WIREMAN, TECH. FOR ELECTRICAL PROJECTS OF MORE THAN $500,000 | 8/22/2019 | 05/31/2020* | 48.000 | 7.160 | L 6.850 | - | 0.870 | 0.240 | 8.0 | 64.560 | M 89.280 | M 89.280 | 114.000 |
| | CABLE SPLICER FOR ELECTRICAL PROJECTS OF MORE THAN $500,000 | 8/22/2019 | 05/31/2020* | 48.750 | 7.160 | L 6.850 | - | 0.870 | 0.240 | 8.0 | 65.330 | M 90.440 | M 90.440 | 115.550 |
| | TUNNEL WIREMAN FOR ELECTRICAL PROJECTS OF MORE THAN $500,000 | 8/22/2019 | 05/31/2020* | 53.630 | 7.160 | L 6.850 | - | 0.870 | 0.240 | 8.0 | 70.360 | M 97.980 | M 97.980 | 125.600 |
| | TUNNEL CABLE SPLICER FOR ELECTRICAL PROJECTS OF MORE THAN $500,000 | 8/22/2019 | 05/31/2020* | 54.380 | 7.160 | L 6.850 | - | 0.870 | 0.240 | 8.0 | 71.130 | M 99.140 | M 99.140 | 127.140 |
| | SOUND AND SIGNAL TECHNICIAN | 8/22/2019 | 05/31/2020** | 32.950 | 7.160 | L 4.090 | - | 0.780 | 0.140 | 8.0 | 46.110 | G 63.080 | N 63.080 | 80.050 |
| O | STREETLIGHTING, TRAFFIC SIGNAL, UNDERGROUND SYSTEMS JOURNEYMAN TECHNICIAN GRADE 1 | 2/22/2019 | 10/06/2019** | 32.440 | 5.950 | L 1.500 | - | 0.250 | 0.170 | 8.0 | 41.280 | P 57.990 | P 57.990 | 74.700 |
| O | TECH GRADE 2 | 2/22/2019 | 10/06/2019** | 27.050 | 5.950 | L 1.500 | - | 0.250 | 0.170 | 8.0 | 35.730 | P 49.660 | P 49.660 | 63.600 |
| O | TECH GRADE 3 | 2/22/2019 | 10/06/2019** | 24.450 | 5.950 | L 1.500 | - | 0.250 | 0.170 | 8.0 | 33.050 | P 45.650 | P 45.650 | 58.240 |
| O | TECH GRADE 4 | 2/22/2019 | 10/06/2019** | 17.650 | 5.950 | L - | - | 0.250 | 0.170 | 8.0 | 24.550 | P 33.640 | P 33.640 | 42.730 |
| O | TECH GRADE 5 | 2/22/2019 | 10/06/2019** | 14.850 | 5.950 | L - | - | 0.250 | 0.170 | 8.0 | 21.670 | P 29.310 | P 29.310 | 36.960 |
| # | **FIELD SURVEYOR:** | | | | | | | | | | | | | |
| Q | CHIEF OF PARTY (018.167-010) | 2/22/2019 | 09/30/2019* | 50.160 | 11.450 | 10.650 | F 4.620 | 1.100 | 0.150 | 8.0 | 78.130 | R 103.210 | R 103.210 | 128.290 |
| Q | INSTRUMENTMAN (018.167-034) | 2/22/2019 | 09/30/2019* | 47.660 | 11.450 | 10.650 | F 4.450 | 1.100 | 0.150 | 8.0 | 75.460 | R 99.290 | R 99.290 | 123.120 |
| Q | CHAINMAN/RODMAN (869.567-010) | 2/22/2019 | 09/30/2019* | 47.080 | 11.450 | 10.650 | F 4.400 | 1.100 | 0.150 | 8.0 | 74.830 | R 98.370 | R 98.370 | 121.910 |
| # | **GLAZIER** | 2/22/2019 | 09/30/2019** | J 44.950 | 6.030 | 11.660 | S - | 0.630 | 0.350 | T 8.0 | 63.620 | U 86.100 | U 86.100 | 108.570 |
| # | **MARBLE FINISHER** | 8/22/2019 | 05/31/2020* | V 33.430 | 9.250 | 3.950 | - | 0.910 | 0.370 | 8.0 | 47.910 | W 64.630 | X 64.630 | Y 81.340 |
| # | **PAINTER:** | | | | | | | | | | | | | |
| Z | PAINTER, LEAD ABATEMENT | 8/22/2019 | 06/30/2020** | A 32.120 | 8.900 | 4.040 | 2.550 | 0.600 | 1.010 | 8.0 | 49.220 | AA 65.280 | AA 65.280 | AA 65.280 |
| Z | REPAINT PAINTER, LEAD ABATEMENT | 8/22/2019 | 06/30/2020** | A 28.590 | 8.900 | 4.040 | 2.430 | 0.600 | 1.010 | 8.0 | 45.570 | AB 59.870 | AB 59.870 | AB 59.870 |
| Z | INDUSTRIAL PAINTER | 8/22/2019 | 06/30/2020** | A 34.020 | 8.900 | 4.040 | 2.850 | 0.700 | 1.010 | 8.0 | 51.520 | AA 68.530 | AA 68.530 | AA 68.530 |
| Z | INDUSTRIAL REPAINT PAINTER | 8/22/2019 | 06/30/2020** | A 30.340 | 8.900 | 4.040 | 2.710 | 0.700 | 1.010 | 8.0 | 47.700 | AB 62.870 | AB 62.870 | AB 62.870 |

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1
FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**LOCALITY: IMPERIAL COUNTY**
**DETERMINATION: IMP-2019-2**

| | | | | | EMPLOYER PAYMENTS | | | | | | STRAIGHT-TIME | | OVERTIME HOURLY RATE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CRAFT (JOURNEY LEVEL) | ISSUE DATE | EXPIRATION DATE | BASIC HOURLY RATE | HEALTH AND WELFARE | PENSION | VACATION/ HOLIDAY | TRAINING | OTHER PAYMENTS | HOURS | TOTAL HOURLY RATE | DAILY | SATURDAY | SUNDAY AND HOLIDAY |
| # | | **PLASTERER** | 8/22/2019 | 08/04/2020** | 37.860 | 9.380 | 5.840 | AC 5.870 | 0.810 | 1.040 | AD 8.0 | 60.800 | AA 79.730 | AE 79.730 | 98.660 |
| # | AF | **PLASTER TENDER** | 8/22/2019 | 08/04/2020** | 37.370 | 7.470 | 8.300 | AG 5.180 | 1.020 | 0.960 | 8.0 | 60.300 | AH 78.990 | AI 78.990 | 97.670 |
| | | PLASTER CLEAN-UP LABORER | 8/22/2019 | 08/04/2020** | 34.820 | 7.470 | 8.300 | AG 5.180 | 1.020 | 0.960 | 8.0 | 57.750 | AH 75.160 | AI 75.160 | 92.570 |
| # | | **PLUMBER:** | | | | | | | | | | | | | |
| | | PLUMBER, INDUSTRIAL AND GENERAL PIPEFITTER | 8/22/2019 | 08/31/2020** | AJ 51.380 | 9.160 | AK 12.250 | AL - | 2.250 | AM 1.270 | 8.0 | 76.310 | AN 101.130 | AN 101.130 | 124.320 |
| | | SEWER AND STORM DRAIN PIPELAYER | 8/22/2019 | 08/31/2020** | AJ 38.490 | 9.050 | AK 9.400 | AL - | 1.980 | AM 1.270 | 8.0 | 60.190 | 78.560 | AO 78.560 | 96.320 |
| | AP | SEWER AND STORM DRAIN PIPE TRADESMAN | 8/22/2019 | 08/31/2020** | AQ 19.040 | 8.800 | 0.380 | - | 1.110 | AM 1.120 | 8.0 | 30.450 | 39.100 | AO 39.100 | 47.740 |
| | | SERVICE & REPAIR (PLUMBER/HVAC-FITTER) | 8/22/2019 | 08/31/2020** | AJ 49.830 | 9.160 | AK 11.940 | AL - | 1.580 | AM 1.270 | 8.0 | 73.780 | 97.820 | AR 97.820 | AS 120.240 |
| | | LANDSCAPE/IRRIGATION FITTER | 8/22/2019 | 08/31/2020** | V 34.400 | 9.160 | AK 12.250 | AL - | 1.640 | AM 1.070 | AO 8.0 | 58.520 | 75.720 | 75.720 | 91.570 |
| | AT | LANDSCAPE/IRRIGATION TRADESMAN | 8/22/2019 | 08/31/2020** | V 14.940 | 3.000 | AK 1.130 | - | 0.100 | AM 0.870 | AO 8.0 | 20.040 | 27.510 | 27.510 | 34.980 |
| | | FIRE SPRINKLER FITTER | 2/22/2019 | 03/31/2019* | & 12.000 | 8.770 | 11.060 | - | 0.450 | - | 8.0 | 32.280 | AU 38.280 | AU 38.280 | AU 38.280 |
| # | | **ROOFER** | 8/22/2019 | 06/30/2020** | AV 34.250 | 6.920 | 1.820 | - | 0.300 | 0.060 | 8.0 | 43.350 | 59.600 | AW 59.600 | Y 75.860 |
| | | PITCH WORK | 8/22/2019 | 06/30/2020** | AV 35.750 | 6.920 | 1.820 | - | 0.300 | 0.060 | 8.0 | 44.850 | 61.850 | AW 61.850 | Y 78.860 |
| # | | **SHEET METAL WORKER (HVAC)** | 8/22/2019 | 06/30/2020* | A 38.940 | AX 9.810 | AY 17.730 | - | AZ 0.930 | BA 0.590 | AO 8.0 | 68.000 | AN 87.470 | AN 87.470 | 106.940 |
| | BB | SHEET METAL TECHNICIAN | 8/22/2019 | 06/30/2020* | A 29.250 | AX 6.700 | AY 1.250 | - | AZ 0.930 | BA 0.540 | AO 8.0 | 38.670 | AN 53.290 | AN 53.290 | 67.920 |
| | BC | UTILITY WORKER | 8/22/2019 | 06/30/2020* | 15.600 | AX 6.300 | BD - | - | AZ 0.550 | BA 0.540 | AO 8.0 | 22.990 | AN 30.790 | AN 30.790 | 38.590 |
| # | | **TERRAZZO FINISHER** | 8/22/2018 | 08/31/2019* | J 31.250 | 8.970 | 3.790 | BE - | 0.650 | 0.260 | AO 8.0 | 44.920 | W 60.540 | BF 60.540 | Y 76.170 |
| # | | **TERRAZZO WORKER** | 8/22/2018 | 08/31/2019* | J 38.390 | 9.250 | 3.970 | BE - | 0.960 | 0.260 | AO 8.0 | 52.830 | W 72.030 | BF 72.030 | Y 91.220 |
| # | | **TILE FINISHER** | 8/22/2019 | 05/31/2020* | V 28.230 | 9.250 | 2.560 | - | 0.840 | 0.310 | 8.0 | 41.190 | W 55.310 | X 55.310 | Y 69.420 |
| # | | **TILE LAYER** | 8/22/2019 | 05/31/2020* | V 40.070 | 9.250 | 8.090 | - | 1.020 | 0.370 | 8.0 | 58.800 | W 78.830 | X 78.830 | Y 98.870 |

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

**LOCALITY: IMPERIAL COUNTY**

**DETERMINATION: IMP-2019-2**

* EFFECTIVE UNTIL SUPERSEDED BY A NEW DETERMINATION ISSUED BY THE DIRECTOR OF INDUSTRIAL RELATIONS. CONTACT THE OFFICE OF THE DIRECTOR – RESEARCH UNIT AT (415) 703-4774 FOR THE NEW RATES AFTER TEN DAYS AFTER THE EXPIRATION DATE IF NO SUBSEQUENT DETERMINATION IS ISSUED.

** THE RATE TO BE PAID FOR WORK PERFORMED AFTER THIS DATE HAS BEEN DETERMINED. IF WORK WILL EXTEND PAST THIS DATE, THE NEW RATE MUST BE PAID AND SHOULD BE INCORPORATED IN CONTRACTS ENTERED INTO NOW. CONTACT THE OFFICE OF THE DIRECTOR – RESEARCH UNIT FOR SPECIFIC RATES AT (415) 703-4774.

\# INDICATES AN APPRENTICEABLE CRAFT. THE CURRENT APPRENTICE WAGE RATES ARE AVAILABLE ON THE INTERNET @ HTTP://WWW.DIR.CA.GOV/OPRL/PWAPPWAGE/PWAPPWAGESTART.ASP. TO OBTAIN ANY APPRENTICE WAGE RATES AS OF JULY 1, 2008 AND PRIOR TO SEPTEMBER 27, 2012, PLEASE CONTACT THE DIVISION OF APPRENTICESHIP STANDARDS OR REFER TO THE DIVISION OF APPRENTICESHIP STANDARDS' WEBSITE AT HTTP://WWW.DIR.CA.GOV/DAS/DAS.HTML.

& THE BASIC HOURLY RATE AND EMPLOYER PAYMENTS ARE NOT TAKEN FROM A COLLECTIVE BARGAINING AGREEMENT FOR THIS CRAFT OR CLASSIFICATION.

A INCLUDES AMOUNT WITHHELD FOR WORKING DUES.

B INCLUDES AN AMOUNT FOR INTERNATIONAL MASONRY INSTITUTE PROMOTION FUND

C SATURDAYS IN THE SAME WORK WEEK MAY BE WORKED AT STRAIGHT-TIME IF JOB IS SHUT DOWN DURING THE NORMAL WORKWEEK DUE TO INCLEMENT WEATHER, OR REASONS BEYOND THE CONTROL OF THE EMPLOYER.

D RATE APPLIES TO THE FIRST 2 DAILY AND THE FIRST 8 SATURDAY OVERTIME HOURS WORKED. ALL OTHER OVERTIME IS PAID AT THE SUNDAY RATE.

E THE RATIO OF BRICK TENDERS TO BRICKLAYERS SHALL BE AS FOLLOWS: ONE (1) BRICK TENDER TO NO MORE THAN THREE (3) BRICKLAYERS DURING THE INSTALLATION OF BLOCK ON A TYPICAL MASONRY PROJECT.

F INCLUDES AN AMOUNT PER HOUR WORKED FOR SUPPLEMENTAL DUES.

G RATE APPLIES TO FIRST 4 DAILY OVERTIME HOURS; ALL OTHER TIME IS PAID AT THE SUNDAY AND HOLIDAY RATE.

H RATE APPLIES TO FIRST 8 HOURS. DOUBLE TIME THEREAFTER.

I A MATERIAL HANDLER MAY BE UTILIZED IN RATIO OF ONE (1) MATERIAL HANDLER WITH ANY FIVE (5) JOURNEYMEN ON ANY GIVEN PROJECT.

J INCLUDES AMOUNT WITHHELD FOR DUES CHECK OFF.

K RATE APPLIES TO FIRST 8 HOURS ONLY. DOUBLE TIME THEREAFTER. SATURDAYS IN THE SAME WORK WEEK MAY BE WORKED AT STRAIGHT-TIME IF JOB IS SHUT DOWN DURING THE NORMAL WORK WEEK DUE TO INCLEMENT WEATHER.

L IN ADDITION, AN AMOUNT EQUAL TO 3% OF THE BASIC HOURLY RATE IS ADDED TO THE TOTAL HOURLY RATE AND OVERTIME HOURLY RATES FOR THE NATIONAL EMPLOYEES BENEFIT BOARD. PURSUANT TO LABOR CODE SECTIONS 1773.1 AND 1773.8, THE AMOUNT PAID FOR THIS EMPLOYER PAYMENT MAY VARY RESULTING IN A LOWER TAXABLE BASIC HOURLY WAGE RATE, BUT THE TOTAL HOURLY RATES FOR STRAIGHT TIME AND OVERTIME MAY NOT BE LESS THAN THE GENERAL PREVAILING RATE OF PER DIEM WAGES.

M RATE APPLIES TO THE FIRST 4 OVERTIME HOURS MONDAY THROUGH FRIDAY AND THE FIRST 8 HOURS WORKED ON SATURDAY. ALL OTHER TIME IS PAID AT THE SUNDAY AND HOLIDAY OVERTIME RATE.

N APPLIES TO THE FIRST 8 HOURS; ALL OTHER TIME WILL BE PAID AT DOUBLE THE STRAIGHT-TIME RATE. IF THE WORK WEEK IS TUESDAY THROUGH SATURDAY, THE SATURDAY FOLLOWING A RECOGNIZED HOLIDAY WHICH FALLS ON MONDAY, SHALL BE PAID AT 1 1/2 STRAIGHT-TIME HOURLY RATE.

O THE FIRST WORKER ON THE SITE MUST BE A JOURNEYMAN TECHNICIAN GRADE #1 OR #2 OR ANY HIGHER PAID JOURNEYMAN CLASSIFICATION, SUCH AS JOURNEYMAN INSIDE WIREMAN; THEREAFTER THE CONTRACTOR MAY EMPLOY FIVE (5) JOURNEYMAN TECHNICIANS WITH A MAXIMUM OF TWO (2) LEVEL #5 TECHNICIANS PER CREW. THESE SIX (6) WORKERS SHALL CONSTITUTE A CREW ON THE JOB SITE.

P RATE APPLIES TO THE FIRST 4 DAILY OVERTIME HOURS AND THE FIRST 8 HOURS WORKED ON SATURDAY. ALL OTHER TIME IS PAID AT THE SUNDAY AND HOLIDAY OVERTIME RATE.

Q DICTIONARY OF OCCUPATIONAL TITLES, FOURTH EDITION, 1977, U.S. DEPARTMENT OF LABOR.

R RATE APPLIES TO THE FIRST 4 DAILY OVERTIME HOURS AND THE FIRST 12 HOURS WORKED ON SATURDAY; ALL OTHER TIME IS PAID AT THE SUNDAY AND HOLIDAY OVERTIME HOURLY RATE.

S INCLUDED IN BASIC HOURLY RATE.

T IN THE EVENT CONDITIONS OR CIRCUMSTANCES WHICH ARE BEYOND THE CONTROL OF THE EMPLOYER, PREVENTS EMPLOYEES FROM WORKING ON ANY ONE OF THE REGULAR MONDAY THROUGH FRIDAY WORK DAYS, THEN SATURDAY MAY BE SCHEDULED AS A MAKE-UP DAY AT THE EMPLOYEE'S REGULAR STRAIGHT TIME RATE.

U RATE APPLIES TO THE FIRST 2 DAILY OVERTIME HOURS AND THE FIRST 8 HOURS ON SATURDAY ONLY; ALL OTHER TIME IS PAID AT THE SUNDAY AND HOLIDAY OVERTIME HOURLY RATE.

V INCLUDES AMOUNT WITHHELD FOR ADMINISTRATIVE DUES.

W RATE APPLIES TO FIRST TWO DAILY OVERTIME HOURS WORKED; ALL OTHER OVERTIME IS PAID AT THE HOLIDAY OVERTIME HOURLY RATE.

X RATE APPLIES TO THE FIRST 8 HOURS WORKED ON A SIXTH OR SEVENTH CONSECUTIVE DAY DURING ANY ONE CALENDAR WEEK UP TO 50 HOURS IN ANY ONE CALENDAR WEEK. ALL HOURS IN EXCESS OF 10 HOURS DAILY OR 50 HOURS WEEKLY ARE PAID AT THE HOLIDAY RATE. SATURDAYS IN THE SAME WORK WEEK MAY BE WORKED AT STRAIGHT-TIME IF JOB IS SHUT DOWN DURING THE NORMAL WORKWEEK DUE TO INCLEMENT WEATHER.

Y RATE APPLIES TO WORK ON HOLIDAYS ONLY; SUNDAYS ARE PAID AT THE SATURDAY OVERTIME HOURLY RATE.

Z AN ADDITIONAL $0.25 PER HOUR WILL BE ADDED TO THE BASIC HOURLY RATE WHEN PERFORMING PAPERHANGING WORK.

AA DOUBLE TIME SHALL BE PAID FOR ALL HOURS WORKED OVER 12 HOURS IN ANY ONE DAY.

AB ON REPAINT WAGE WORK ANY 8 HOURS IN A 24 HOUR PERIOD MONDAY THROUGH SUNDAY SHALL BE THE WORK DAY AND ANY 40 HOURS IN A WEEK SHALL BE THE WORK WEEK, PROVIDED THAT THE 40 HOURS IS WORKED IN 5 CONSECUTIVE DAYS (LEGAL HOLIDAYS WILL NOT BE COUNTED IN THE 5 CONSECUTIVE DAYS). FOR ALL WORK UNDER THIS CRAFT/CLASSIFICATION DOUBLE TIME SHALL BE PAID FOR ALL HOURS WORKED OVER 12 HOURS IN ANY ONE DAY.

AC INCLUDES AN AMOUNT PER HOUR WORKED OR PAID FOR DUES CHECK OFF

AD SATURDAY IN THE SAME WORKWEEK MAY BE WORKED AT THE STRAIGHT-TIME HOURLY RATE IF IT IS NOT POSSIBLE TO COMPLETE FORTY HOURS OF WORK MONDAY THROUGH FRIDAY WHEN THE JOB IS SHUT DOWN DUE TO INCLEMENT WEATHER OR SIMILAR ACT OF GOD, OR BEYOND THE CONTRACTOR'S CONTROL.

AE RATE APPLIES TO THE FIRST 8 HOURS WORKED; ALL OTHER TIME IS PAID AT THE SUNDAY AND HOLIDAY OVERTIME HOURLY RATE.

AF THE RATIO OF PLASTER TENDERS TO PLASTERERS SHALL BE AS FOLLOWS: THERE SHALL BE A PLASTER TENDER ON THE JOBSITE WHENEVER THERE IS A PLASTERER PERFORMING WORK ON THE JOBSITE, EXCEPT ON SMALL PATCH WORK WHERE ONLY ONE PLASTERER IS PERFORMING WORK. FOR INSIDE BROWN COATINGS THERE SHALL BE 2 PLASTER TENDERS FOR UP TO EVERY 3 PLASTERERS. FOR INSIDE FINISH COATINGS THERE SHALL BE 1 PLASTER TENDER FOR UP TO EVERY 3 PLASTERERS. ON OUTSIDE FINISH AND BROWN COATINGS AND FOR ALL OTHER WORK, THERE SHALL BE 1 PLASTER TENDER FOR UP TO EVERY 2 PLASTERERS.

AG INCLUDES AN AMOUNT PER HOUR WORKED OR PAID FOR SUPPLEMENTAL DUES.

AH ALL WORK PERFORMED AFTER TWELVE (12) HOURS IN A DAY SHALL BE PAID AT THE SUNDAY/HOLIDAY RATE.

AI RATE APPLIES TO THE FIRST EIGHT HOURS ON SATURDAY. ALL OTHER TIME IS PAID AT THE SUNDAY AND HOLIDAY OVERTIME RATE. SATURDAY WORK MAY BE PAID AT THE STRAIGHT TIME RATE IF THE JOB IS SHUT DOWN DURING THE NORMAL WORK WEEK DUE TO INCLEMENT WEATHER.

**LOCALITY: IMPERIAL COUNTY**

**DETERMINATION: IMP-2019-2**

AJ INCLUDES AN AMOUNT WITHHELD FOR ADMINISTRATIVE DUES WHICH IS NOT FACTORED INTO OVERTIME AND AN AMOUNT FOR VACATION WHICH IS FACTORED AT 1.5 TIMES FOR ALL OVERTIME.

AK INCLUDES AMOUNT FOR NATIONAL PENSION AND RETIREE'S X-MAS FUND.

AL AMOUNT INCLUDED IN BASIC HOURLY RATE AND FACTORED AT 1.5 TIMES FOR ALL OVERTIME.

AM INCLUDES AN AMOUNT FOR THE P.I.P.E. LABOR MANAGEMENT COOPERATION COMMITTEE AND THE CONTRACTOR EDUCATION & DEVELOPMENT FUND.

AN RATE APPLIES TO THE FIRST 2 DAILY OVERTIME HOURS AND THE FIRST 10 HOURS ON SATURDAY; ALL OTHER TIME IS PAID AT THE SUNDAY AND HOLIDAY OVERTIME HOURLY RATE.

AO SATURDAYS IN THE SAME WORK WEEK MAY BE WORKED AT STRAIGHT-TIME IF JOB IS SHUT DOWN DURING THE NORMAL WORKWEEK DUE TO INCLEMENT WEATHER.

AP PIPE TRADESMEN SHALL NOT BE PERMITTED ON ANY JOB WITHOUT A JOURNEYMAN.

AQ INCLUDES AN AMOUNT WITHHELD FOR ADMINISTRATIVE DUES WHICH IS NOT FACTORED IN THE OVERTIME RATES.

AR SATURDAY MAY BE WORKED AT STRAIGHT-TIME RATE, PROVIDED THAT THE HOURS DO NOT EXCEED 8 HOURS PER DAY OR 40 HOURS PER WEEK.

AS DOUBLE TIME SHALL BE PAID FOR NEW YEAR'S DAY, EASTER SUNDAY, LABOR DAY, THANKSGIVING DAY, AND CHRISTMAS.

AT TRADESMEN SHALL ONLY BE USED IF THE FIRST WORKER ON THE JOB IS A LANDSCAPE/IRRIGATION FITTER, SECOND WORKER MUST BE A LANDSCAPE/IRRIGATION FITTER OR APPRENTICE LANDSCAPE/IRRIGATION FITTER. THE 3RD AND 4TH MAY BE A TRADESMAN. THE 5TH MUST BE A LANDSCAPE/IRRIGATION FITTER AND THEREAFTER TRADESMEN WILL BE REFERRED ON A 50-50 BASIS, TO JOURNEYMAN OR APPRENTICE.

AU RATE APPLIES TO ALL TIME WORKED IN EXCESS OF 8 HOURS PER DAY OR 40 HOURS PER WEEK.

AV INCLUDES AMOUNT WITHHELD FOR WORKING ASSESSMENT.

AW RATE APPLIES TO ALL HOURS WORKED ON SATURDAY AND SUNDAY, HOWEVER, IF THE EMPLOYEE DID NOT COMPLETE FORTY (40) HOURS MONDAY THROUGH FRIDAY UP TO EIGHT (8) HOURS CAN BE WORKED AT THE STRAIGHT-TIME HOURLY RATE ON SATURDAY.

AX INCLUDES AN AMOUNT FOR THE SHEET METAL OCCUPATIONAL HEALTH INSTITUTE TRUST.

AY INCLUDES AMOUNT FOR 401(A) PLAN. PURSUANT TO LABOR CODE SECTIONS 1773.1 AND 1773.8, THE AMOUNT PAID FOR THIS EMPLOYER PAYMENT MAY VARY RESULTING IN A LOWER TAXABLE BASIC HOURLY WAGE RATE, BUT THE TOTAL HOURLY RATES FOR STRAIGHT TIME AND OVERTIME MAY NOT BE LESS THAN THE GENERAL PREVAILING RATE OF PER DIEM WAGES.

AZ INCLUDES AN AMOUNT FOR INTERNATIONAL TRAINING INSTITUTE.

BA INCLUDES AMOUNTS FOR NATIONAL ENERGY MANAGEMENT INSTITUTE (NEMI) FUND, SHEET METAL WORKERS' INTERNATIONAL SCHOLARSHIP FUND (SMWSF) AND INDUSTRY FUND.

BB ONE TECHNICIAN MAY BE EMPLOYED ON EACH JOB SITE. IN ADDITION, ONE (1) TECHNICIAN MAY BE EMPLOYED FOR EACH THREE (3) BUILDING TRADES JOURNEYMAN, OR PORTION THEREOF, EMPLOYED ON THE SITE.

BC THE EMPLOYER MAY EMPLOY ONE UTILITY WORKER, PLUS ONE FOR EACH FIVE(5) BUILDING JOURNEYMAN OR PORTION THEREOF.

BD PURSUANT TO LABOR CODE SECTIONS 1773.1 AND 1773.8, THE AMOUNT PAID FOR THIS EMPLOYER PAYMENT MAY VARY RESULTING IN A LOWER TAXABLE BASIC HOURLY WAGE RATE, BUT THE TOTAL HOURLY RATES FOR STRAIGHT TIME AND OVERTIME MAY NOT BE LESS THAN THE GENERAL PREVAILING RATE OF PER DIEM WAGES.

BE INCLUDED IN STRAIGHT-TIME HOURLY RATE.

BF RATE APPLIES TO THE FIRST 8 HOURS WORKED ON A SIXTH OR SEVENTH CONSECUTIVE DAY DURING ANY ONE CALENDAR WEEK UP TO 50 HOURS IN ANY ONE CALENDAR WEEK. ALL OTHER TIME IS PAID AT THE HOLIDAY RATE.

**RECOGNIZED HOLIDAYS:** HOLIDAYS UPON WHICH THE GENERAL PREVAILING HOURLY WAGE RATE FOR HOLIDAY WORK SHALL BE PAID, SHALL BE ALL HOLIDAYS IN THE COLLECTIVE BARGAINING AGREEMENT, APPLICABLE TO THE PARTICULAR CRAFT, CLASSIFICATION, OR TYPE OF WORKER EMPLOYED ON THE PROJECT, WHICH IS ON FILE WITH THE DIRECTOR OF INDUSTRIAL RELATIONS. IF THE PREVAILING RATE IS NOT BASED ON A COLLECTIVELY BARGAINED RATE, THE HOLIDAYS UPON WHICH THE PREVAILING RATE SHALL BE PAID SHALL BE AS PROVIDED IN SECTION 6700 OF THE GOVERNMENT CODE. YOU MAY OBTAIN THE HOLIDAY PROVISIONS FOR THE CURRENT DETERMINATIONS ON THE INTERNET AT HTTP://WWW.DIR.CA.GOV/OPRL/DPREWAGEDETERMINATION.HTM. HOLIDAY PROVISIONS FOR CURRENT OR SUPERSEDED DETERMINATIONS MAY BE OBTAINED BY CONTACTING THE OFFICE OF THE DIRECTOR - RESEARCH UNIT AT (415) 703-4774.

**TRAVEL AND/OR SUBSISTENCE PAYMENT:** IN ACCORDANCE WITH LABOR CODE SECTIONS 1773.1 AND 1773.9, CONTRACTORS SHALL MAKE TRAVEL AND/OR SUBSISTENCE PAYMENTS TO EACH WORKER TO EXECUTE THE WORK. YOU MAY OBTAIN THE TRAVEL AND/OR SUBSISTENCE PROVISIONS FOR THE CURRENT DETERMINATIONS ON THE INTERNET @ HTTP://WWW.DIR.CA.GOV/OPRL/DPREWAGEDETERMINATION.HTM. TRAVEL AND/OR SUBSISTENCE REQUIREMENTS FOR CURRENT OR SUPERSEDED DETERMINATIONS MAY BE OBTAINED FROM THE OFFICE OF THE DIRECTOR - RESEARCH UNIT AT (415) 703-4774.

IMP-2019-2-Determination

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1
FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

**LOCALITY: IMPERIAL COUNTY**
**DETERMINATION: IMP-2019-2**

| | | | | INCREASE 1 | | INCREASE 2 | | INCREASE 3 | | INCREASE 4 | | INCREASE 5 | | INCREASE 6 | | INCREASE 7 | | INCREASE 8 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CRAFT (JOURNEY LEVEL) | ISSUE DATE | EXPIRATION DATE | DATE OF NEXT CHANGE | AMOUNT OF INCREASE | DATE OF NEXT CHANGE | AMOUNT OF INCREASE | DATE OF NEXT CHANGE | AMOUNT OF INCREASE | DATE OF NEXT CHANGE | AMOUNT OF INCREASE | DATE OF NEXT CHANGE | AMOUNT OF INCREASE | DATE OF NEXT CHANGE | AMOUNT OF INCREASE | DATE OF INEXT CHANGE | AMOUNT OF INCREASE | DATE OF NEXT CHANGE | AMOUNT OF INCREASE |
| | **BRICKLAYER:** | 2/22/2019 | 10/31/2019** | 11/1/2019 | $2.00 A | 11/1/2006 | $1.50 B | 11/1/2020 | $2.00 A | 11/1/2007 | $1.50 B | | | | | | | | |
| C | **BRICK TENDER** | 8/22/2019 | 06/30/2020** | 7/1/2020 | $1.55 A | | | | | | | | | | | | | | |
| | **BRICK TENDER:** | | | | | | | | | | | | | | | | | | |
| | FORKLIFT OPERATOR | 8/22/2019 | 06/30/2020** | 7/1/2020 | $1.55 A | | | | | | | | | | | | | | |
| | **DRYWALL FINISHER** | | | | | | | | | | | | | | | | | | |
| | DRYWALL FINISHER | 8/22/2019 | 09/30/2019** | 10/1/2019 | $2.40 D | 10/1/2020 | $2.50 A | 10/1/2021 | $2.50 A | | | | | | | | | | |
| | **ELECTRICIAN:** | | | | | | | | | | | | | | | | | | |
| | SOUND AND SIGNAL TECHNICIAN | 8/22/2019 | 05/31/2020** | 6/1/2020 | $1.50 A | 6/1/2021 | $1.50 A | | | | | | | | | | | | |
| E | STREETLIGHTING, TRAFFIC SIGNAL, UNDERGROUND SYSTEMS JOURNEYMAN TECHNICIAN GRADE 1 | 2/22/2019 | 10/06/2019** | 10/7/2019 | $1.01 F | | | | | | | | | | | | | | |
| E | TECH GRADE 2 | 2/22/2019 | 10/06/2019** | 10/7/2019 | $0.83 G | | | | | | | | | | | | | | |
| E | TECH GRADE 3 | 2/22/2019 | 10/06/2019** | 10/7/2019 | $0.67 H | | | | | | | | | | | | | | |
| E | TECH GRADE 4 | 2/22/2019 | 10/06/2019** | 10/7/2019 | $0.57 I | | | | | | | | | | | | | | |
| E | TECH GRADE 5 | 2/22/2019 | 10/06/2019** | 10/7/2019 | $0.46 J | | | | | | | | | | | | | | |
| | **GLAZIER** | 2/22/2019 | 09/30/2019** | 10/1/2019 | $2.15 K | 1/1/2020 | -$3.81 L | | | | | | | | | | | | |
| | **PAINTER:** | | | | | | | | | | | | | | | | | | |
| M | PAINTER, LEAD ABATEMENT | 8/22/2019 | 06/30/2020** | 7/1/2020 | $2.15 N | | | | | | | | | | | | | | |
| M | REPAINT PAINTER, LEAD ABATEMENT | 8/22/2019 | 06/30/2020** | 7/1/2020 | $2.15 N | | | | | | | | | | | | | | |
| M | INDUSTRIAL PAINTER | 8/22/2019 | 06/30/2020** | 7/1/2020 | $2.65 O | | | | | | | | | | | | | | |
| M | INDUSTRIAL REPAINT PAINTER | 8/22/2019 | 06/30/2020** | 7/1/2020 | $2.65 O | | | | | | | | | | | | | | |
| | **PLASTERER** | 8/22/2019 | 08/04/2020** | 8/5/2020 | $2.20 A | 8/4/2021 | $2.20 A | | | | | | | | | | | | |
| P | **PLASTER TENDER** | 8/22/2019 | 08/04/2020** | 8/5/2020 | $2.20 A | 8/4/2021 | $2.20 A | | | | | | | | | | | | |
| | PLASTER CLEAN-UP LABORER | 8/22/2019 | 08/04/2020** | 8/5/2020 | $2.20 A | 8/4/2021 | $2.20 A | | | | | | | | | | | | |
| | **PLUMBER:** | | | | | | | | | | | | | | | | | | |
| | PLUMBER, INDUSTRIAL AND GENERAL PIPEFITTER | 8/22/2019 | 08/31/2020** | 9/1/2020 | $2.01 A | 9/1/2021 | $2.26 A | 9/1/2022 | $2.26 A | 9/1/2023 | $2.35 A | 9/1/2024 | $2.50 A | 9/1/2025 | $2.50 A | | | | |
| | SEWER AND STORM DRAIN PIPELAYER | 8/22/2019 | 08/31/2020** | 9/1/2020 | $2.01 A | 9/1/2021 | $2.26 A | 9/1/2022 | $2.26 A | 9/1/2023 | $2.35 A | 9/1/2024 | $2.50 A | 9/1/2025 | $2.50 A | | | | |
| Q | SEWER AND STORM DRAIN PIPE TRADESMAN | 8/22/2019 | 08/31/2020** | 9/1/2020 | $0.80 A | 9/1/2021 | $0.90 A | 9/1/2022 | $0.90 A | 9/1/2023 | $0.94 A | 9/1/2024 | $1.00 A | 9/1/2025 | $1.00 A | | | | |
| | SERVICE & REPAIR (PLUMBER/HVAC-FITTER) | 8/22/2019 | 08/31/2020** | 9/1/2020 | $2.01 A | 9/1/2021 | $2.26 A | 9/1/2022 | $2.26 A | 9/1/2023 | $2.35 A | 9/1/2024 | $2.50 A | 9/1/2025 | $2.50 A | | | | |
| | LANDSCAPE/IRRIGATION FITTER | 8/22/2019 | 08/31/2020** | 9/1/2020 | $2.01 A | 9/1/2021 | $2.26 A | 9/1/2022 | $2.26 A | 9/1/2023 | $2.35 A | 9/1/2024 | $2.50 A | 9/1/2025 | $2.50 A | | | | |
| R | LANDSCAPE/IRRIGATION TRADESMAN | 8/22/2019 | 08/31/2020** | 9/1/2020 | $0.52 A | 9/1/2021 | $0.59 A | 9/1/2022 | $0.59 A | 9/1/2023 | $0.61 A | 9/1/2024 | $0.65 A | 9/1/2025 | $0.65 A | | | | |
| | **ROOFER** | 8/22/2019 | 06/30/2020** | 7/1/2020 | $2.00 A | 7/1/2021 | $2.00 A | | | | | | | | | | | | |
| | PITCH WORK | 8/22/2019 | 06/30/2020** | 7/1/2020 | $2.00 A | 7/1/2021 | $2.00 A | | | | | | | | | | | | |

FOOTNOTES

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS

PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

**LOCALITY: IMPERIAL COUNTY**

**DETERMINATION: IMP-2019-2**

A THE PREDETERMINED INCREASE SHOWN IS TO BE ALLOCATED TO WAGES AND/OR EMPLOYER PAYMENTS. PLEASE CONTACT THE OFFICE OF THE DIRECTOR - RESEARCH UNIT AT (415) 703-4774 WHEN THE PREDETERMINED INCREASE BECOMES DUE TO CONFIRM THE DISTRIBUTION. PLEASE ALSO EXAMINE THE IMPORTANT NOTICES TO SEE IF ANY MODIFICATIONS HAVE BEEN ISSUED, AS THERE MAY BE REDUCTIONS TO PREDETERMINED INCREASES.

B $1.50 TO THE BASIC HOURLY RATE.

C THE RATIO OF BRICK TENDERS TO BRICKLAYERS SHALL BE AS FOLLOWS: ONE (1) BRICK TENDER TO NO MORE THAN THREE (3) BRICKLAYERS DURING THE INSTALLATION OF BLOCK ON A TYPICAL MASONRY PROJECT.

D $2.00 TO THE BASIC HOURLY RATE, $0.25 TO PENSION, $0.05 TO TRAINING AND $0.10 TO OTHER.

E THE FIRST WORKER ON THE SITE MUST BE A JOURNEYMAN TECHNICIAN GRADE #1 OR #2 OR ANY HIGHER PAID JOURNEYMAN CLASSIFICATION, SUCH AS JOURNEYMAN INSIDE WIREMAN; THEREAFTER THE CONTRACTOR MAY EMPLOY FIVE (5) JOURNEYMAN TECHNICIANS WITH A MAXIMUM OF TWO (2) LEVEL #5 TECHNICIANS PER CREW. THESE SIX (6) WORKERS SHALL CONSTITUTE A CREW ON THE JOB SITE.

F $0.98 TO THE BASIC HOURLY RATE AND $0.03 TO NEBF.

G $0.80 TO THE BASIC HOURLY RATE, AND $0.03 TO NEBF.

H $0.65 TO THE BASIC HOURLY RATE AND $0.02 TO NEBF.

I $0.55 TO THE BASIC HOURLY RATE AND $0.02 TO NEBF.

J $0.45 TO THE BASIC HOURLY RATE AND $0.01 TO NEBF.

K $1.00 TO THE BASIC HOURLY RATE, $1.09 TO PENSION AND $0.06 TO TRAINING.

L $3.81 REDUCED FROM PENSION.

M AN ADDITIONAL $0.25 PER HOUR WILL BE ADDED TO THE BASIC HOURLY RATE WHEN PERFORMING PAPERHANGING WORK.

N $1.00 TO THE BASIC HOURLY RATE, $0.90 TO PENSION AND $0.25 TO WAGES AND/OR FRINGES.

O $1.50 TO THE BASIC HOURLY RATE, $0.90 TO PENSION AND $0.25 TO WAGES AND/OR FRINGES.

P THE RATIO OF PLASTER TENDERS TO PLASTERERS SHALL BE AS FOLLOWS: THERE SHALL BE A PLASTER TENDER ON THE JOBSITE WHENEVER THERE IS A PLASTERER PERFORMING WORK ON THE JOBSITE, EXCEPT ON SMALL PATCH WORK WHERE ONLY ONE PLASTERER IS PERFORMING WORK. FOR INSIDE BROWN COATINGS THERE SHALL BE 2 PLASTER TENDERS FOR UP TO EVERY 3 PLASTERERS. FOR INSIDE FINISH COATINGS THERE SHALL BE 1 PLASTER TENDER FOR UP TO EVERY 3 PLASTERERS. ON OUTSIDE FINISH AND BROWN COATINGS AND FOR ALL OTHER WORK, THERE SHALL BE 1 PLASTER TENDER FOR UP TO EVERY 2 PLASTERERS.

Q PIPE TRADESMEN SHALL NOT BE PERMITTED ON ANY JOB WITHOUT A JOURNEYMAN.

R TRADESMEN SHALL ONLY BE USED IF THE FIRST WORKER ON THE JOB IS A LANDSCAPE/IRRIGATION FITTER, SECOND WORKER MUST BE A LANDSCAPE/IRRIGATION FITTER OR APPRENTICE LANDSCAPE/IRRIGATION FITTER. THE 3RD AND 4TH MAY BE A TRADESMAN. THE 5TH MUST BE A LANDSCAPE/IRRIGATION FITTER AND THEREAFTER TRADESMEN WILL BE REFERRED ON A 50-50 BASIS, TO JOURNEYMAN OR APPRENTICE.

IMP-2019-2-INC

"General Decision Number: CA20200002 08/28/2020

Superseded General Decision Number: CA20190002

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: Under Executive Order (EO) 13658, an hourly minimum wage of $10.80 for calendar year 2020 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, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.80 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 calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate,if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

| Modification Number | Publication Date |
|---|---|
| 0 | 01/03/2020 |
| 1 | 01/10/2020 |
| 2 | 01/31/2020 |
| 3 | 03/06/2020 |
| 4 | 04/17/2020 |
| 5 | 05/29/2020 |
| 6 | 06/05/2020 |
| 7 | 07/03/2020 |
| 8 | 07/17/2020 |
| 9 | 07/24/2020 |
| 10 | 07/31/2020 |
| 11 | 08/07/2020 |
| 12 | 08/14/2020 |
| 13 | 08/21/2020 |
| 14 | 08/28/2020 |

ASBE0005-002 09/01/2019

| | Rates | Fringes |
|---|---|---|
| Asbestos Workers/Insulator | | |

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(Includes the application of
all insulating materials,
protective coverings,
coatings, and finishes to all
types of mechanical systems).....$ 43.77            22.48
Fire Stop Technician
(Application of Firestopping
Materials for wall openings
and penetrations in walls,
floors, ceilings and curtain
walls)...........................$ 28.92            18.73
----------------------------------------------------------------
 ASBE0005-004 07/01/2019

                                  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)....$ 20.63            12.17
----------------------------------------------------------------
 BRCA0004-002 11/01/2018

                                  Rates          Fringes

BRICKLAYER; MARBLE SETTER........$ 48.11            17.54
----------------------------------------------------------------
 BRCA0018-004 06/01/2019

                                  Rates          Fringes

MARBLE FINISHER..................$ 33.43            14.11
TILE FINISHER....................$ 28.23            12.65
TILE LAYER.......................$ 40.07            18.36
----------------------------------------------------------------
 BRCA0018-010 09/01/2018

                                  Rates          Fringes

TERRAZZO FINISHER................$ 31.25            13.41
TERRAZZO WORKER/SETTER...........$ 38.39            14.18
----------------------------------------------------------------
 CARP0409-001 07/01/2018

                                  Rates          Fringes

CARPENTER
     (1) Carpenter, Cabinet
     Installer, Insulation
     Installer, Hardwood Floor
     Worker and acoustical
     installer...................$ 41.84            19.17
     (2) Millwright..............$ 42.91            19.17
     (3) Piledrivermen/Derrick
     Bargeman, Bridge or Dock
     Carpenter, Heavy Framer,
     Rock Bargeman or Scowman,
     Rockslinger, Shingler
     (Commercial)................$ 42.54            19.17
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     (4) Pneumatic Nailer,
     Power Stapler...............$ 40.09           19.17
     (5)  Sawfiler...............$ 39.83           19.17
     (6)  Scaffold Builder.......$ 31.60           19.17
     (7)  Table Power Saw
     Operator...................$ 40.93           19.17

  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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 CARP0409-002 07/01/2016

                                  Rates          Fringes

Diver
     (1) Wet....................$ 712.48          17.03
     (2) Standby................$ 356.24          17.03
     (3) Tender.................$ 348.24          17.03
     (4) Assistant Tender.......$ 324.24          17.03

Amounts in ""Rates' column are per day
----------------------------------------------------------------
 CARP0409-005 07/01/2015

                                  Rates          Fringes

Drywall
     DRYWALL INSTALLER/LATHER....$ 37.35          11.08
     STOCKER/SCRAPPER............$ 10.00           7.17
----------------------------------------------------------------
 CARP0409-008 08/01/2010

                                  Rates          Fringes

Modular Furniture Installer......$ 17.00           7.41
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 ELEC0569-002 06/01/2020

                                  Rates          Fringes

Electricians (Electrical
contracts of $500,000 or less)
     Cable Splicer...............$ 45.75         3%+14.88
      Tunnel Work................$ 51.38         3%+14.88
     Electrician.................$ 45.00         3%+14.88
      Tunnel Work................$ 50.63         3%+14.88
Electricians: (Electrical
contracts of $500,000 and
over)
     Cable Splicer...............$ 48.75         3%+14.88
      Tunnel Work................$ 54.38         3%+14.88
     Electrician.................$ 48.00         3%+14.88
      Tunnel Work................$ 53.63         3%+14.88
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 ELEC0569-005 06/01/2020

                                  Rates          Fringes

Sound & Communications
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     Sound Technician............$ 33.95            13.55
  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, freuency 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 10/01/2018

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.......$ 32.44             8.67
     Utility Technician #2.......$ 27.05             8.51

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 06/01/2020

                                  Rates          Fringes

LINE CONSTRUCTION
     (1) Lineman; Cable splicer..$ 59.14            20.78
     (2) Equipment specialist
     (operates crawler
     tractors, commercial motor
     vehicles, backhoes,
     trenchers, cranes (50 tons
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     and below), overhead &
     underground distribution
     line   equipment)..........$ 47.24           19.59
     (3) Groundman..............$ 36.12           19.19
     (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 01/01/2020

                                  Rates          Fringes

ELEVATOR MECHANIC...............$ 57.40       34.765+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 Years 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
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      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 followng 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 economatic 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
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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 bendng 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 tha 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, PILEDRIVING 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 whch 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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IRON0433-006 07/01/2020

| | Rates | Fringes |
|---|---|---|
| IRONWORKER | | |
| Fence Erector | $ 34.58 | 24.81 |
| Ornamental, Reinforcing and Structural | $ 41.00 | 33.45 |

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 01/01/2018

| | Rates | Fringes |
|---|---|---|
| Asbestos Removal Laborer | $ 33.19 | 17.78 |

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 07/01/2020

| | Rates | Fringes |
|---|---|---|
| LABORER (GUNITE) | | |
| GROUP 1 | $ 45.05 | 19.62 |
| GROUP 2 | $ 44.10 | 19.62 |
| GROUP 3 | $ 40.56 | 19.62 |

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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LABO1184-001 07/01/2020

| | Rates | Fringes |
|---|---|---|
| Laborers: (HORIZONTAL DIRECTIONAL DRILLING) | | |
| (1) Drilling Crew Laborer | $ 37.85 | 15.99 |
| (2) Vehicle Operator/Hauler | $ 38.02 | 15.99 |
| (3) Horizontal Directional Drill Operator | $ 39.87 | 15.99 |
| (4) Electronic Tracking Locator | $ 41.87 | 15.99 |
| Laborers: (STRIPING/SLURRY SEAL) | | |
| GROUP 1 | $ 39.06 | 19.01 |
| GROUP 2 | $ 40.36 | 19.01 |
| GROUP 3 | $ 42.37 | 19.01 |
| GROUP 4 | $ 44.11 | 19.01 |

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 07/01/2019

| | Rates | Fringes |
|---|---|---|
| LABORER (TUNNEL) | | |
| GROUP 1 | $ 41.29 | 20.09 |
| GROUP 2 | $ 41.61 | 20.09 |
| GROUP 3 | $ 42.07 | 20.09 |
| GROUP 4 | $ 42.76 | 20.09 |
| LABORER | | |
| GROUP 1 | $ 35.24 | 20.09 |
| GROUP 2 | $ 35.79 | 20.09 |
| GROUP 3 | $ 36.34 | 20.09 |

GROUP 4.....$ 37.89 20.09
GROUP 5.....$ 38.24 20.09

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, cabletender; 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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LABO1184-004 07/01/2020

| | Rates | Fringes |
|---|---|---|
| Brick Tender | $ 34.00 | 19.77 |

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LABO1414-003 08/05/2020

| | Rates | Fringes |
|---|---|---|
| LABORER | | |
| PLASTER CLEAN-UP LABORER | $ 36.03 | 21.01 |

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     PLASTER TENDER.............$ 38.58            21.01

 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.

 ----------------------------------------------------------------
  PAIN0036-008 10/01/2019

                                  Rates          Fringes

 DRYWALL FINISHER/TAPER...........$ 42.18            19.52
 ----------------------------------------------------------------
  PAIN0036-013 01/01/2020

                                  Rates          Fringes

 GLAZIER.........................$ 44.55            17.06
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 * PAIN0036-019 06/01/2020

                                  Rates          Fringes

 SOFT FLOOR LAYER................$ 32.27            17.24
 ----------------------------------------------------------------
  PLAS0200-004 08/07/2019

                                  Rates          Fringes

 PLASTERER.......................$ 43.73            16.03

 Work at Naval Air Facility Seeley:  $3.00 additional per hour
 ----------------------------------------------------------------
  PLAS0500-002 07/01/2020

                                  Rates          Fringes

 CEMENT MASON/CONCRETE FINISHER...$ 38.50           25.91
 ----------------------------------------------------------------
  PLUM0016-008 09/01/2019

                                  Rates          Fringes
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PLUMBER/PIPEFITTER
     Seeley Naval Air Station....$ 61.88           23.66
     Work ONLY on new additions
     and remodeling of bars,
     restaurants, stores and
     commercial buildings, not
     to exceed 5,000 sq. ft. of
     floor space................$ 49.83           22.68
     Work ONLY on strip malls,
     light commercial, tenant
     improvement and remodel
     work.......................$ 38.05           21.01
     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.......................$ 51.38           23.66
-----------------------------------------------------------------
 PLUM0345-001 09/01/2019

                                  Rates          Fringes

PLUMBER
     Landscape/Irrigation Fitter.$ 34.40           23.05
     Sewer & Storm Drain Work....$ 38.49           20.43
-----------------------------------------------------------------
 ROOF0045-001 07/01/2020

                                  Rates          Fringes

ROOFER.........................$ 36.25            9.24
-----------------------------------------------------------------
 SFCA0669-002 04/01/2020

                                  Rates          Fringes

SPRINKLER FITTER................$ 39.83           25.71
-----------------------------------------------------------------
 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
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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 www.dol.gov/whd/govcontracts.

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 Regional Office for the area in which the survey was conducted because those Regional Offices have 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:

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            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 DECISION"
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# 4. BID FORM

Project Identification: **City of Holtville – Water Treatment Plant Improvements Project**

Contract Identification and Number: _____

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## ARTICLE 1 - BID RECIPIENT

1.01 This Bid Is Submitted To: **City of Holtville, 121 West Fifth Street, Holtville, California 92250**

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 **one hundred twenty (120) 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 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.

E. 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.

F. 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.

G. 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.

H. The Bidder has given the Owner 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 Owner is acceptable to the Bidder.

I. 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.

J. 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**

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

| Item No. | Item Description | Units of Measure | Price Per Unit (In Figures) | Bid Quantity | Unit Cost |
|---|---|---|---|---|---|
| **1.** | **Mobilization for the Project.** | | | | |
| 1. a | Provide Insurance, Payment Bond, Performance Bond, Taxes, Temporary Facilities, Attain Permits and Licenses, Attend Meetings, Protection of Existing Facilities, Safety Requirements, Project Closeout, Demobilization. | Each | _____ | 1 | _____ |
| 1. b | Provide Project Sign. | Each | _____ | 1 | _____ |
| 1. c | Provide Submittals of equipment and material. | Each | _____ | 1 | _____ |
| 1. d | Provide excavation and verification (pothole) of existing underground utilities. | Each | _____ | 1 | _____ |
| 1. e | Mobilize and maintain Construction Office Trailer at project site. | Each | _____ | 1 | _____ |
| 1. f | Provide As-Built drawings and Operation & Maintenance Manuals for all equipment. | Each | _____ | 1 | _____ |
| | | | | | |
| **2** | **Construct the Clarifiers / Filters Shade Structure Improvements.** | | | | |
| 2. a | Construction of the Shade Structure. | Each | _____ | 1 | _____ |
| 2. b | Construction of Netting surrounding Clarifiers / Filters | Each | _____ | 1 | _____ |
| | | | | | |
| **3** | **Construct the Baffle System in the 1.5 MG Ground Storage Steel Water Tank.** | | | | |
| 3. a | Removal of existing coating within the interior of the Water Tank. | Each | _____ | 1 | _____ |
| 3. b | Recoat the interior of Water Tank. | Each | _____ | 1 | _____ |
| 3. c | Touch up coating of the exterior of the Water Tank. | Each | _____ | 1 | _____ |
| 3. d | Installation of the Baffle System in the | | _____ | 1 | _____ |

| Item No. | Item Description | Units of Measure | Price Per Unit (In Figures) | Bid Quantity | Unit Cost |
|---|---|---|---|---|---|
| | Water Tank. | Each | | | |
| 3. e | Disinfection Testing of Water Tank. | Each | _____ | 1 | _____ |
| | | | | | |
| **4** | **Construct the New Finish Water Pipeline Improvements.** | | | | |
| 4.a | Construction of the New Finish Water Pipeline Improvements. | Each | _____ | 1 | _____ |
| 4.b | Pressure Test of New Finish Water Pipeline. | Each | _____ | 1 | _____ |
| 4.c | Disinfection the New Finish Water Pipeline. | Each | _____ | 1 | _____ |
| | | | | | |
| **5** | **Rehabilitation of the 2.4 MG Ground Storage Steel Water Tank.** | | | | |
| 5. a | Removal of existing coating within the interior of the Water Tank. | Each | _____ | 1 | _____ |
| 5. b | Recoat the interior of Water Tank. | Each | _____ | 1 | _____ |
| 5. c | Disinfection Testing of Water Tank. | Each | _____ | 1 | _____ |
| 5. d | Remove and Replace the Interior Tank Ladder within the 2.4 MG Ground Storage Steel Water | Each | _____ | 1 | _____ |
| 5. e | Remove and Replace the four (4) 20-inch Vent Screens on top of the 2.4 MG Ground Storage Steel Water Tank. | Each | _____ | 1 | _____ |
| 5. f | Remove and Replace the interior Roof Clip Shoe Supports, including bolt down system, within the 2.4 MG Ground Storage Steel Water Tank. | Each | _____ | 1 | _____ |
| 5. g | Installation and commission of a Cathodic Protection System. | Each | _____ | 1 | _____ |
| 5. h | Start-up of Cathodic Protection System. | Each | _____ | 1 | _____ |
| | | | | | |
| **6** | **Install the Trihalomethane Removal System (TRS) Improvements.** | | | | |
| 6. a | Construction of Blower and Ventilation | | | 1 | |

| Item No. | Item Description | Units of Measure | Price Per Unit (In Figures) | Bid Quantity | Unit Cost |
|---|---|---|---|---|---|
| | System for TRS. | Each | _____ | | _____ |
| 6. b | Construction of Spray Aeration System for TRS. | Each | _____ | 1 | _____ |
| 6. c | Construction of Mixer System for TRS. | Each | _____ | 1 | _____ |
| 6. d | Start-up of TRS. | Each | _____ | 1 | _____ |
| | | | | | |
| **7** | **Construct the New Emergency Standby Generators Improvements.** | | | | |
| 7. a | Construct Concrete Foundation for Emergency Standby Generators at the Raw Water Ponds Site. | Each | _____ | 1 | _____ |
| 7. b | Installation of Emergency Standby Generator at the Raw Water Pond Site. | Each | _____ | 1 | _____ |
| 7. c | Start-up of Emergency Standby Generator at the Raw Water Pond Site. | Each | _____ | 1 | _____ |
| 7. d | Construct Concrete Foundation for Emergency Standby Generators at the Water Treatment Plant Site. | Each | _____ | 1 | _____ |
| 7. e | Installation of Emergency Standby Generator at the Water Treatment Plant Site. | Each | _____ | 1 | _____ |
| 7. f | Start-up of Emergency Standby Generator at the Water Treatment Plant Site. | Each | _____ | 1 | _____ |
| | | | | | |
| **8** | **Installation of the Electrical System and Control System Improvements.** | | | | |
| 8.a | Construct Water Treatment Plant Master (Main) PLC Cabinet work. This item includes all conduits, wiring and all appurtenant wiring/communication work. | Each | _____ | 1 | _____ |
| 8. b | Construct RIO PLC Cabinet work. This item includes all conduits, wiring and all appurtenant wiring/communication work. | Each | _____ | 1 | _____ |
| 8. c | Program all Control and SCADA system | | | 1 | |

| Item No. | Item Description | Units of Measure | Price Per Unit (In Figures) | Bid Quantity | Unit Cost |
|---|---|---|---|---|---|
| | for the PLC System and provide electrical and control computer equipment. | Each | _____ | | _____ |
| 8. d | Construct Electrical and Control for Raw Water Pump Station work. This item includes all antenna(s), conduits, wiring and all appurtenant wiring/communication work. | Each | _____ | 1 | _____ |
| 8. e | Construct Backwash Water Recovery Pump Control work. | Each | _____ | 1 | _____ |
| 8. f | Remove existing Finish Water Transfer Pumps' motors. | Each | _____ | 1 | _____ |
| 8. g | Replace the finish water transfer pump motors with variable speed inverter rated motors and variable frequency drives. This item shall include the installation of starters, conduits, wiring and all appurtenant pump motor work. | Each | _____ | 1 | _____ |
| 8. h | Construct all Electrical and Control for the TRS at the 2.4 MG Water Tank. This item includes all conduits, wiring and all appurtenant wiring/communication work. | Each | _____ | 1 | _____ |
| 8. i | Construct all Electrical and Control for the Cathodic Protection System at the 2.4 MG Water Tank. This item includes all conduits, wiring and all appurtenant wiring/communication work. | Each | _____ | 1 | _____ |
| 8. j | Complete all other Miscellaneous electrical and control work. | Each | _____ | 1 | _____ |
| | | | | | |

**TOTAL BID (Items 1 through 8)** in Figures $_____

**TOTAL BID (Items 1 through 8)** in Words $_____

_____

_____(only).

A. Unit Prices, if any, have been computed in accordance with **Paragraph 11.03.A** of the General Conditions.

**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 (Section 420);

B. Required Bid Security of ten percent (10%) in the form of a Bid Bond (Section 430) or Certified Check (circle type of security provided);

C. If Bid amount exceeds $10,000, signed Compliance Statement/Certifications of Nonsegregated Facilities (Section 440). Refer to specific equal opportunity requirements set forth in paragraph 18.10 of the General Conditions;

D. If Bid amount exceeds $25,000, signed Certification Regarding Debarment (Section 450);

E. If Bid amount exceeds $100,000, signed Certification for Contracts, Grant, and Loans (Section 460). Refer to paragraph 18.11 of the General Conditions;

F. Contractor's Certification Regarding Worker's Compensation Insurance (Section 470); and

G. A Tabulation of Subcontractors (Section 480);

H. Required Bidder Qualifications Statement with supporting data (Section 490);

I. Required Subcontractor Qualifications Statement with supporting data (Section 495);

J. Tabulation of Major Material Suppliers (Section 500); and

K. Disadvantage Business Enterprise Program (Section 630).

**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: _____

First Joint Venture Name: _____

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

SEAL, if required by State

Name (typed or printed): _____

Title: _____

Second Joint Venture Name: _____

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

SEAL, if required by State

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 _____, 2020.

**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):
**City of Holtville**
**121 West Fifth Street**
**Holtville, California 92250**

BID
Bid Due Date: **Thursday November 5, 2020**
Project: **City of Holtville – Water Treatment Plant Improvements Project**
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 |
|---|---|
| _____ (Seal) | _____ (Seal) |
| Bidder's Name and Corporate Seal | Surety's Name and Corporate Seal |
| By: _____ | By: _____ |
| Signature and Title | Signature and Title |
| | (Attach Power of Attorney) |
| Attest: _____ | Attest: _____ |
| Signature and Title | 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 **City of Holtville**
(Name of borrower or grantee)

Who expects to finance the contract with assistance from the Drinking Water State Revolving Fund (DWSRF), and Federally Funded Resources (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 either the DWSRF, or Federally Funded Resources, or to the office 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).

**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. CERTIFICATION REGARDING DEBARMENT

## Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – Lower Tier Covered Transactions.

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 7 CFR Part 3017.510, Participants' responsibilities. The regulations were published as Part IV of the January 30, 1989, Federal Register (pages 4722-4733). Copies of the regulations may be obtained by contacting the Department of Agriculture agency with which this transaction originated.

**(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS ON THE FOLLOWING PAGE)**

(1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is 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 lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

_____

Organization Name PR/Award Number or Project Name

_____

Name(s) and Title(s) of Authorized Representative(s)

_____

Signature(s) Date

## INSTRUCTIONS FOR CERTIFICATION

1. By signing and submitting this form, the prospective lower tier participant is providing the certification set out on the reverse side in accordance with these instructions.

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 lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

3. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant 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 lower tier participant agrees by submitting this form 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 department or agency with which this transaction originated.

6. The prospective lower tier participant further agrees by submitting this form that it will include this 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 it 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 principles. Each participant may, but is not required to, check the Nonprocurement List.

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 transaction knowingly entered 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 department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

## 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 From – 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.

_____ _____
(Name) (Date)

_____
(Title)

## 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 commending the performance of the work of this Contract.

_____
(Name of Contractor)

By: _____

_____
(Signature of Contractor)

Date: _____

## 11. TABULATION OF SUBCONTRACTORS

| No. | Subcontractor | Work To Be Performed |
|---|---|---|
| 1. | **Name:** | |
| | **Address:** | |
| | | |
| | **DIR Registration Number:** | |
| | | |
| | **CA Contractor's License Number:** | |
| | | |
| | **Percent of Total Contract:** | |
| 2. | **Name:** | |
| | **Address:** | |
| | | |
| | **DIR Registration Number:** | |
| | | |
| | **CA Contractor's License Number:** | |
| | | |
| | **Percent of Total Contract:** | |
| 3. | **Name:** | |
| | **Address:** | |
| | | |
| | **DIR Registration Number:** | |
| | | |
| | **CA Contractor's License Number:** | |
| | | |
| | **Percent of Total Contract:** | |
| 4. | **Name:** | |
| | **Address:** | |
| | | |
| | **DIR Registration Number:** | |
| | | |
| | **CA Contractor's License Number:** | |
| | | |
| | **Percent of Total Contract:** | |
| 5. | **Name:** | |
| | **Address:** | |
| | | |
| | **DIR Registration Number:** | |
| | | |
| | **CA Contractor's License Number:** | |
| | | |
| | **Percent of Total Contract:** | |

| No. | Subcontractor | Work To Be Performed |
|---|---|---|
| 6. | **Name:** | |
| | **Address:** | |
| | | |
| | **DIR Registration Number:** | |
| | | |
| | **CA Contractor's License Number:** | |
| | | |
| | **Percent of Total Contract:** | |
| 7. | **Name:** | |
| | **Address:** | |
| | | |
| | **DIR Registration Number:** | |
| | | |
| | **CA Contractor's License Number:** | |
| | | |
| | **Percent of Total Contract:** | |
| 8. | **Name:** | |
| | **Address:** | |
| | | |
| | **DIR Registration Number:** | |
| | | |
| | **CA Contractor's License Number:** | |
| | | |
| | **Percent of Total Contract:** | |
| 9. | **Name:** | |
| | **Address:** | |
| | | |
| | **DIR Registration Number:** | |
| | | |
| | **CA Contractor's License Number:** | |
| | | |
| | **Percent of Total Contract:** | |
| 10. | **Name:** | |
| | **Address:** | |
| | | |
| | **DIR Registration Number:** | |
| | | |
| | **CA Contractor's License Number:** | |
| | | |
| | **Percent of Total Contract:** | |

(ATTACH ADDITIONAL NUMBERED PAGES IF NEEDED)

## 12A. 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 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.** | | | | | |
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| **2.** | | | | | |
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## 12B. SUBCONTRACTOR QUALIFICATIONS STATEMENT

The bidder's subcontractors 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 by the subcontractors are true and accurate.

a. The subcontractor has been engaged in the contracting business under its present business name for _____ years. The name and address of the subcontractor is _____ _____.

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 Subcontractor has satisfactorily completed all contracts awarded to it, except as follows: (Name any and all exceptions and reasons therefore. Subcontractor 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.** | | | | | |
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| **2.** | | | | | |
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| **7.** | | | | | |
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## 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. | | | |
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| 11. | | | |
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| 12. | | | |
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| No. | Item | Manufacturer | Supplier |
|---|---|---|---|
| 13. | | | |
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(ATTACH ADDITIONAL NUMBERED PAGES IF NEEDED)

## 14. NOTICE OF AWARD

Dated: _____

| Project: **Water Treatment Plant Improvements Project** | Owner: **City of Holtville** | Owner's Contract No.: **SWRCB0000000000D180200500** |
|---|---|---|
| Contract: | | Engineer's Project No.: **116.455E** |

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 **City of Holtville – Water Treatment Plant Improvements Project**.

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.

**City of Holtville**
(Owner)

_____
(Authorized Signature)

_____
(Title)

**ACCEPTANCE NOTICE**

Receipt of above NOTICE OF AWARD is hereby acknowledged

By: _____,

this the _____ day of _____, 2020.

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

THIS AGREEMENT is by and between **City of Holtville** ("Owner")
and
_____("Contractor").

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

***TABLE OF ARTICLES*** ***Page***


| | |
|---|---|
| Agreement | 00521-1 |
| Article 1-Work | 00521-1 |
| Article 2-The Project | 00521-1 |
| Article 3-Engineer | 00521-1 |
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| 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:

**City of Holtville –Water Treatment Plant Improvements Project**

## 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:

**City of Holtville –Water Treatment Plant Improvements Project**

## ARTICLE 3 – ENGINEER

3.01 The Project has been designed by ***The Holt Group, Inc.*** (Engineer), who is to act as the Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to the Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

## ARTICLE 4 – CONTRACT TIMES

4.01 *Time is of the Essence*

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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 **three hundred fifty (330) 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 preceding 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 **$2,000.00** 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 and 5.01.B 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.

## 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

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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, <u>inter alias:</u>

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.

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## ARTICLE 7 – INTEREST

7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at **eight percent (8%)** 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 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 (pages 1 to 6, inclusive).

2. Performance Bond (pages _____ to _____, inclusive).

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3. Payment Bond (pages _____ to _____, inclusive).

4. Other bonds (pages _____ to _____, inclusive).

   a. (pages to , inclusive).

   b. (pages to , inclusive).

   c. (pages to , inclusive).

5. General Conditions (pages _____ to _____, inclusive).

6. Supplementary Conditions (pages _____ to _____, inclusive).

7. Technical Conditions (pages _____ to _____, inclusive).

8. Special Conditions (pages _____ to _____, inclusive).

9. Specifications as listed in the Table of Contents of the Project Manual.

10. Drawings consisting of _____ sheets.

11. Addenda (numbers _____ to _____, inclusive).

12. Exhibits to this Agreement (enumerated as follows):

    a. The Contractor's Bid (pages _____ to _____, inclusive).

    b. Documentation submitted by the Contractor prior to the Notice of Award (pages _____ to _____, inclusive).

    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 (pages _____ to _____, inclusive).

    b. Work Change Directives (pages _____ to _____, inclusive).

    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.

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## 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.

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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: **City of Holtville**

_____

By: _____

Title: _____

[CORPORATE SEAL]

Attest: _____

Title: _____

Address for giving notices:

_____

_____

_____

CONTRACTOR:

_____

By: _____

Title: _____

[CORPORATE SEAL]

Attest: _____

Title: _____

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: _____

Date: _____

By: _____

Title: _____

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## 16. NOTICE TO PROCEED

Dated: _____

| Project: | Owner: | Owner's Contract No.: |
|---|---|---|
| **Water Treatment Plant Improvements Project** | **City of Holtville** | **SWRCB0000000000D180200500** |
| Contract: | | Engineer's Project No.: **116.455E** |

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.

| | **City of Holtville** |
|---|---|
| Contractor | Owner |
| Given by: | Given by: |
| Authorized Signature | Authorized Signature |
| Title | Title |
| Date | Date |

Copy to: Resident 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):
**City of Holtville**
**121 West Fifth Street**
**Holtville, California 92250**

CONTRACT
Date:
Amount:
Description: **City of Holtville – Water Treatment Plant Improvement Project**

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**
Company:

Signature: (Seal)
Name and Title:

(Space is provided below for signatures of additional parties, if required.)

**SURETY**

(Seal)
Surety's Name and Corporate Seal

By:
Signature and Title
(Attach Power of Attorney)

Attest:
Signature and Title

**CONTRACTOR AS PRINCIPAL**
Company:

Signature: (Seal)
Name and Title:

**SURETY**

(Seal)
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

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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.

**FOR INFORMATION ONLY**
**(Name, Address and Telephone)**

**SURETY AGENCY OR BROKER:** _____

_____

_____

**OWNER'S REPRESENTATIVE:** ***The Holt Group, Inc.***
***1601 North Imperial Avenue, El Centro, CA 92243***
***Phone: (760) 337-3883 Fax: (760) 337-5997***

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## 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):
**City of Holtville**
**121 West Fifth Street**
**Holtville, California 92250**

CONTRACT
Date:
Amount:
**City of Holtville – Water Treatment Plant Improvements Project**

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:

Signature: _____ (Seal)
Name and Title:

**SURETY**

_____ (Seal)
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:

Signature: _____ (Seal)
Name and Title:

**SURETY**

_____ (Seal)
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.

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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.

**FOR INFORMATION ONLY**
**(Name, Address and Telephone)**

**SURETY AGENCY OR BROKER**: _____

_____

_____

**OWNER'S REPRESENTATIVE**: ***The Holt Group, Inc.***
***1601 North Imperial Avenue, El Centro, CA 92243***
***Phone: (760) 337-3883 Fax: (760) 337-5997***

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## 19. CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, _____the duly authorized and acting legal representative of

**City of Holtville** 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

| | |
|---|---|
| RECORDING REQUESTED BY:<br>City of Holtville<br>AND WHEN RECORDED MAIL TO:<br>Attn: Clerk of the Board<br>City of Holtville<br>(Name)<br>121 West Fifth Street<br>(Street Address)<br>Holtville, California 92250<br>(City, State, Zip) | |

SPACE ABOVE THIS LINE FOR
RECORDER'S USE

| | |
|---|---|
| Project:<br>**Water Treatment Plant Improvements Project** | Owner's Contract No.:<br>**SWRCB0000000000D180200500** |
| Owner:<br>**City of Holtville** | |
| Address of Owner:<br>**121 West Fifth Street, Holtville, California 92250** | Date of Contract: |
| Contractor: | Engineer's Project No.:<br>**116.455E** |

**This [tentative] [definitive] Certificate of Substantial Completion applies to:**

All Work under the Contract Documents: The following specified portions:

_____

_____

_____

_____
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:

_____

_____

_____

Contractor's Amended Responsibilities:

_____

_____

_____

The following documents are attached to and made part of this Certificate:

_____

_____

_____

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. DISADVANTAGE BUSINESS ENTERPRISE (DBE) PROGRAM

Bidders are advised that, as required by federal law and all recipients of federal funds and those of the Resources Control Board (SWRCB), The City of Holtville is implementing Disadvantaged Business Enterprise (DBE) requirements.

The DBE Program is an outreach, education, and goaling program designed to increase the participation of DBEs in procurements funded by Federally Funded agreements. The DBE Program encompasses many of the components of the former MBE/WBE Program and includes many new features. For further information on DBE Program, DBE certification, search for DBE, public information meetings, etc., refer to the following website:

Bidder shall meet Disadvantage Business Enterprise requirements as set forth by the Guidelines for Meeting the California State Revolving Fund (CASRF) Programs (Clean Water and Drinking Water SRF) Disadvantaged Business Enterprise Requirements. The Guidelines and forms are attached this specification section as follows.

California State Water Resources Control Board
Division of Financial Assistance
1001 I Street • Sacramento, California 95814 • (916) 341-5700 FAX (916) 341-5707
Mailing Address: P. O. Box 944212 • Sacramento, California • 94244-2120
Internet Address: http://www.waterboards.ca.gov

# Guidelines for Meeting the California State Revolving Fund (CASRF) Programs (Clean Water and Drinking Water SRF) Disadvantaged Business Enterprise Requirements

The Disadvantaged Business Enterprise (DBE) Program is an outreach, education, and objectives program designed to increase the participation of DBEs in the Clean Water State Revolving Fund (CWSRF) and Drinking Water State Revolving Fund (DWSRF) Programs.

## How to Achieve the Purpose of the Program

Recipients of CWSRF/DWSRF financing that are subject to the DBE requirements (recipients) are required to seek, and are encouraged to use, DBEs for their procurement needs. Recipients should award a "fair share" of sub-agreements to DBEs. This applies to all sub-agreements for equipment, supplies, construction, and services.

The key functional components of the DBE Program are as follows:

- Fair Share Objectives
- DBE Certification
- Six Good Faith Efforts
- Contract Administration Requirements
- DBE Reporting

## Disadvantaged Business Enterprises are:

- Entities owned and/or controlled by socially and economically disadvantaged individuals as described by Title X of the Clean Air Act Amendments of 1990 (42 U.S.C. 7601 note) (10% statute), and Public Law 102-389 (42 U.S.C. 4370d) (8% statute), respectively;
- Minority Business Enterprise (MBE) - entities that are at least 51% owned and/or controlled by a socially and economically disadvantaged individual as described by Title X of the Clean Air Act Amendments of 1990 (42 U.S.C. 7601 note), and Public Law 102-389 (42 U.S.C. 4370d), respectively;
- Women Business Enterprise (WBE) - entities that are at least 51% owned and/or controlled by women;
- Small Business Enterprise (SBE);
- Small Business in a Rural Area (SBRA);
- Labor Surplus Area Firm (LSAF); or
- Historically Underutilized Business (HUB) Zone Small Business Concern or a concern under a successor program.

## Certifying DBE Firms:

Under the DBE Program, entities can no longer self-certify and contractors and sub-contractors must be certified at bid opening. Contractors and sub-contractors must provide to the CASRF recipient proof of DBE certification. Certifications will be accepted from the following:

- The U.S. Environmental Protection Agency (USEPA)
- The Small Business Administration(SBA)
- The Department of Transportation's State implemented DBE Certification Program (with U.S. citizenship)
- Tribal, State and Local governments
- Independent private organization certifications

If an entity holds one of these certifications, it is considered acceptable for establishing status under the DBE Program.

## Six Good Faith Efforts (GFE)

All CWSRF/DWSRF financing recipients are required to complete and ensure that the prime contractor complies with the GFE below to ensure that DBEs have the opportunity to compete for financial assistance dollars.

1. Ensure DBEs are made aware of contracting opportunities to the fullest extent practical through outreach and recruitment activities. For Tribal, State and Local Government Recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
2. Make information on forthcoming opportunities available to DBEs. Posting solicitations for bids or proposals for a minimum of 30 calendar days in a local newspaper, before the bid opening date.
3. Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs.
4. Encourage contracting with a group of DBEs when a contract is too large for one firm to handle individually.
5. Use the services of the SBA **and/or** Minority Business Development Agency (MBDA) of the US Department of Commerce.
6. If the prime contractor awards subcontracts, require the prime contractor to take the above steps.

The forms listed in the table below and attached to these guidelines; must be completed and submitted with the GFE:

| FORM NUMBER | FORM NAME | REQUIREMENT | PROVIDED BY | COMPLETED BY | SUBMITTED TO |
|---|---|---|---|---|---|
| **SWRCB Form 4500-2 or EPA Form** | **DBE Sub-Contractor Participation Form** | **As Needed to Report Issues** | **Recipient** | **Sub-contractor** | **EPA DBE Coordinator** |
| **SWRCB Form 4500-3 or EPA Form** | **DBE Sub-Contractor Performance Form** | **Include with Bid or Proposal Package** | **Prime Contractor** | **Sub-Contractor** | **SWRCB by Recipient** |
| **SWRCB Form 4500-4 or EPA Form** | **DBE Sub-Contractor Utilization Form** | **Include with Bid or Proposal Package** | **Recipient** | **Prime Contractor** | **SWRCB by Recipient** |

**The completed forms must be submitted with each Bid or Proposal.** The recipient shall review the bidder's documents closely to determine that the GFE was performed **prior** to bid or proposal opening date. Failure to complete the GFE and to substantiate completion of the GFE before the bid opening date could jeopardize CWSRF/DWSRF financing for the project. The following situations and circumstances require action as indicated:

1. If the apparent successful low bidder was rejected, a complete explanation must be provided.
2. Failure of the apparent low bidder to **perform** the GFE **prior** to bid opening constitutes a non-responsive bid. The construction contract may then be awarded to the next low, responsive, and responsible bidder that meets the requirements or the Recipient may re-advertise the project.
3. If there is a bid dispute, all disputes shall be settled **prior** to submission of the Final Budget Approval Form.

## Administration Requirements

- A recipient of CWSRF/DWSRF financing must require entities receiving funds to create and maintain a Bidders List if the recipient of the financing agreement is subject to, or chooses to follow, competitive bidding requirements.
- The Bidders list must include all firms that bid or quote on prime contracts, or bid or quote on subcontracts, including both DBEs and non-DBEs.

- Information retained on the Bidder's List must include the following:
    1. Entity's name with point of contact;
    2. Entity's mailing address and telephone number;
    3. The project description on which the entity bid or quoted and when;
    4. Amount of bid/quote; and
    5. Entity's status as a DBE or non-DBE.
- The Bidders List must be kept until the recipient is no longer receiving funding under the agreement.
- The recipient shall include Bidders List as part of the Final Budget Approval Form.
- A recipient must require its prime contractor to pay its subcontractor for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the Recipient.
- A recipient must be notified in writing by its prime contractor prior to any termination of a DBE subcontractor by the prime contractor.
- If a DBE subcontractor fails to complete work under the subcontract for any reason, the recipient must require the prime contractor to employ the six GFEs if soliciting a replacement subcontractor.
- A recipient must require its prime contractor to employ the six GFEs even if the prime contractor has achieved its fair share objectives.

**Reporting Requirements**

For the duration of the construction contract(s), the recipient is required to submit to the State Water Resources Control Board DBE reports annually by October 10 of each fiscal year on the attached Utilization Report form (UR-334). Failure to provide this information as stipulated in the financial agreement language may be cause for withholding disbursements.

**CONTACT FOR MORE INFORMATION**

SWRCB, CASRF – Barbara August (916) 341-6952 barbara.august@waterboards.ca.gov

US EPA, Region 9 – Joe Ochab (415) 972-3761 ochab.joe@epa.gov

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## *Disadvantaged Business Enterprise (DBE) Program*

## *DBE Subcontractor Participation Form*

A Financial Assistance Agreement Recipient must require its prime contractors to provide this form to its DBE subcontractors. This form gives a DBE[1] subcontractor[2] the opportunity to describe work received and/or report any concerns regarding the funded project (e.g., in areas such as termination by prime contractor, late payments, etc.). The DBE subcontractor can, as an option, complete and submit this form to the DBE Coordinator at any time during the project period of performance.

| | | |
|---|---|---|
| Subcontractor Name | Project Name | |
| Bid / Proposal No. | Assistance Agreement ID No. (if known) | Point of Contact |
| Address | | |
| Telephone No. | Email Address | |
| Prime Contractor Name | Issuing/Funding Entity | |

| Contract Item Number | Description of Work Received from the Prime Contractor Involving Construction, Services, Equipment or Supplies | Amount Received by Prime Contractor |
|---|---|---|
| | | |

[1] A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.2015 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

[2] Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

Please use the space below to report any concerns regarding the above funded project:

| Subcontractor Signature | Print Name |
|---|---|
| | |
| **Title** | **Date** |
| | |

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

**Send completed Form 4500-2 to:**
Mr. Joe Ochab, DBE Coordinator
US EPA, Region 9
75 Hawthorne Street
San Francisco, CA 94105

***FORM 4500-2 (DBE Subcontractor Participation Form)***

## *Disadvantaged Business Enterprise (DBE) Program*

## *DBE Subcontractor Performance Form*

This form is intended to capture the DBE[1] subcontractor's[2] description of work to be performed and the price of the work submitted to the prime contractor. A Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractor's bid or proposal package.

| | | |
|---|---|---|
| Subcontractor Name | Project Name | |
| Bid / Proposal No. | Assistance Agreement ID No. (if known) | Point of Contact |
| Address | | |
| Telephone No. | Email Address | |
| Prime Contractor Name | Issuing/Funding Entity | |

| Contract Item Number | Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies | Price of Work Submitted to the Prime Contractor |
|---|---|---|
| | | |
| DBE Certified By: _ DOT _ SBA<br>Other: _____ | Meets/exceeds EPA certification standards?<br>YES NO Unknown | |

[1] A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.2015 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

[2] Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

| Prime Contractor Signature | Print Name |
|---|---|
| | |
| Title | Date |
| | |

| Subcontractor Signature | Print Name |
|---|---|
| | |
| Title | Date |
| | |

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

## *Disadvantaged Business Enterprise (DBE) Program*

## *DBE Subcontractor Utilization Form*

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE[1] subcontractor's[2] and the estimated dollar amount of each subcontract. A Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

| | | |
|---|---|---|
| Prime Contractor Name | Project Name | |
| Bid / Proposal No. | Assistance Agreement ID No. (if known) | Point of Contact |
| Address | | |
| Telephone No. | Email Address | |
| Issuing/Funding Entity | | |

I have identified potential DBE certified subcontractors. YES NO

If *yes*, please complete the table below. If *no*, please explain:

| Subcontractor Name/ Company Name | Company Address / Phone / Email | Estimated Dollar Amount | Currently DBE Certified? |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

*--Continue on back if needed--*

[1] A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.2015 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

[2] Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

| Prime Contractor Signature | Print Name |
|---|---|
| | |
| Title | Date |
| | |

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

**STATE WATER RESOURCES CONTROL BOARD – DIVISION OF FINANCIAL ASSISTANCE**
**DISADVANTAGED BUSINESS ENTERPRISE (DBE) UTILIZATION**
**CALIFORNIA STATE REVOLVING FUNDS (CASRF)**
**FORM UR-334**

| | | |
|---|---|---|
| **1. Grant/Finance Agreement Number:** | **2. Annual Reporting Period**<br>**10/1/___ through 09/30/_** | **3. Purchase Period of Financing Agreement:** |
| **4. Total Payments Paid to Prime Contractor or Sub-Contractors During Current Reporting Period: $** | | |
| **5. Recipient's Name and Address:** | **6. Recipient's Contact Person and Phone Number:** | |

**7. List All DBE Payments Paid by Recipient or Prime Contractor During Current Reporting Period:**

| Payment or Purchase Paid by Recipient or Prime Contractor | Amount Paid to Any DBE Contractor or Sub-Contractor For Service Provided to Recipient | | Date of Payment (MM/DD/YY) | Procurement Type Code** (see below) | Name and Address of DBE Contractor of Sub-Contractor or Vendor |
|---|---|---|---|---|---|
| | **MBE** | **WBE** | | | |
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| | | | | | |

| | |
|---|---|
| **8. Initial here if no DBE contractors or sub-contractors paid during current reporting period:** | |
| **9. Initial here if all procurements for this contract are completed:** | |
| **10. Comments:** | |
| **11. Signature and Title of Recipient's Authorized Representative** | **12. Date** |

**Email Form UR-334 to:**

DrinkingWaterSRF@waterboards.ca.gov OR CleanWaterSRF@waterboards.ca.gov

**Questions may be directed to:**

Barbara August, SWRCB
Barbara.August@waterboards.ca.gov
Phone: (916) 341-6952
Fax: (916) 327-7469

****Procurement Type:**
1. Construction
2. Supplies
3. Services (includes business services; professional services; repair services and personnel services)
4. Equipment

**STATE WATER RESOURCES CONTROL BOARD - DIVISION OF FINANCIAL ASSISTANCE**
**DISADVANTAGED BUSINESS ENTERPRISE (DBE) UTILIZATION**
**CALIFORNIA STATE REVOLVING FUNDS**

## INSTRUCTIONS FOR COMPLETING FORM UR-334

**Box 1** Grant or Financing Agreement Number.

**Box 2** Annual reporting period.

**Box 3** Enter the dates between which you made procurements under this financing agreement or grant.

**Box 4** Enter the total amount of payments paid to the contractor or sub-contractors during this reporting period.

**Box 5** Enter Recipient's Name and Address.

**Box 6** Enter Recipient's Contact Name and Phone Number.

**Box 7** Enter details for the **DBE purchases only** and be sure to limit them to the current period. 1) Use either an "R" or a "C" to represent "Recipient" or "Contractor." 2) Enter a dollar total for DBE and total the two columns at the bottom of the section. 3) Provide the payment date. 4) Enter a product type choice from those at the bottom of the page. 5) List the vendor name and address in the right-hand column

**Box 8** Initial here if no DBE contractors or sub-contractors were paid during this reporting period.

**Box 9** Initial this box only if all purchases under this financing agreement or grant have been completed during this reporting period or a previous period. If you initial this box, we will no longer send you a survey.

**Box 10** This box is for explanatory information or questions.

**Box 11** Provide an authorized representative signature.

**Box 12** Enter the date form completed.

# 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.


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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 Times.

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 Times 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.


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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 Times.

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


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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 Times 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 Times.

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.


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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.


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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 Times; Notice to Proceed*

A. The Contract Times 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 Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence 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 Times. 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.


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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.


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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.


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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


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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 Times Adjustments*

1. The Contract Price or the Contract Times, 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 Times 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 Times 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.


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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 Times, 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 Times, 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 Times, the Owner or Contractor may make a Claim therefore as provided in Paragraph 10.05.


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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 Times, 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.


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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 Times 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.


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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,


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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;


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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.


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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


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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.


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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 Times. 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 Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times 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 Times, 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


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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


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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 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.


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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.


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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


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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 will 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.


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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 may require 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.


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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.


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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 actor, 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; or

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,


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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


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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.


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8.05 *Lands and Easements; Reports and Tests*

A. The Owner's duties in respect of providing lands 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 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.


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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 Owner designates another representative or agent to represent Owner at the Site who is not 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 Times 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 Times, 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.


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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 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.


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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 Times, 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 Times 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 Times 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 Times 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 Times) 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


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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 in respect of 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 Times 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


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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


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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 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, expediters, 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 Owner and Engineer.

B. *Cash Allowances:*

1. The Contractor agrees that:


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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*

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 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.

## 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.


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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 Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times 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 Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.


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12.03 *Delays*

A. Where the Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of the Contractor, the Contract Times 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 Times, or both. The Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to the Contractor's ability to complete the Work within the Contract Times.

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 Times, if such adjustment is essential to the Contractor's ability to complete the Work within the Contract Times. 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 Times 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.


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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.


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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.


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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 a**fter 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, 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 Times 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.


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## 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:


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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 Owner with 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 Owner to 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;


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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.


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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 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 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


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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 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 Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to 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.


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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 Times, 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, 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.


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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


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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 Times 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.


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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


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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.


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18.08 *Clean Air and Pollution Control Acts*

A. If this Contract exceeds **$100,000**, 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.*). 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.


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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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## 23. SUPPLEMENTARY CONDITIONS

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These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract Funding Agency Edition (No. C-700, 2009 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. Believe

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.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.11 Add the following language to the end of Paragraph 1.01.A.11:**
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.33 Add the following language to the end of Paragraph 1.01.A.33:**
The Owner's Representative for this project is: **The Holt Group, Inc.** The Owner's Representative Consultants on this project are:

**1)** **Electrical Engineer –** Delta Systems Engineer, Inc.
**2)** **Geotechnical Engineer –** Landmark Consultants, Inc.

**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-4.01.C Delete Paragraph 4.01.C and insert the following in its place:**
The City of Holtville shall provide a land area to the Contractor for temporary construction facilities, storage of materials and equipment as further described in the Special Conditions section of the Specifications.

**SC-4.02 Add the following new paragraph immediately after Paragraph 4.02.D:**

E. In the preparation of Drawings and Specifications, Engineer relied upon the following As-Built Drawings and Reports at the Site:

1. **City of Holtville Water Treatment Plant Improvement Project As-Built Drawings prepared by Kennedy-Jenks Engineering dated November, 20, 1990.**

2. **City of Holtville Water System Improvement Project As-Built Plans prepared by The Holt Group, Inc. dated December, 20, 2010 - THG #116.191.**

3. **City of Holtville – Replacement of 1.5 Million Gallon Reservoir and Ultraviolet Disinfection System Improvement Project As-Built Plans prepared by The Holt Group, Inc., dated November 21, 2012 - THG #116.311.**

4. **City of Holtville – Replacement of 1.5 Million Gallon Reservoir and Ultraviolet Disinfection System Improvement Project Geotechnical Evaluation prepared by Ninyo & Moore, dated October 11, 2007_____ - THG #116.311 and N&M # 106193001,**

**SC-4.06 Delete Paragraph 4.06.A and 4.06.B in their entirety and insert the following:**

A. No reports or explorations or tests of subsurface conditions at or contiguous to the Site are known to the Owner or Engineer.

**SC-4.06.D Amend the beginning of Paragraph 4. 06.D to read as follows:**

If 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 Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately:

**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's 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's and eliminate the exclusion with respect to property under the care, custody, and control of the Contractor:

| | |
|---|---|
| a. General Aggregate | $2,000,000 |
| b. Products – Completed Operations Aggregate | $1,000,000 |
| c. Personal and Advertising Injury | $1,000,000 |
| d. Each Occurrence (Bodily Injury and Property Damage) | $2,000,000 |
| e. Excess or Umbrella Liability | |
| 1) General Aggregate | $5,000,000 |
| 2) Each Occurrence | $2,000,000 |

3. Automobile Liability under paragraph 5.04.6 of the General Conditions:

| | |
|---|---|
| a. Combined Single Limit | $1,000,000 |

4. Property Damage liability insurance will provide Explosion, Collapse and Underground (X,C,U) coverage's where applicable.

5. Contractual Liability coverage required by paragraph 5.04.B.4 of the General Conditions shall be provided as part of the General Liability coverage.

6. The Owner and Engineer are to be included as additional insureds.

**SC-5.06.A.4 Delete the first sentence of Paragraph 5.06.A.4 and replace with the following sentence.**
Cover materials and equipment stored at the site or at another location as noted on the Plans or Special Conditions Section of the Specifications, provided that such materials and equipment have been included in an application for Payment or Schedule of Values approved by the Owner's Representative.

**SC-5.06. Add the following new paragraph to the end of Paragraph 5.06.D:**

The Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of $2,000,000 in accordance with Paragraph 5.06. The Owner is to be included as additional insured on the policy:

**SC-6.02.B The first sentence of 6.02.B shall be deleted and replaced with the following sentence:**
At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall be approved by the Owner and engineer during the Submittal Review Process.

**SC-6.03.B Add the following to the first sentence of SC-6.03.B**:
. . . unless otherwise approved in writing by the Owner and the Owner's Representative.

**SC-6.06.C Amend the paragraph by making two subparagraphs under the title C.**

Engineer's Evaluation:

1. *During Bidding:* The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or "or-equal" materials and equipment as defined in Paragraph 6.05 of the General Conditions, or those substitute or materials and equipment approved by the Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of the required type, function, and quality to be met by any proposed substitute or "or-equal" item. A request for the Engineer's clarification of materials and equipment considered "or-equal" prior to the Effective Date of the Agreement must be received by the Engineer at least **five (5) days** prior to the date for receipt of Bids. No item of material or equipment will be considered by the Engineer as a substitute unless written request for approval has been submitted by the 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 sent forth in an Addendum issued to all prospective Bidders. The Bidders shall not rely upon approvals made in any other manner.

2. *After the Effective Date of the Agreement:* The 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. The Engineer may require the Contractor to furnish additional data about the proposed substitute item. The Engineer will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized until the 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". The Engineer will advise the Contractor in writing of any negative determination.

**SC-6.07. Add a new paragraph immediately after paragraph 6.07.G:**

H. The Contractor shall not award work valued at more than **eighty-five percent (85%)** of the Contract Price to subcontractor, without prior written approval of the Engineer.

**SC-6.07.B Delete the first paragraph of SC6.07.B and replace with the following paragraph:**

Article 12 of the Instruction to Bidders requires the identity of certain subcontractors, suppliers or other individuals or entities to be submitted with the Bidding Documents. 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 to identified may be revoked on the basis of reasonable objection after due investigation. If the Owner rejects a subcontractor or supplier as unacceptable, then 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. If the Owner and Contractor cannot agree on an acceptable subcontractor or supplier, then the Owner reserves the right to reject the Contractor's bid if the agreement between the Owner and Contractor has not been entered into, or terminate the agreement if the agreement has been entered into. No acceptance by 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 Owner or Engineer to reject defective Work.

**SC-6.14. Add the following language to the end of paragraph 6.14.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-6.21. Delete Paragraph 6.21.C.2 in its entirety.**

**SC-6.23. Delete Section 6.23 and replace with the following:**

A. Contractor will be required to provide professional design services as required to prepare the electrical shop drawing plans, specifications and related documents for the cathodic protection system, the TTHM removal system, and the electrical control system and instrumentation facilities for this project. The professional design services and related shop drawing plans, specifications and other related documents shall be in conformance with the Project Manual as defined by General Condition Section 1.01.A.38.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will indicate performance and design criteria or guidelines that such services must satisfy as contained within the Project Manual. Contractor shall cause such services or certificates to be provided by a properly licensed professional in the State of California, whose signature and seal shall appear on the shop drawing plans, calculations, specifications, certifications, and other submittals prepared by such professional. The professional's license shall be active and current.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.23, Engineer's review and approval of shop drawing calculations, plans and specifications and other submittal documents will be for the purpose of checking conformance with the requirements of the Design Manual.

**SC-9.03. Add the following language at the end of Paragraph 9.03:**

The Duties, Responsibilities and Limitations of Authority of the Resident Project Representative will be stated in the Agreement for Engineering Services executed for this specific Project.

**SC-10.05. Add the following new paragraph immediately after Paragraph 10.05.F:**

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 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 to file such a claim shall be defined in Public Contract Code Section 20104.2(e).

**SC-10.05.B The last sentence of Section 10.05.B shall be delted and replaced with the following sentence:**
The opposing party shall submit any response to Engineer and the claimant as stipulated in Supplementary Conditions Section SC-10.05.G.

**SC-10.05.C. Delete SC10.05.C.**

**SC-10.05.D. Delete SC-10.05.D.**

**SC-10.05.E. Delete SC-10.05.E.**

**SC-11.03.D.1. Delete Paragraph 11.03.D.1 in its entirety and insert the following in its place:**

1. The variation in the quantity of that particular item of Unit Price work performed by the Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and

**SC-14.02.C.1. Delete Paragraph 14.02.C.1 in its entirety and insert the following in its place:**

2. **Thirty (30) days** after presentation of the Application for Payment to Owner with 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 Owner to Contractor.

**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 Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

**SC-16.01 Delete Sections 16.01A, 16.01B and 16.01C. Replace Section 16.01.A with the following:**
Methods and procedures for dispute resolution shall conform with SC-10.05.G.

**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-20 Add the following new paragraphs:**

**ARTICLE 20 – BUY AMERICAN/USE OF AMERICAN IRON AND STEEL**

**General:**
All iron and steel products used in the project shall be produced in the United States, unless a waiver is provided by the United States Environmental Protection Agency (EPA).

The term "iron and steel products" means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves structural steel, reinforced precast concrete, and construction materials.

Production of iron or steel products in the United States requires that all manufacturing processes must take place in the United States, except metallurgical processes such as melting, refining, forming, rolling, drawing, finishing, fabricating, and coating. Steel means an alloy that includes at least 50 percent iron and between 0.02 and 2 percent carbon and may contain other elements.

International trade agreements have no effect on this provision for this contract. Local government entities, such as Owner, are not obligated under international trade agreements to treat foreign produced iron and steel the same as United States produced iron and steel.

See the following EPA website for further information and details on this requirement: http://water.epa.gove/grants_funding/aisrequirement.cfm. See especially the "American Iron and Steel Requirement Guidance" at the website.

**Documentation:**

Contractor shall collect Buy American documentation for each iron and steel product used in the project. The documentation shall show that all production processes for each product occurred in the United States. Documentation shall show the manufacturer(s) involved in production of the product and the city and state where each process occurred. Copies of all Buy American documentation shall be submitted to Engineer. This shall be submitted along with any other products under the EPA issued "De Minimus" waiver, Contractor shall collect the documentation required under that waiver and submit a copy to Engineer. Additional information, including example product certifications and the De Minimus waiver can be found at the above referenced EPA website.

**Waivers:**
EPA may grant a waiver if it determines that:

1. Applying the requirement would be inconsistent with the public interest,
2. Iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality, or
3. Inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent

Owner is the entity that formally makes the request for a waiver, including requests that originate from Contractor or subcontractors or suppliers. EPA requires detailed supporting information to evaluate a waiver request. See the above referenced EPA website for additional information on the waiver process. Owner shall send waiver request, in the form of a Word document (.doc), along with all supporting documentation, to the SRF program. The SRF program will forward waivers to EPA.

EPA will make available to the public on an informal basis a copy of the waiver request and information available to the EPA concerning the request, and shall allow for informal public input on the request for at least 15 days prior to making a finding based on the request. EPA shall make the waiver request and accompanying information available on the above referenced EPA website. If EPA grants a waiver, it will publish such waiver on that website.

**SC-21 Add the following new paragraphs:**

**ARTICLE 21 - ADDITIONAL STATE REQUIREMENTS**

21.01 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.

21.02 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.

## 25. CONTRACTOR'S APPLICATION FOR PAYMENT

| | | |
|---|---|---|
| | Application Period: | Application Date: |
| To (Owner): **City of Holtville** | From (Contractor): | Via (Owner's Representative) |
| Project: **Water Treatment Plant Improvements** | Contract: | |
| Owner's Contract No.: | Contractor's Project No.: | Engineer's Project No.: **116.455E** |

**APPLICATION FOR PAYMENT**

**Change Order Summary**

| Approved Change Orders | | |
|---|---|---|
| Number | Additions | Deductions |
| | | |
| | | |
| | | |
| | | |
| TOTALS | | |
| NET CHANGE BY CHANGE ORDERS | | |

**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.

| By: | Date: |
|---|---|

**1. ORIGINAL CONTRACT PRICE** ..... $ _____

**2. Net change by Change Orders** ..... $ _____

**3. CURRENT CONTRACT PRICE (Line 1 ± 2)** ..... $ _____

**4. TOTAL COMPLETED AND STORED TO DATE**

**(Column F on Progress Estimate)** ..... $ _____

**5. RETAINAGE:**

**a. _____ % x $_____ Work Completed** ..... $ _____

**b. _____ % x $_____ Stored Material** ..... $ _____

**c. Total Retainage (Line 5a + Line 5b)** ..... $ _____

**6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)** ..... $ _____

**7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)** ..... $ _____

**8. AMOUNT DUE THIS APPLICATION** ..... $ _____

**9. BALANCE TO FINISH, PLUS RETAINAGE**

**(Column G on Progress Estimate + Line 5 above)** ..... $ _____

Payment of: $_____
(Line 8 or other - attach explanation of other amount)

is recommended by: _____ _____
(Owner's Representative) (Date)

Payment of: $_____
(Line 8 or other - attach explanation of other amount)

is approved by: _____ _____
(Owner) (Date)

Approved by: _____ _____
Funding Agency (if applicable) (Date)

**PROGRESS ESTIMATE** **CONTRACTOR'S APPLICATION**

| | |
|---|---|
| For (contract): | Application Number: |
| Application Period: | Application Date: |

| A | | | | B | C | D | E | F | | G |
|---|---|---|---|---|---|---|---|---|---|---|
| Item | | 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) |
| Bid Item No. | Description | | | | | | | | | |
| | | | | | | | | | | |
| | **TOTALS** | | | | | | | | | |

## 26. CHANGE ORDER FORM

**No. _____**

Date of Issuance:

Effective Date:

Project:
**Water Treatment Improvements Project**

Owner:
**City of Holtville**

Owner's Contract No.:

Contract:

Date of Contract:

Contractor:

Owner's Project No.:
**116.455E**

**The Contract Documents are modified as follows upon execution of this Change Order:**

Description:

Attachments: (List documents supporting change):

**CHANGE IN CONTRACT PRICE:**

Original Contract Price:

$_____

[Increase] [Decrease] from previously approved Change Orders No._____ to No._____:

$_____

Contract Price prior to this Change Order:

$_____

[Increase] [Decrease] of this Change Order:

$_____

Contract Price incorporating this Change Order:

$_____

**CHANGE IN CONTRACT TIMES:**

Original Contract ☐ Working days ☐ Calendar days
Substantial completion (days or date): _____
Ready for final payment (days or date): _____

[Increase] [Decrease] from previously approved Change Orders No._____ to No._____:

Substantial completion (days): _____
Ready for final payment (days): _____

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:
Substantial completion (days or date): _____
Ready for final payment (days or date): _____

Contract Times with all approved Change Orders:
Substantial completion (days or date): _____
Ready for final payment (days or date): _____

| RECOMMENDED: | ACCEPTED: | ACCEPTED: |
|---|---|---|
| By: _____ | By: _____ | By: _____ |
| Engineer (Authorized Signature) | Owner (Authorized Signature) | Contractor (Authorized Signature) |
| Date: _____ | Date: _____ | Date: _____ |
| Approved by Funding Agency (if applicable): | Date: _____ | Date: _____ |

## CHANGE ORDER INSTRUCTIONS

A. *General Information*

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered 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 Times, a Field Order should be used.

B. *Completing the Change Order Form*

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Owner or 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. Engineer should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

## 27. SPECIAL CONDITIONS


| SECTION | DESCRIPTION | |
|---|---|---|
| **1** | Scope | 00840-2 |
| **2** | Business License | 00840-2 |
| **3** | Sequence of Construction | 00840-2 |
| **4** | Inspection of Work | 00840-4 |
| **5** | Air Pollution Control District Requirements | 00840-6 |
| **6** | Environmental Report Requirements | 00840-6 |
| **7** | Permits | 00840-6 |
| **8** | Project Signs | 00840-6 |
| **9** | Geotechnical Testing | 00840-10 |
| **10** | Appendix | 00840-10 |

## 1. Scope

These Special Conditions supplement the General Conditions, Technical Specifications, and Plans. All requirements and provisions of the General Conditions, Technical Specifications and Plans apply.

## 2. Business License

The Contractor and Subcontractors performing work on this project shall obtain a business license from the City of Holtville at 121 West Fifth Street, Holtville, California 92250, telephone number (760) 356-2912. The Contractor and Subcontractors shall contact the City Clerk regarding the cost of the license and include the business license cost in the proposal.

## 3. Sequence of Construction

The Contractor shall prepare and submit for review a sequence of construction to complete the work of the City of Holtville – Water Treatment Plant Improvements Project prior to 21 days before the start of construction. The work will be sequenced to maintain the WTP in operation during the entire construction period.

Primary sequence of construction activities to be submitted for review shall include, but not limited to, the following:

3.01 Sequenced mobilization onto Project Site

3.02 Sequenced demolition of existing facilities

3.03 Sequenced construction, including the following:

a. Rehabilitation of the 2.4 MG Water Storage Tank - See Section 11900;

i. Emptying and Refilling of Water Storage Tank.

ii. Removal and Installation of new Interior Coating.

iii. Removal and Installation of new Interior Tank Accessories.

iv. Installation of the new Cathodic Protection System

v. Rehabilitation of Exterior Coating of Tank, if applicable (See Section 11900).

b. In-Reservoir Trihalomethane Removal System (TRS) - See Section 13290,

   i. Installation of a TRS; including sprayation system, mixers, exterior blowers and foundation work, blower ducting.

   ii. Rehabilitation of Exterior Coating of Tank, if applicable (See Section 11900).

   iii. Electrical Work to provide power and control between the TRS control panel: and equipment, and electrical switch board (power), and new PLC system in the laboratory (control) (See Divisions 16 & 17).

c. Finish Water Pipeline Installation,

   i. Adjusting the existing Magnetic Flowmeter; including wiring work.

   ii. Installation of New Finish Water Pipeline.

   iii. Disinfection of Water Pipelines

d. Clarifier/Mix Media Filters Shade Structure,

   i. Construction of Structural Footings.

   ii. Erection of Steel Shade Structure.

   iii. Installation of Steel Shade Structure Lighting.

e. Construction of the Standby Emergency Generators (For the Water Treatment Plant and the Raw Water Ponds Site),

   i. The construction of the Standby Generators are to be expedited for construction of this project. It is requested that the generator submittal be processed within 21 days from the Notice To Proceed. Followed by immediate fabrication and construction of the generator set.

   ii. Setup Temporary Standby Power, as applicable.

   iii. Relocation of existing generator. Demolition of existing Generator Pad.

iv. Construction of new Generator Pad.

v. Installation and commissioning of new Generator.

f. Water Plant Electrical Control Improvements – See Electrical and Instrumentation Design Plan Sheets and Divisions 16 & 17

i. Removal and Installation of new Master PLC Cabinet with an associated Remote I/O Cabinet and PC Based HMI System

ii. Installation of two (2) new VFD base starters within the Existing Electrical Room, as shown in the Electrical Site Plan (E002).

iii. Removal and Installation of two (2) new Inverter Rated Motors for the Finish Water Transfer Pumps (See Section 15380 – Motors).

3.04 Sequenced Close Out and Demobilization

3.05 The Contractor shall inform the Owner and the Owner's Representative a minimum of 14 days prior to facility and/or pipeline outages, if necessary.

3.06 Other Items: Any other significant project construction activity items required by the Contract Documents which are not listed in the above paragraphs 3.01 to 3.05 should be included in the Sequence of Construction submittal. The Contractor shall complete the required activities during the construction period. In the event construction activities not listed within the contents of the Sequence of Construction are identified as impacting the day-to-day operation of the City of Holtville Water Treatment Plant and effecting the ability of the City of Holtville Water Treatment Plant to provide the City of Holtville Water Distribution water demand, then the Owner's Representative shall include the construction activity and define the construction activity sequence of events. The Contractor shall comply with the sequence of construction requirements for the additional identified construction activities as required by the Owner's Representative. The Contractor shall keep the Water Treatment Plant in operation at all times.

## 4. Inspection of Work

4.01 All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the Contract Documents.

4.02 The Contractor shall provide all inspection and testing services unless specified to be provided by the Owner's Representative.

4.03 The Owner's Representative shall provide at the Contractor's expense the testing and inspection services required by the Contract Documents if the Contractor fails or refuses to provide the required testing and inspection services.

4.04 If the Contract documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any work to specifically be inspected, tested, or approved by someone other than the Owner's Representative, the Contractor will give the Owner's Representative timely notice of readiness. The Contractor will then furnish the Owner's Representative the required certificates of inspection, testing or approval.

4.05 Inspections, tests, or approvals by the Owner's Representative or others shall not relieve the Contractor from the obligations to perform the work in accordance with the requirements of the Contract Documents.

4.06 If any work is covered prior to inspection by the Owner's Representative it must, if requested by the Owner's Representative, be uncovered for the Owner's Representative's observation and replaced at the Contractor's expense.

4.07 The Owner and the Owner's Representative will at all times have access to the work. In addition, authorized representatives and agents of any participating Federal or State agency shall be permitted to inspect all work, materials, payrolls, records, invoices of materials, and other relevant data and records. The Contractor will provide proper facilities for such access, observation of the work, and also for any inspection/testing thereof.

4.08 If the Owner's Representative considers it necessary or advisable that covered work be inspected or tested by others, the Contractor, at the Owner's Representative's request, will uncover, expose or otherwise make available for observation, inspection or testing as the Owner's Representative may require, that portion of the work in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such work is defective, the Contractor will bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction. If, however, such work is not found to be defective, the Contractor will be allowed an increase in the contract price or any extension of the contract time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and construction and an appropriate change order shall be issued.

## 5. 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 for dust mitigation.

For implementation of the THM Removal System, the contractor shall be responsible for coordination and submittal of the blower and ventilation system, along with a request of exemption from any permit requirements.

## 6. Environmental Report Requirements

Environmental Documents have not been prepared for this Project. The Project was exempted by California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA).

The Contractor is responsible for exercising their Best Management Practices (BMPs) during the duration of construction on the Project Site.

The Contractor shall make a special effort to control dust during the execution of the work. Dust shall be maintained to a minimum by regular applications of water as necessary and as directed by the Owner's representative.

## 7. Permits

The Contractor shall obtain all necessary permits from the City of Holtville. The contractor shall notify the City of Holtville and The Holt Group, Inc. The contractor shall include all expenses associated with the Holtville business license in the proposal submitted to the City.

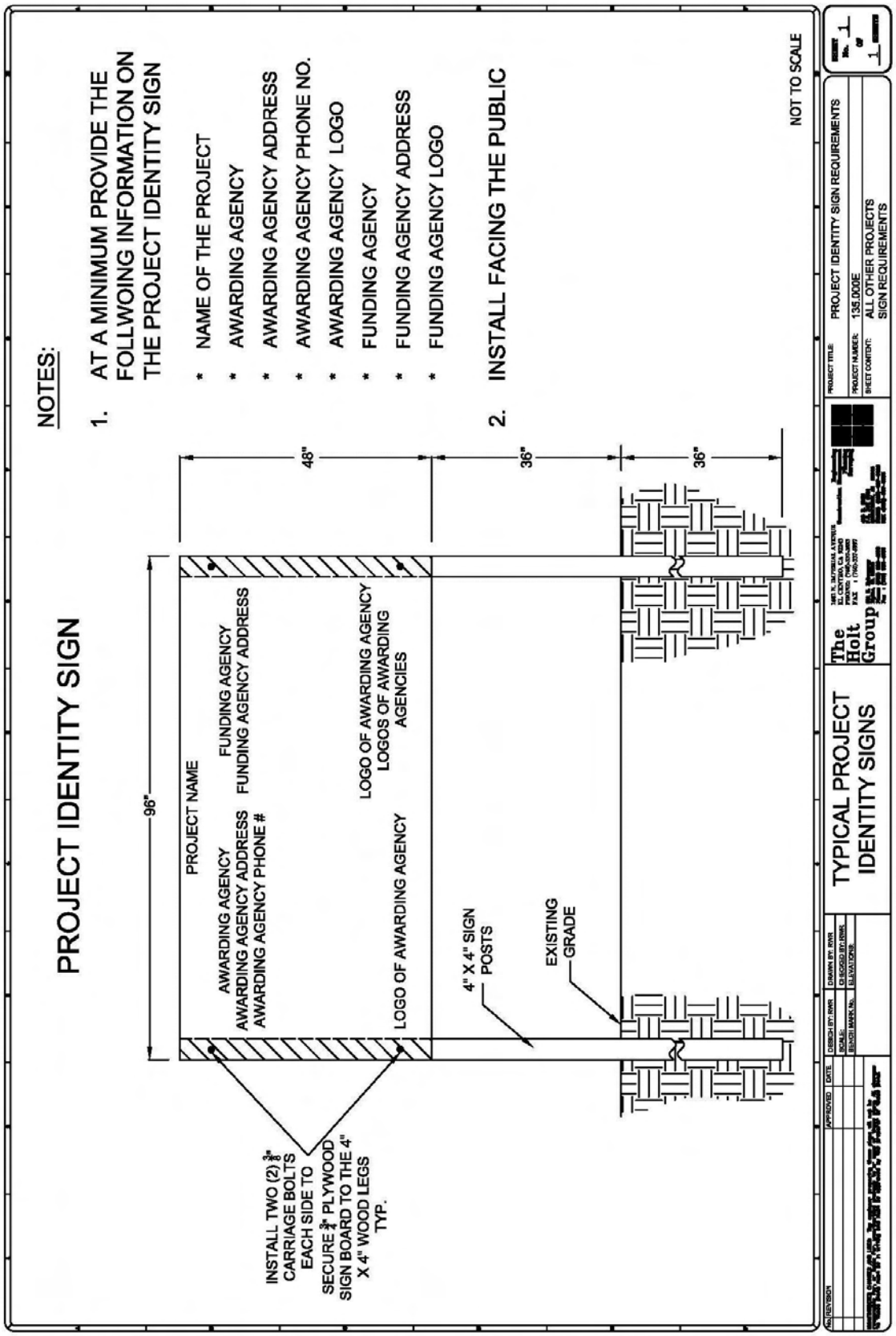
## 8. Project Signs

California labor laws require employee notices and posters be provided at all project sites that employ workers. 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 a construction project, along with EEO, OSHA and other required postings.

The Contractor shall provide, install and maintain a Project Sign. The sign shall measure 4’ x 8’ and made of 3/4-inch thick exterior grade plywood and adhere to the project specifications. The sign shall be prepared by a professional sign painter. A clear Plexiglas plate is to be placed over the sign to protect the posters from the elements.

The Project signs shall be submitted to the Engineer as a submittal document for review and approval. 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 project.

The project signs are illustrated at the end of this section.


PROJECT IDENTITY SIGN
NOTES:
1. AT A MINIMUM PROVIDE THE FOLLWOING INFORMATION ON THE PROJECT IDENTITY SIGN
* NAME OF THE PROJECT
* AWARDING AGENCY
* AWARDING AGENCY ADDRESS
* AWARDING AGENCY PHONE NO.
* AWARDING AGENCY LOGO
* FUNDING AGENCY
* FUNDING AGENCY ADDRESS
* FUNDING AGENCY LOGO
2. INSTALL FACING THE PUBLIC
NOT TO SCALE
96"
48"
36"
36"
PROJECT NAME
AWARDING AGENCY
AWARDING AGENCY ADDRESS
AWARDING AGENCY PHONE #
FUNDING AGENCY
FUNDING AGENCY ADDRESS
LOGO OF AWARDING AGENCY
LOGOS OF AWARDING AGENCIES
LOGO OF AWARDING AGENCY
4" X 4" SIGN POSTS
EXISTING GRADE
INSTALL TWO (2) 3/8" CARRIAGE BOLTS EACH SIDE TO SECURE 3/4" PLYWOOD SIGN BOARD TO THE 4" X 4" WOOD LEGS TYP.
TYPICAL PROJECT IDENTITY SIGNS
The Holt Group
PROJECT TITLE: PROJECT IDENTITY SIGN REQUIREMENTS
PROJECT NUMBER: 135.000E
SHEET CONTENT: ALL OTHER PROJECTS SIGN REQUIREMENTS
No. 1 of 1

## 9. Geotechnical Testing

A Geotechnical Report has been prepared for the construction of the Shade Structure. The Geotechnical Report is attached to these Special Conditions as an Appendix.

This project will require geotechnical testing as specified within the contents of the plans and specifications. The cost for the Geotechnical Testing shall be borne by the Contractor and included as a part of this specific Scope of Work. A copy of all tests shall be forwarded to the Owner's Representative within two (2) days after the testing is complete.

The Owner's Representative shall determine the location of the tests. Any other compaction testing and requirements can be found in Section 02200 of the Technical Specifications.

## 10. Appendix

The Exhibits contained within the Appendix are as follows:

**APPENDIX – LIST OF EXHIBITS**

| Exhibit | Item |
|---|---|
| A | Geotechnical Report – Proposed Clarifier / Filter Shade Structure – Holtville Water Treatment Plant, dated June 2020 |

## Geotechnical Report

# Proposed Clarifier/Filter Shade Structure
## Holtville Water Treatment Plant
## 180 E. 4th Street
## Holtville, California

Prepared for:

**The Holt Group**
**1601 N. Imperial Avenue**
**El Centro, CA 92243**

LANDMARK
Geo-Engineers and Geologists

Prepared by:

**Landmark Consultants, Inc.**
**780 N. 4th Street**
**El Centro, CA 92243**
**(760) 370-3000**

**June 2020**

LANDMARK
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77-948 Wildcat Drive
Palm Desert, CA 92211
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gchandra@landmark-ca.com

June 5, 2020

Mr. Juny Marmolejo
The Holt Group
1601 N. Imperial Avenue
El Centro, CA 92243

**Limited Geotechnical Report**
**Clarifier/Filter Shade Structure**
**Holtville Water Treatment Plant**
**180 E. 4th Street**
**Holtville, California**
***LCI Report No. LE20083***

Dear Mr. Marmolejo:

Landmark Consultants, Inc. is providing this limited geotechnical report for the proposed installation of a shade structure over the existing clarifier/filter units at the Holtville Water Treatment Plant located at 180 E. 4th Street in Holtville, California. The proposed shade structure will consist of steel columns with a metal roof. Column loads for the shade structure are estimated to range from 10 to 30 kips. If structural loads exceed those stated above, we should be notified so we may evaluate their impact on foundation settlement and bearing capacity.

Ninyo and Moore Geotechnical and Environmental Consultants (Ninyo & Moore) conducted a geotechnical investigation in 2011 at the water plant (Ninyo & Moore Project No. 106193003, dated November 4, 2011) for the 1.5 million-gallon reservoir tank at the water treatment plant for The Holt Group. Our report describes our soil engineering site evaluation and presents our professional opinions regarding geotechnical conditions at the sites to be considered in the design and construction of the project based on the subsurface exploration data obtained by Ninyo and Moore in 2011.

## Field Exploration

Ninyo and Moore conducted a geotechnical investigation in 2011 at the water treatment plant site for the 1.5 million-gallon reservoir tank located about 30 feet north from the proposed shade structure. Subsurface exploration was performed on October 10 and 11, 2011, and consisted of four (4) borings to a maximum depth of 61.5 feet below existing ground surface. Boring B-4 was converted into a piezometer consisting of a 2-inch diameter PVC pipe with a gravel pack and bentonite seal installed to a depth of approximately 20 feet. The borings were advanced with a truck-mounted drill rig using 8-inch diameter, hollow-stem, continuous-flight augers. The approximate boring locations were established in the field and plotted on the site map by sighting to discernible site features. The boring locations are shown on the Site and Exploration Plan (Plate A-2).

**Seismic Parameters**

Seismic Risk: The project site is located in the seismically active Imperial Valley of southern California with numerous mapped faults of the San Andreas Fault System traversing the region. The San Andreas Fault System is comprised of the San Andreas, San Jacinto, and Elsinore fault zones in southern California. The Imperial fault represents a transition from the more continuous San Andreas fault to a more nearly echelon pattern characteristic of the faults under the Gulf of California (USGS 1990). We have performed a computer-aided search of known faults or seismic zones that lie within a 38-mile (61 kilometer) radius of the project site as provided in Table 1.

A fault map illustrating known active faults relative to the site is presented on Figure 1, *Regional Fault Map*. A legend for the regional fault map is presented on Figure 2. The criterion for fault classification adopted by the California Geological Survey defines Earthquake Fault Zones along active or potentially active faults. An active fault is one that has ruptured during Holocene time (roughly within the last 11,000 years). A fault that has ruptured during the last 1.8 million years (Quaternary time), but has not been proven by direct evidence to have not moved within Holocene time is considered to be potentially active. A fault that has not moved during both Pleistocene and Holocene time (that is no movement within the last 1.8 million years) is considered to be inactive.

Review of the current Alquist-Priolo Earthquake Fault Zone maps (CGS, 2000a) indicates that the nearest mapped Earthquake Fault Zone is the Rico fault located approximately 1.2 miles west of the project site and the Imperial fault located approximately 3.0 miles west of the project site.

Site Acceleration: The project site is considered likely to be subjected to moderate to strong ground motion from earthquakes in the region. Ground motions are dependent primarily on the earthquake magnitude and distance to the seismogenic (rupture) zone. Accelerations also are dependent upon attenuation by rock and soil deposits, direction of rupture and type of fault; therefore, ground motions may vary considerably in the same general area. The project site is considered likely to be subjected to moderate to strong ground motion from earthquakes in the region. Ground motions are dependent primarily on the earthquake magnitude and distance to the seismogenic (rupture) zone. Acceleration magnitudes also are dependent upon attenuation by rock and soil deposits, direction of rupture and type of fault; therefore, ground motions may vary considerably in the same general area.

2019 CBC General Ground Motion Parameters: The California Building Code (CBC) requires that a site-specific ground motion hazard analysis be performed in accordance with ASCE 7-16 Section 11.4.8 for structures on Site Class D and E sites with $S_1$ greater than or equal to 0.2 and Site Class E sites with $S_s$ greater than or equal to 1.0. **This project site has been classified as Site Class D and has a $S_1$ value of 0.6, which would require a site-specific ground motion hazard analysis**. However, ASCE 7-16 Section 11.4.8 provides three exceptions which permit the use of conservative values of design parameters for certain conditions for Site Class D and E sites in lieu of a site specific hazard analysis. The exceptions are:

- Exception 1: Structures on Site Class E sites with $S_s$ greater than or equal to 1.0, provided the site coefficient $F_a$ is taken as equal to that of Site Class C.
- Exception 2: Structures on Site Class D sites with $S_1$ greater than or equal to 0.2, provided the value of the seismic response coefficient $C_s$ is determined by Equations 12.8-2 for values of $T \leq 1.5T_S$ and taken as equal to 1.5 times the value computed in accordance with either Equation 12.8-3 for $T_L \geq T > 1.5T_S$ or Equation 12.8-4 for $T > T_L$.
- Exception 3: Structures on Site Class E sites with $S_1$ greater than or equal to 0.2, provided that $T$ is less than or equal to $T_S$ and the equivalent static force procedure is used for design.

**The project structural engineer should confirm that an exception applies to the project.** If none of the exceptions apply, our office should be consulted to perform a site-specific ground motion hazard analysis.

The 2019 CBC general ground motion parameters are based on the Risk-Targeted Maximum Considered Earthquake ($MCE_R$). The Structural Engineers Association of California (SEAOC) and Office of Statewide Health Planning and Development (OSHPD) Seismic Design Maps Web Application (SEAOC, 2020) was used to obtain the site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters. Design spectral response acceleration parameters are defined as the earthquake ground motions that are two-thirds (2/3) of the corresponding $MCE_R$ ground motions. The Maximum Considered Earthquake Geometric Mean ($MCE_G$) peak ground acceleration adjusted for soil site class effects ($PGA_M$) value to be used for liquefaction and seismic settlement analysis in accordance with 2019 CBC Section 1803.5.12 ($PGA_M = F_{PGA}*PGA$) is estimated at 0.68g for the project site. **Design earthquake ground motion parameters are provided in Table 2.**

## Subsurface Soil and Groundwater

Subsurface soils encountered during the 2011 Ninyo & Moore field exploration consist of approximately 7 feet of fill material consisting of brown, moist to wet, very stiff, sandy to silty clay and medium dense, sandy silt with scattered gravel. Lake bed deposits were reported in the borings underlying the fills to the depths explored. As encountered, the material generally consisted of various shades of brown and gray, moist to saturated, stiff to hard, silty to sandy clay to clayey silt and loose to medium dense, sandy silt to silty sand.

Ninyo & Moore reported groundwater at a depth of approximately 19 feet at the time of drilling. Groundwater was measured at a depth of approximately 17 feet approximately (Ninyo & Moore, 2011). The site is underlain predominantly by relatively low permeability materials such as silts and clays. Evaluating groundwater levels in low permeability soils is often problematic as it often takes hours to days to achieve a stable equilibrium.

There is uncertainty in the accuracy of short-term water level measurements, particularly in fine-grained soil. Groundwater levels may fluctuate with variations in ground surface topography, irrigation of adjacent properties, drainage, and site grading. The referenced groundwater level should not be interpreted to represent an accurate or permanent condition.

## Liquefaction Potential

Liquefaction occurs when granular soil below the water table is subjected to vibratory motions, such as produced by earthquakes. With strong ground shaking, an increase in pore water pressure develops as the soil tends to reduce in volume. If the increase in pore water pressure is sufficient to reduce the vertical effective stress (suspending the soil particles in water), the soil strength decreases and the soil behaves as a liquid (similar to quicksand). Liquefaction can produce excessive settlement, ground rupture, lateral spreading, or failure of shallow bearing foundations. Four conditions are generally required for liquefaction to occur:

(1) the soil must be saturated (relatively shallow groundwater);
(2) the soil must be loosely packed (low to medium relative density);
(3) the soil must be relatively cohesionless (not clayey); and
(4) groundshaking of sufficient intensity must occur to function as a trigger mechanism.

Due to the predominantly cohesive nature of the underlying soils, Ninyo & Moore indicated that the project area is not considered susceptible to liquefaction or seismically induced dynamic settlements.

## Site Preparation

Subgrade Preparation for Shade Structure Spread Footings: The exposed surface soil within foundation areas should be removed to 18 inches below the bottom of the foundation elevation or existing grade (whichever is lower) extending two (2) feet beyond all foundation lines. Exposed subgrade should be scarified to a minimum depth of 6 inches, uniformly moisture conditioned to above optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density. The native soil is suitable for use as engineered fill provided it is free from concentrations of organic matter or other deleterious material. The fill soil should be uniformly moisture conditioned by discing and watering to the limits specified above, placed in maximum 8-inch lifts (loose), and compacted to the limits specified above.

## Foundations and Settlements

The columns for the metal shade structures may either be placed on individual spread footings or short drilled piers (reinforced concrete).

Spread Footings: Spread footings placed with 2 feet of embedment in compacted native clay soils may be designed with an allowable soil pressure of 1,500 psf. The allowable soil pressure may be increased by 20% for each foot of embedment depth in excess of 24 inches and by one-third for short term loads induced by winds or seismic events. The maximum allowable soil pressure at increased embedment depths shall not exceed 3,000 psf.

Spread footings should have a minimum horizontal dimension of 36 inches. Recommended concrete reinforcement and sizing for all footings should be provided by the structural engineer. Resistance to horizontal loads will be developed by passive earth pressure on the sides of footings and frictional resistance developed along the bases of footings. Passive resistance to lateral earth pressure may be calculated using an equivalent fluid pressure of 250 pcf to resist lateral loadings. The top one foot of embedment should not be considered in computing passive resistance unless the adjacent area is confined by a slab or pavement. An allowable friction coefficient of 0.25 may also be used at the base of the footings to resist lateral loading.

Drilled Piers: Individual short piers may also be adequate to support the shade structure. Embedment depth for short piers to resist lateral loads where no lateral constraint at the ground surface is provided may be designed using the following formula per 2019 CBC Section 1807.3.2.1:

$$d = A/2\ [1 + (1+4.36h/A)^{1/2}]$$

where:

$A = 2.34P/S_1b$
$b$ = Pier diameter in feet
d = Embedment depth in feet (but not over 12 ft for purpose of computing lateral pressure)
h = Distance in feet from ground surface to point of application of "P"
P = Applied lateral force in pounds
$S_1$ = Allowable lateral soil bearing pressure (basic value of 100 psf/ft. Isolated piers that are not adversely affected by a 0.5 inch motion at the ground surface due to short-term lateral loads are permitted to be designed using lateral soil bearing pressures equal to two times the provided value (200 psf/ft). This load increase should not be used for the security camera pole foundation designs.

The short pier foundations may be designed using an allowable soil bearing pressure of 1,500 psf. The cohesion value shall be multiplied by the contact area, as limited by Section 1806.3 of the 2019 CBC. Uplift capacity may be determined by using ⅔ of the cohesion value (cohesion = 130 psf).

***Installation*:** Excavation for piers should be inspected by the geotechnical consultant. A tremie pipe should be used to pour concrete from the bottom up and to ensure less than five feet of free fall. Groundwater was reported at approximately 17 feet by Ninyo & Moore. The structural steel and concrete should be placed immediately after drilling. Prior to placing any structural steel or concrete, loose soil or slough material should be removed from the bottom of the drilled pier excavation.

## Concrete Mixes and Corrosivity

No laboratory tests for soil chemical properties for corrosion or sulfate resistance have been made. However, native soil deposits are generally known to be aggressive to concrete and can cause severe corrosion to steel. A minimum of 6.0 sacks per cubic yard of concrete (4,500 psi) of Type V Portland Cement with a maximum water/cement ratio of 0.45 (by weight) should be used for concrete placed in contact with native soil on this project. Admixtures may be required to allow placement of this low water/cement ratio concrete.

Foundation designs shall provide a minimum concrete cover of three (3) inches around steel reinforcing or embedded components (anchor bolts, hold-downs, etc.) to 18 inches above grade. If the 3-inch concrete edge distance cannot be achieved, all embedded steel components (anchor bolts, rebar, thrust anchors, etc.) shall be epoxy dipped for corrosion protection or a corrosion inhibitor and a permanent waterproofing membrane shall be placed along the exterior face of the exterior footings. Additionally, the concrete should be thoroughly vibrated at footings during placement to decrease the permeability of the concrete.

## Closure

We appreciate the opportunity to provide our findings and professional opinions regarding geotechnical conditions at the site. If you have any questions or comments regarding our findings, please call our office at (760) 370-3000.

Respectfully Submitted,
***Landmark Consultants, Inc.***

Julian Avalos, PE
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
JULIAN R. AVALOS
No. 73339
EXPIRES 12-31-20
CIVIL
STATE OF CALIFORNIA

Steven K. Williams, PG, EG
Senior Engineering Geologist

PROFESSIONAL GEOLOGIST
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# TABLES

**Table 1**
**Summary of Characteristics of Closest Known Active Faults**

| Fault Name | Approximate Distance (miles) | Approximate Distance (km) | Maximum Moment Magnitude (Mw) | Fault Length (km) | Slip Rate (mm/yr) |
|---|---|---|---|---|---|
| Rico * | 1.2 | 1.9 | | | |
| Imperial | 3.0 | 4.7 | 7 | 62 ± 6 | 20 ± 5 |
| Brawley * | 5.6 | 8.9 | | | |
| Superstition Hills | 13.0 | 20.8 | 6.6 | 23 ± 2 | 4 ± 2 |
| Superstition Mountain | 18.6 | 29.7 | 6.6 | 24 ± 2 | 5 ± 3 |
| Unnamed 2* | 19.4 | 31.1 | | | |
| Cerro Prieto * | 21.3 | 34.1 | | | |
| Unnamed 1* | 21.7 | 34.8 | | | |
| Yuha* | 23.4 | 37.5 | | | |
| Borrego (Mexico)* | 23.8 | 38.0 | | | |
| Laguna Salada | 25.5 | 40.8 | 7 | 67 ± 7 | 3.5 ± 1.5 |
| Algodones * | 25.6 | 40.9 | | | |
| Pescadores (Mexico)* | 25.9 | 41.5 | | | |
| Cucapah (Mexico)* | 26.1 | 41.7 | | | |
| Shell Beds | 26.5 | 42.3 | | | |
| Yuha Well * | 26.8 | 42.8 | | | |
| Vista de Anza* | 30.1 | 48.2 | | | |
| Elmore Ranch | 30.9 | 49.4 | 6.6 | 29 ± 3 | 1 ± 0.5 |
| Painted Gorge Wash* | 30.9 | 49.5 | | | |
| Ocotillo* | 34.4 | 55.0 | | | |
| Elsinore - Coyote Mountain | 37.8 | 60.5 | 6.8 | 39 ± 4 | 4 ± 2 |
| San Jacinto - Borrego | 38.2 | 61.1 | 6.6 | 29 ± 3 | 4 ± 2 |

* Note: Faults not included in CGS database.

# Table 2
## 2019 California Building Code (CBC) and ASCE 7-16 Seismic Parameters

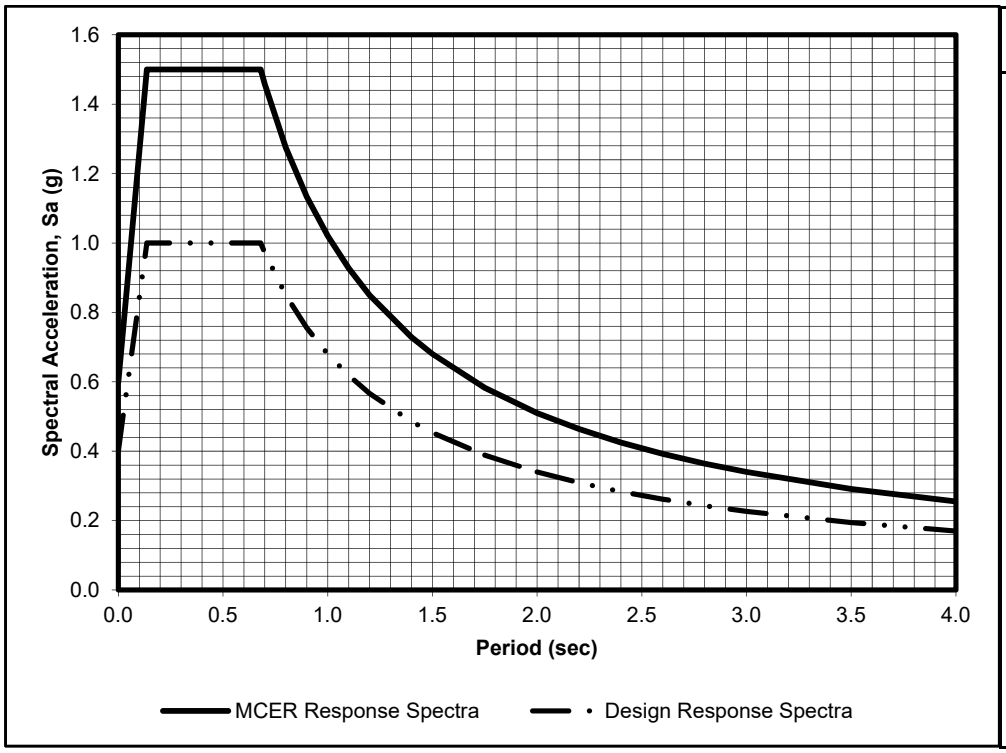
| | | | ASCE 7-16 Reference |
|---|---|---|---|
| Soil Site Class: | **D** | | Table 20.3-1 |
| Latitude: | 32.8085 | N | |
| Longitude: | -115.3799 | W | |
| Risk Category: | I | | |
| Seismic Design Category: | D | | |

### Maximum Considered Earthquake (MCE) Ground Motion

| | | | | |
|---|---|---|---|---|
| Mapped $MCE_R$ Short Period Spectral Response | $S_s$ | 1.500 g | ASCE Figure 22-1 | |
| Mapped $MCE_R$ 1 second Spectral Response | $S_1$ | 0.600 g | ASCE Figure 22-2 | |
| Short Period (0.2 s) Site Coefficient | $F_a$ | 1.00 | ASCE Table 11.4-1 | |
| Long Period (1.0 s) Site Coefficient | $F_v$ | 1.70 | ASCE Table 11.4-2 | |
| $MCE_R$ Spectral Response Acceleration Parameter (0.2 s) | $S_{MS}$ | 1.500 g | = Fa * $S_s$ | ASCE Equation 11.4-1 |
| $MCE_R$ Spectral Response Acceleration Parameter (1.0 s) | $S_{M1}$ | 1.020 g | = Fv * $S_1$ | ASCE Equation 11.4-2 |

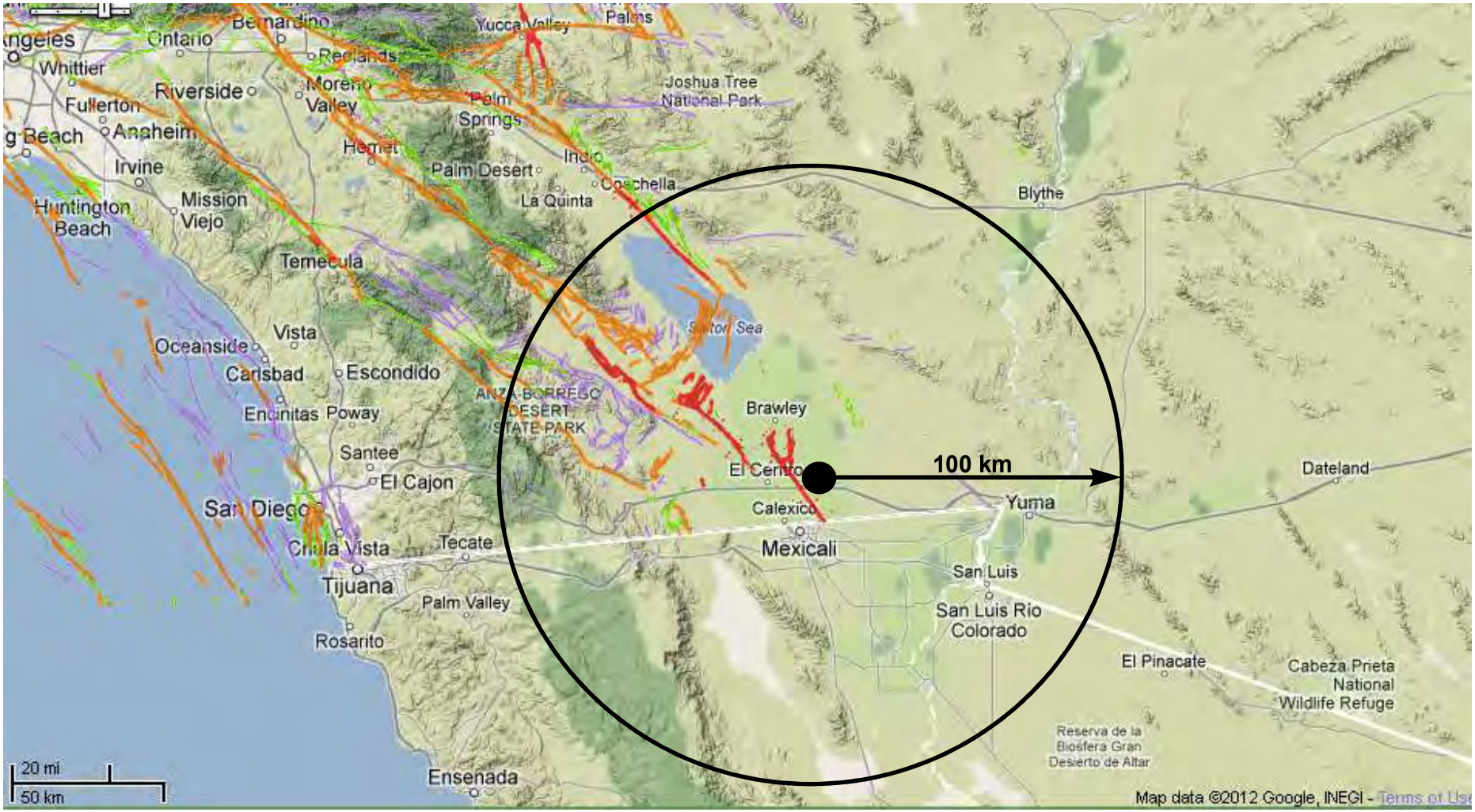
### Design Earthquake Ground Motion

| | | | | |
|---|---|---|---|---|
| Design Spectral Response Acceleration Parameter (0.2 s) | $S_{DS}$ | 1.000 g | = 2/3*$S_{MS}$ | ASCE Equation 11.4-3 |
| Design Spectral Response Acceleration Parameter (1.0 s) | $S_{D1}$ | 0.680 g | = 2/3*$S_{M1}$ | ASCE Equation 11.4-4 |
| Risk Coefficient at Short Periods (less than 0.2 s) | $C_{RS}$ | 0.942 | | ASCE Figure 22-17 |
| Risk Coefficient at Long Periods (greater than 1.0 s) | $C_{R1}$ | 0.914 | | ASCE Figure 22-18 |
| | $T_L$ | 8.00 sec | | ASCE Figure 22-12 |
| | $T_O$ | 0.14 sec | =0.2*$S_{D1}$/$S_{DS}$ | |
| | $T_S$ | 0.68 sec | =$S_{D1}$/$S_{DS}$ | |
| Peak Ground Acceleration | $PGA_M$ | 0.68 g | | ASCE Equation 11.8-1 |




| Period T (sec) | Sa (g) | $MCE_R$ Sa (g) |
|---|---|---|
| 0.00 | 0.40 | 0.60 |
| 0.14 | 1.00 | 1.50 |
| 0.68 | 1.00 | 1.50 |
| 0.70 | 0.97 | 1.46 |
| 0.80 | 0.85 | 1.28 |
| 0.90 | 0.76 | 1.13 |
| 1.00 | 0.68 | 1.02 |
| 1.10 | 0.62 | 0.93 |
| 1.20 | 0.57 | 0.85 |
| 1.20 | 0.57 | 0.85 |
| 1.40 | 0.49 | 0.73 |
| 1.50 | 0.45 | 0.68 |
| 1.75 | 0.39 | 0.58 |
| 2.00 | 0.34 | 0.51 |
| 2.20 | 0.31 | 0.46 |
| 2.40 | 0.28 | 0.43 |
| 2.60 | 0.26 | 0.39 |
| 2.80 | 0.24 | 0.36 |
| 3.00 | 0.23 | 0.34 |
| 3.50 | 0.19 | 0.29 |
| 4.00 | 0.17 | 0.26 |

# FIGURES




Source: California Geological Survey 2010 Fault Activity Map of California
http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#

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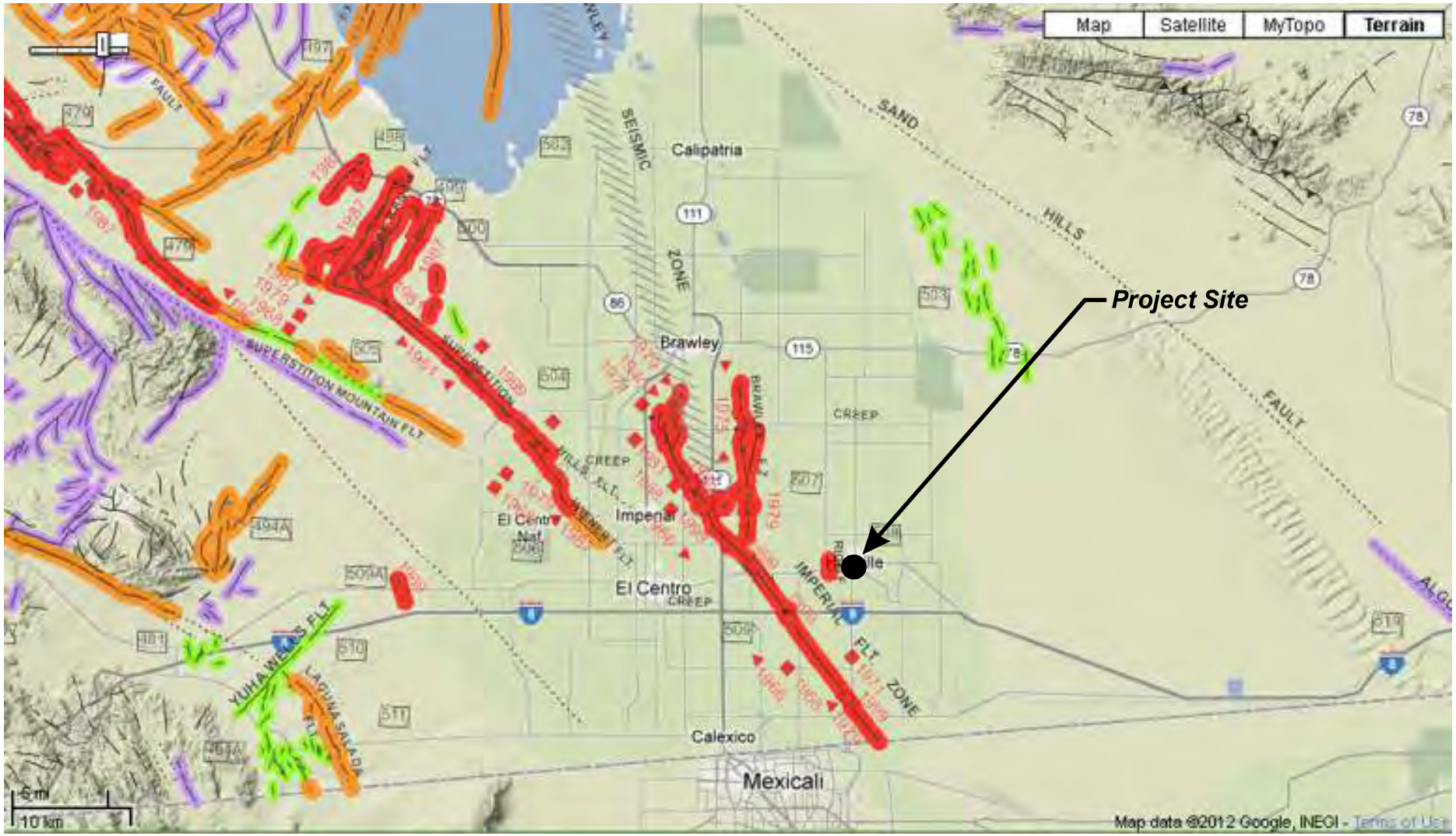
Regional Fault Map

Figure 1




Source: California Geological Survey 2010 Fault Activity Map of California
http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#

| | | |
|---|---|---|
| LANDMARK Geo-Engineers and Geologists<br>Project No.: LE20083 | Map of Local Faults | Figure 2 |

# EXPLANATION

Fault traces on land are indicated by solid lines where well located, by dashed lines where approximately located or inferred, and by dotted lines where concealed by younger rocks or by lakes or bays. Fault traces are queried where continuation or existence is uncertain. Concealed faults in the Great Valley are based on maps of selected subsurface horizons, so locations shown are approximate and may indicate structural trend only. All offshore faults based on seismic reflection profile records are shown as solid lines where well defined, dashed where inferred, queried where uncertain.

## FAULT CLASSIFICATION COLOR CODE
(Indicating Recency of Movement)

Fault along which historic (last 200 years) displacement has occurred and is associated with one or more of the following:

(a) a recorded earthquake with surface rupture. (Also included are some well-defined surface breaks caused by ground shaking during earthquakes, e.g. extensive ground breakage, not on the White Wolf fault, caused by the Arvin-Tehachapi earthquake of 1952). The date of the associated earthquake is indicated. Where repeated surface ruptures on the same fault have occurred, only the date of the latest movement may be indicated, especially if earlier reports are not well documented as to location of ground breaks.

(b) fault creep slippage - slow ground displacement usually without accompanying earthquakes.

(c) displaced survey lines.

1906 ▶ ◀ 1906
1838 ▷ ◁ 1838

A triangle to the right or left of the date indicates termination point of observed surface displacement. Solid red triangle indicates known location of rupture termination point. Open black triangle indicates uncertain or estimated location of rupture termination point.

▶ 1951 ◀

Date bracketed by triangles indicates local fault break.

1992

No triangle by date indicates an intermediate point along fault break.

CREEP

Fault that exhibits fault creep slippage. Hachures indicate linear extent of fault creep. Annotation (creep with leader) indicates representative locations where fault creep has been observed and recorded.

1969
1968 ■ ■ 1968

Square on fault indicates where fault creep slippage has occured that has been triggered by an earthquake on some other fault. Date of causative earthquake indicated. Squares to right and left of date indicate terminal points between which triggered creep slippage has occurred (creep either continuous or intermittent between these end points).

Holocene fault displacement (during past 11,700 years) without historic record. Geomorphic evidence for Holocene faulting includes sag ponds, scarps showing little erosion, or the following features in Holocene age deposits: offset stream courses, linear scarps, shutter ridges, and triangular faceted spurs. Recency of faulting offshore is based on the interpreted age of the youngest strata displaced by faulting.

Late Quaternary fault displacement (during past 700,000 years). Geomorphic evidence similar to that described for Holocene faults except features are less distinct. Faulting may be younger, but lack of younger overlying deposits precludes more accurate age classification.

Quaternary fault (age undifferentiated). Most faults of this category show evidence of displacement sometime during the past 1.6 million years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age. Unnumbered Quaternary faults were based on Fault Map of California, 1975. See Bulletin 201, Appendix D for source data.

Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement. Some faults are shown in this category because the source of mapping used was of reconnaissnce nature, or was not done with the object of dating fault displacements. Faults in this category are not necessarily inactive.

## ADDITIONAL FAULT SYMBOLS

Bar and ball on downthrown side (relative or apparent).

Arrows along fault indicate relative or apparent direction of lateral movement.

Arrow on fault indicates direction of dip.

Low angle fault (barbs on upper plate). Fault surface generally dips less than 45° but locally may have been subsequently steepened. On offshore faults, barbs simply indicate a reverse fault regardless of steepness of dip.

## OTHER SYMBOLS

491

Numbers refer to annotations listed in the appendices of the accompanying report. Annotations include fault name, age of fault displacement, and pertinent references including Earthquake Fault Zone maps where a fault has been zoned by the Alquist-Priolo Earthquake Fault Zoning Act. This Act requires the State Geologist to delineate zones to encompass faults with Holocene displacement.

Structural discontinuity (offshore) separating differing Neogene structural domains. May indicate discontinuities between basement rocks.

Brawley Seismic Zone, a linear zone of seismicity locally up to 10 km wide associated with the releasing step between the Imperial and San Andreas faults.

| Geologic Time Scale | | | Years Before Present (Approx.) | Fault Symbol | Recency of Movement | DESCRIPTION: ON LAND | DESCRIPTION: OFFSHORE |
|---|---|---|---|---|---|---|---|
| Quaternary | Late Quaternary | Historic | | | | Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep. | |
| | | | 200 | | | | |
| | | Holocene | | | ? ? ? | Displacement during Holocene time. | Fault offsets seafloor sediments or strata of Holocene age. |
| | | | 11,700 | | | | |
| | | Pleistocene | | | ? ? | Faults showing evidence of displacement during late Quaternary time. | Fault cuts strata of Late Pleistocene age. |
| | | | 700,000 | | | | |
| | Early Quaternary | Pleistocene | | | ? | Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age. | Fault cuts strata of Quaternary age. |
| | | | 1,600,000* | | | | |
| Pre-Quaternary | | | | | | Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive. | Fault cuts strata of Pliocene or older age. |
| | | | 4.5 billion (Age of Earth) | | | | |

* Quaternary now recognized as extending to 2.6 Ma (Walker and Geissman, 2009). Quaternary faults in this map were established using the previous 1.6 Ma criterion.

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**Fault Map Legend**

**Figure 3**

# APPENDIX A

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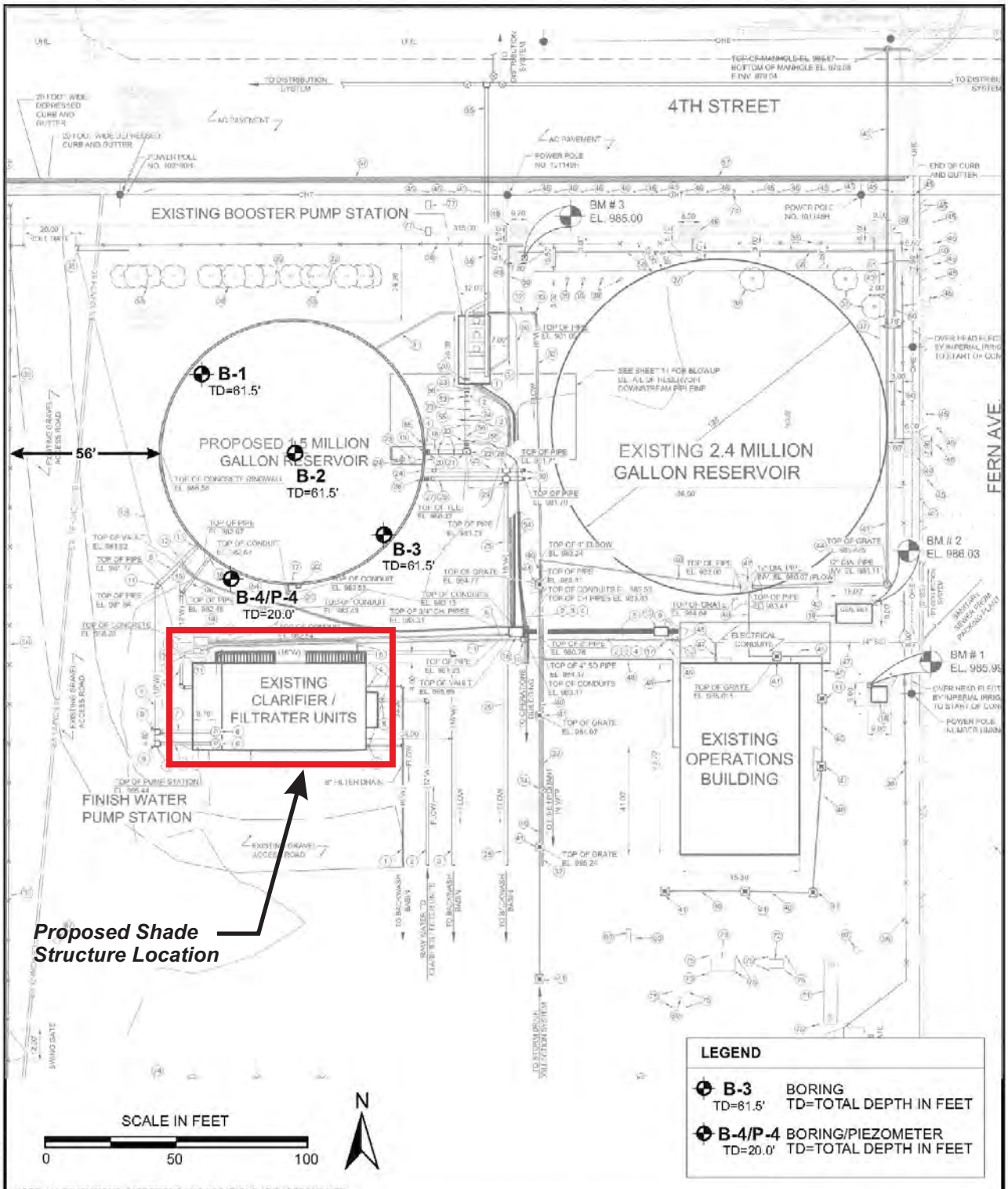
Vicinity Map

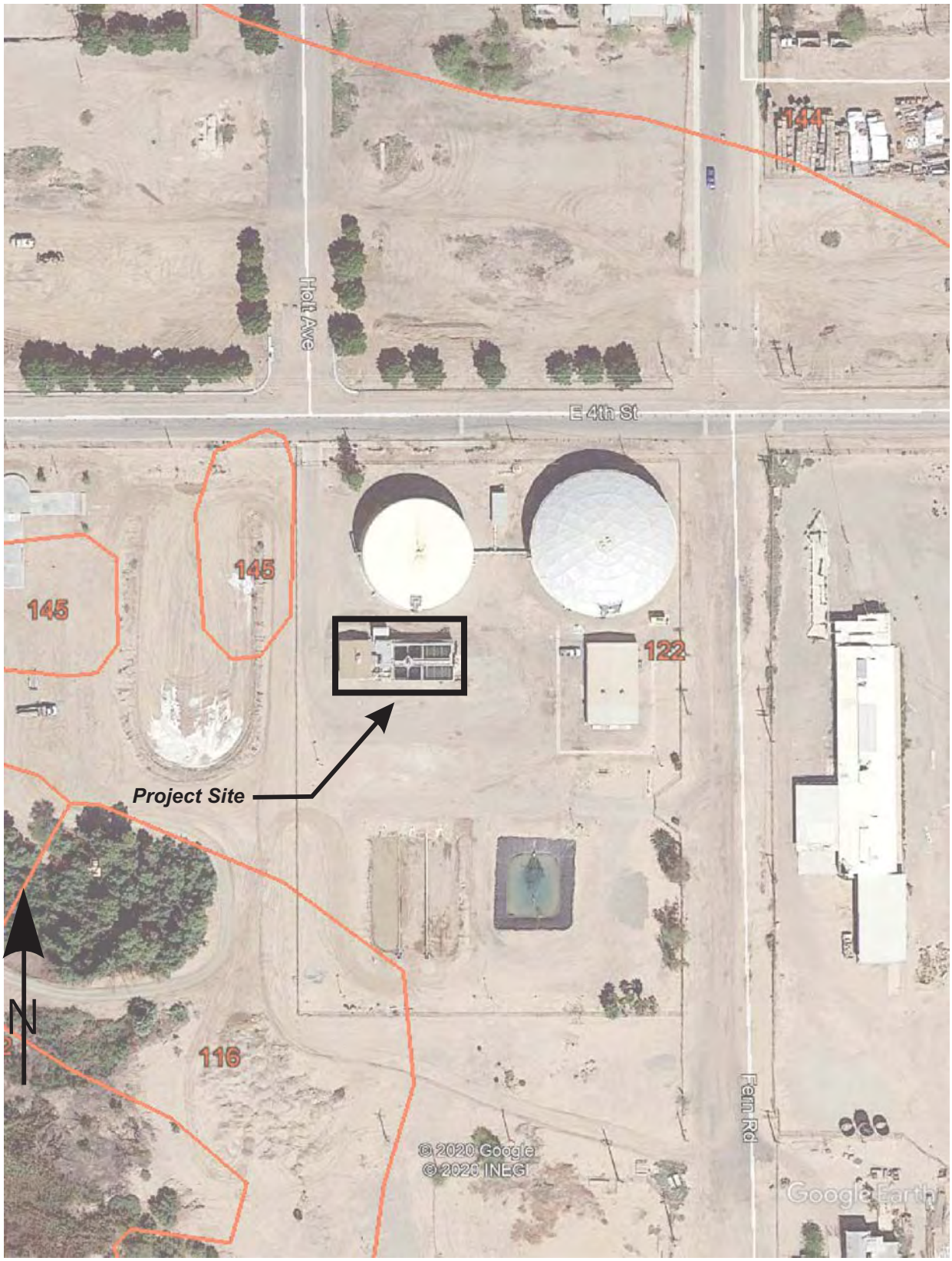
Plate
A-1




NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

| Ninyo & Moore | BORING AND PIEZOMETER LOCATIONS | FIGURE |
|---|---|---|
| PROJECT NO. 106193003 / DATE 11/11 | HOLTVILLE WATER TREATMENT PLANT<br>1.5 MG RESERVOIR REPLACEMENT<br>HOLTVILLE, CALIFORNIA | 2 |

| LANDMARK Geo-Engineers and Geologists | | |
|---|---|---|
| Project No.: LE20083 | Site and Exporation Map | Plate A-2 |

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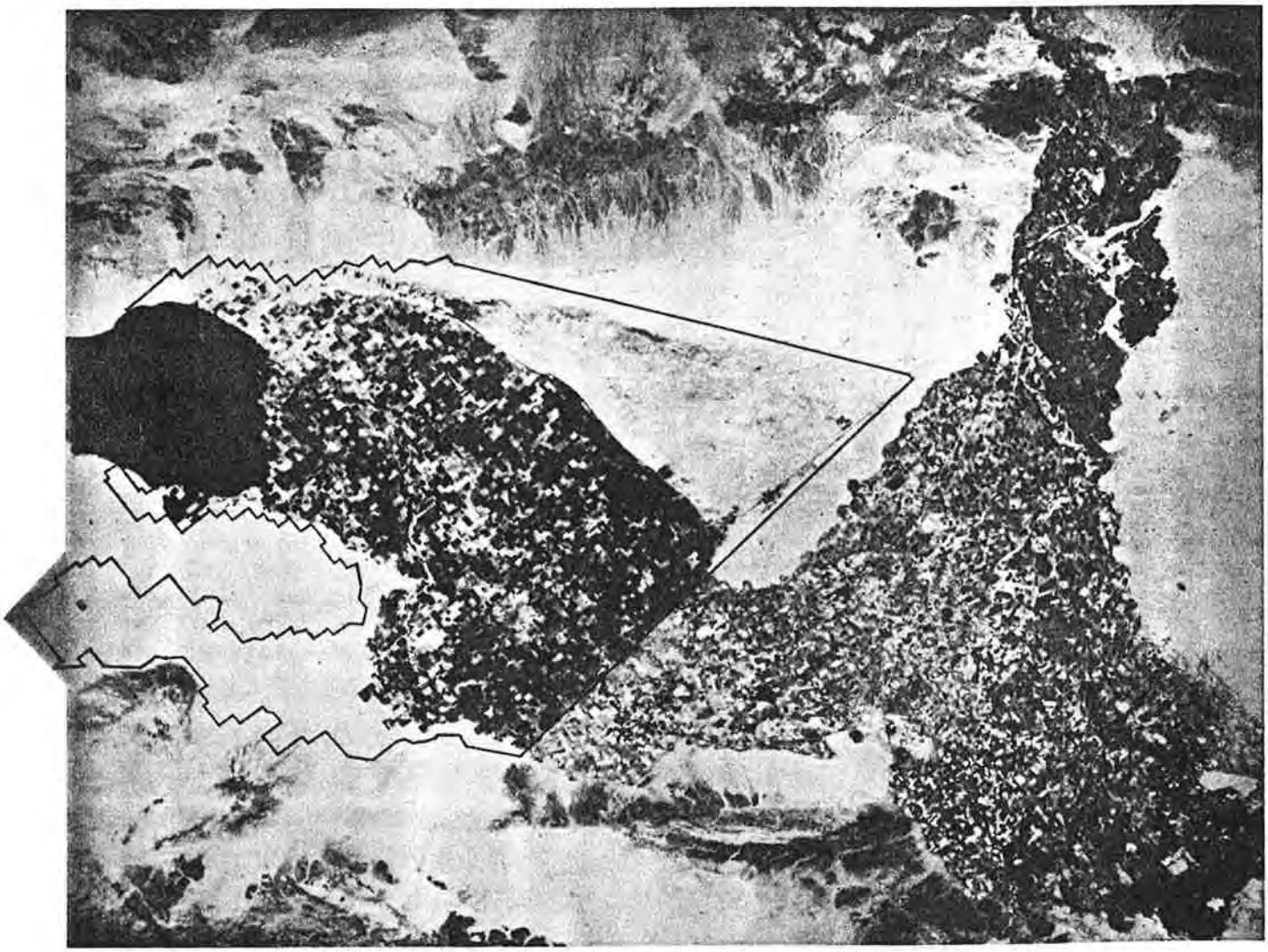
Soil Survey Map

Plate
A-3

Soil Survey of

# IMPERIAL COUNTY CALIFORNIA IMPERIAL VALLEY AREA



United States Department of Agriculture Soil Conservation Service
in cooperation with
University of California Agricultural Experiment Station
and
Imperial Irrigation District

TABLE 11.--ENGINEERING INDEX PROPERTIES

[The symbol > means more than. Absence of an entry indicates that data were not estimated]

| Soil name and map symbol | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Frag- ments > 3 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plas- ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | | | | | Pct | |
| 100---------- Antho | 0-13 | Loamy fine sand | SM | A-2 | 0 | 100 | 100 | 75-85 | 10-30 | --- | NP |
| | 13-60 | Sandy loam, fine sandy loam. | SM | A-2, A-4 | 0 | 90-100 | 75-95 | 50-60 | 15-40 | --- | NP |
| 101*: | | | | | | | | | | | |
| Antho---------- | 0-8 | Loamy fine sand | SM | A-2 | 0 | 100 | 100 | 75-85 | 10-30 | --- | NP |
| | 8-60 | Sandy loam, fine sandy loam. | SM | A-2, A-4 | 0 | 90-100 | 75-95 | 50-60 | 15-40 | --- | NP |
| Superstition------ | 0-6 | Fine sand------- | SM | A-2 | 0 | 100 | 95-100 | 70-85 | 15-25 | --- | NP |
| | 6-60 | Loamy fine sand, fine sand, sand. | SM | A-2 | 0 | 100 | 95-100 | 70-85 | 15-25 | --- | NP |
| 102*. Badland | | | | | | | | | | | |
| 103---------- Carsitas | 0-10 | Gravelly sand--- | SP, SP-SM | A-1, A-2 | 0-5 | 60-90 | 50-85 | 30-55 | 0-10 | --- | NP |
| | 10-60 | Gravelly sand, gravelly coarse sand, sand. | SP, SP-SM | A-1 | 0-5 | 60-90 | 50-85 | 25-50 | 0-10 | --- | NP |
| 104* Fluvaquents | | | | | | | | | | | |
| 105---------- Glenbar | 0-13 | Clay loam------- | CL | A-6 | 0 | 100 | 100 | 90-100 | 70-95 | 35-45 | 15-30 |
| | 13-60 | Clay loam, silty clay loam. | CL | A-6 | 0 | 100 | 100 | 90-100 | 70-95 | 35-45 | 15-30 |
| 106---------- Glenbar | 0-13 | Clay loam------- | CL | A-6, A-7 | 0 | 100 | 100 | 90-100 | 70-95 | 35-45 | 15-25 |
| | 13-60 | Clay loam, silty clay loam. | CL | A-6, A-7 | 0 | 100 | 100 | 90-100 | 70-95 | 35-45 | 15-25 |
| 107*---------- Glenbar | 0-13 | Loam---------- | ML, CL-ML, CL | A-4 | 0 | 100 | 100 | 100 | 70-80 | 20-30 | NP-10 |
| | 13-60 | Clay loam, silty clay loam. | CL | A-6, A-7 | 0 | 100 | 100 | 95-100 | 75-95 | 35-45 | 15-30 |
| 108---------- Holtville | 0-14 | Loam---------- | ML | A-4 | 0 | 100 | 100 | 85-100 | 55-95 | 25-35 | NP-10 |
| | 14-22 | Clay, silty clay | CL, CH | A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 40-65 | 20-35 |
| | 22-60 | Silt loam, very fine sandy loam. | ML | A-4 | 0 | 100 | 100 | 95-100 | 65-85 | 25-35 | NP-10 |
| 109---------- Holtville | 0-17 | Silty clay------ | CL, CH | A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 40-65 | 20-35 |
| | 17-24 | Clay, silty clay | CL, CH | A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 40-65 | 20-35 |
| | 24-35 | Silt loam, very fine sandy loam. | ML | A-4 | 0 | 100 | 100 | 95-100 | 65-85 | 25-35 | NP-10 |
| | 35-60 | Loamy very fine sand, loamy fine sand. | SM, ML | A-2, A-4 | 0 | 100 | 100 | 75-100 | 20-55 | --- | NP |
| 110---------- Holtville | 0-17 | Silty clay------ | CH, CL | A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 40-65 | 20-35 |
| | 17-24 | Clay, silty clay | CH, CL | A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 40-65 | 20-35 |
| | 24-35 | Silt loam, very fine sandy loam. | ML | A-4 | 0 | 100 | 100 | 95-100 | 55-85 | 25-35 | NP-10 |
| | 35-60 | Loamy very fine sand, loamy fine sand. | SM, ML | A-2, A-4 | 0 | 100 | 100 | 75-100 | 20-55 | --- | NP |

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Frag- ments > 3 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plas- ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | | | | | Pct | |
| 111*: | | | | | | | | | | | |
| Holtville | 0-10 | Silty clay loam | CL, CH | A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 40-65 | 20-35 |
| | 10-22 | Clay, silty clay | CL, CH | A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 40-65 | 20-35 |
| | 22-60 | Silt loam, very fine sandy loam. | ML | A-4 | 0 | 100 | 100 | 95-100 | 65-85 | 25-35 | NP-10 |
| Imperial | 0-12 | Silty clay loam | CL | A-7 | 0 | 100 | 100 | 100 | 85-95 | 40-50 | 10-20 |
| | 12-60 | Silty clay loam, silty clay, clay. | CH | A-7 | 0 | 100 | 100 | 100 | 85-95 | 50-70 | 25-45 |
| 112 Imperial | 0-12 | Silty clay | CH | A-7 | 0 | 100 | 100 | 100 | 85-95 | 50-70 | 25-45 |
| | 12-60 | Silty clay loam, silty clay, clay. | CH | A-7 | 0 | 100 | 100 | 100 | 85-95 | 50-70 | 25-45 |
| 113 Imperial | 0-12 | Silty clay | CH | A-7 | 0 | 100 | 100 | 100 | 85-95 | 50-70 | 25-45 |
| | 12-60 | Silty clay, clay, silty clay loam. | CH | A-7 | 0 | 100 | 100 | 100 | 85-95 | 50-70 | 25-45 |
| 114 Imperial | 0-12 | Silty clay | CH | A-7 | 0 | 100 | 100 | 100 | 85-95 | 50-70 | 25-45 |
| | 12-60 | Silty clay loam, silty clay, clay. | CH | A-7 | 0 | 100 | 100 | 100 | 85-95 | 50-70 | 25-45 |
| 115*: | | | | | | | | | | | |
| Imperial | 0-12 | Silty clay loam | CL | A-7 | 0 | 100 | 100 | 100 | 85-95 | 40-50 | 10-20 |
| | 12-60 | Silty clay loam, silty clay, clay. | CH | A-7 | 0 | 100 | 100 | 100 | 85-95 | 50-70 | 25-45 |
| Glenbar | 0-13 | Silty clay loam | CL | A-6, A-7 | 0 | 100 | 100 | 90-100 | 70-95 | 35-45 | 15-25 |
| | 13-60 | Clay loam, silty clay loam. | CL | A-6, A-7 | 0 | 100 | 100 | 90-100 | 70-95 | 35-45 | 15-25 |
| 116*: | | | | | | | | | | | |
| Imperial | 0-13 | Silty clay loam | CL | A-7 | 0 | 100 | 100 | 100 | 85-95 | 40-50 | 10-20 |
| | 13-60 | Silty clay loam, silty clay, clay. | CH | A-7 | 0 | 100 | 100 | 100 | 85-95 | 50-70 | 25-45 |
| Glenbar | 0-13 | Silty clay loam | CL | A-6, A-7 | 0 | 100 | 100 | 90-100 | 70-95 | 35-45 | 15-25 |
| | 13-60 | Clay loam, silty clay loam. | CL | A-6 | 0 | 100 | 100 | 90-100 | 70-95 | 35-45 | 15-30 |
| 117, 118 Indio | 0-12 | Loam | ML | A-4 | 0 | 95-100 | 95-100 | 85-100 | 75-90 | 20-30 | NP-5 |
| | 12-72 | Stratified loamy very fine sand to silt loam. | ML | A-4 | 0 | 95-100 | 95-100 | 85-100 | 75-90 | 20-30 | NP-5 |
| 119*: | | | | | | | | | | | |
| Indio | 0-12 | Loam | ML | A-4 | 0 | 95-100 | 95-100 | 85-100 | 75-90 | 20-30 | NP-5 |
| | 12-72 | Stratified loamy very fine sand to silt loam. | ML | A-4 | 0 | 95-100 | 95-100 | 85-100 | 75-90 | 20-30 | NP-5 |
| Vint | 0-10 | Loamy fine sand | SM | A-2 | 0 | 95-100 | 95-100 | 70-80 | 25-35 | --- | NP |
| | 10-60 | Loamy sand, loamy fine sand. | SM | A-2 | 0 | 95-100 | 95-100 | 70-80 | 20-30 | --- | NP |
| 120* Laveen | 0-12 | Loam | ML, CL-ML | A-4 | 0 | 100 | 95-100 | 75-85 | 55-65 | 20-30 | NP-10 |
| | 12-60 | Loam, very fine sandy loam. | ML, CL-ML | A-4 | 0 | 95-100 | 85-95 | 70-80 | 55-65 | 15-25 | NP-10 |

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

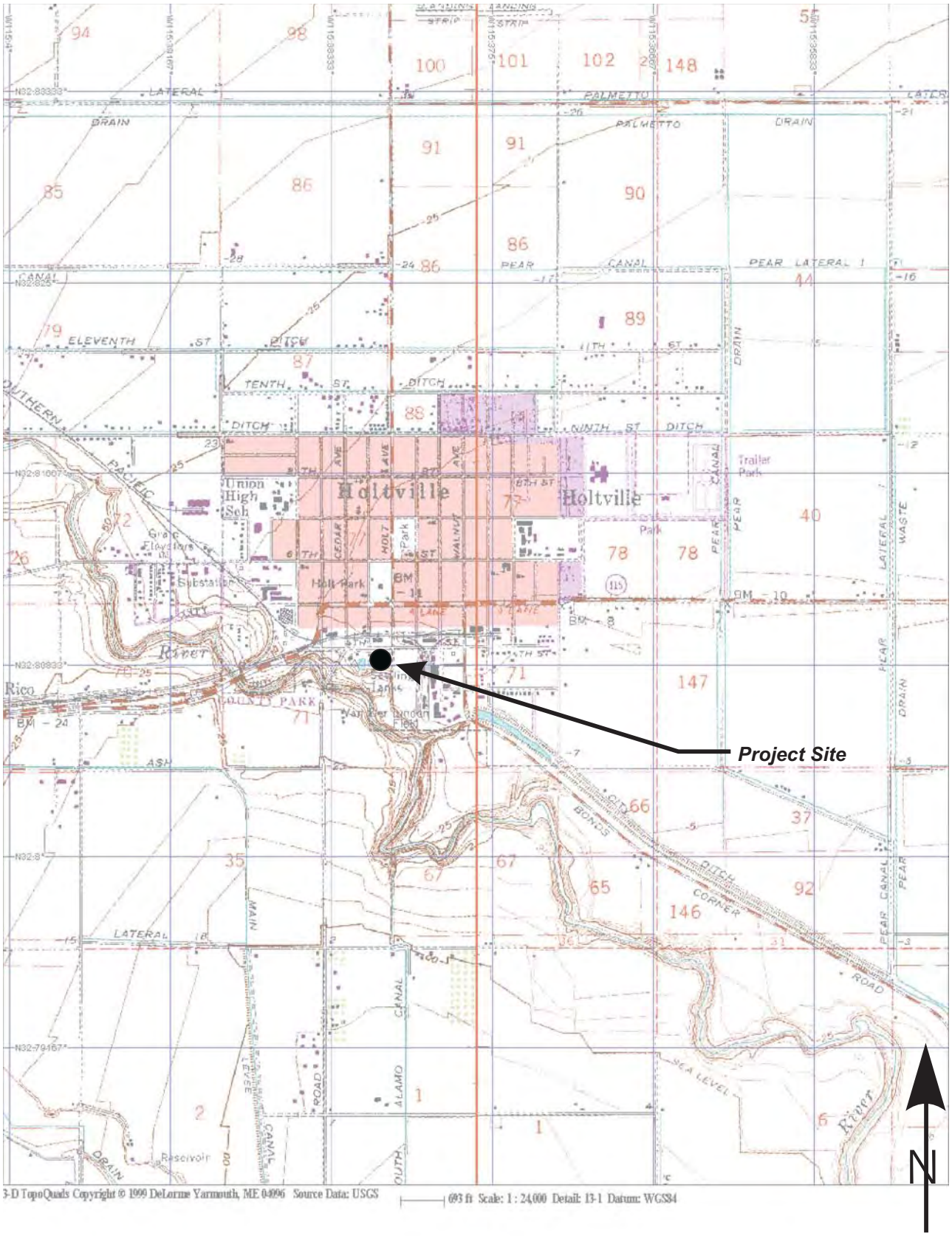
| Soil name and map symbol | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Frag- ments > 3 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plas- ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | | | | | Pct | |
| 121---------- Meloland | 0-12 | Fine sand------- | SM, SP-SM | A-2, A-3 | 0 | 95-100 | 90-100 | 75-100 | 5-30 | --- | NP |
| | 12-26 | Stratified loamy fine sand to silt loam. | ML | A-4 | 0 | 100 | 100 | 90-100 | 50-65 | 25-35 | NP-10 |
| | 26-71 | Clay, silty clay, silty clay loam. | CL, CH | A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 40-65 | 20-40 |
| 122---------- Meloland | 0-12 | Very fine sandy loam. | ML | A-4 | 0 | 95-100 | 95-100 | 95-100 | 55-85 | 25-35 | NP-10 |
| | 12-26 | Stratified loamy fine sand to silt loam. | ML | A-4 | 0 | 100 | 100 | 90-100 | 50-70 | 25-35 | NP-10 |
| | 26-71 | Clay, silty clay, silty clay loam. | CH, CL | A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 40-65 | 20-40 |
| 123*: Meloland---------- | 0-12 | Loam---------- | ML | A-4 | 0 | 95-100 | 95-100 | 95-100 | 55-85 | 25-35 | NP-10 |
| | 12-26 | Stratified loamy fine sand to silt loam. | ML | A-4 | 0 | 100 | 100 | 90-100 | 50-70 | 25-35 | NP-10 |
| | 26-38 | Clay, silty clay, silty clay loam. | CH, CL | A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 40-65 | 20-40 |
| | 38-60 | Stratified silt loam to loamy fine sand. | SM, ML | A-4 | 0 | 100 | 100 | 75-100 | 35-55 | 25-35 | NP-10 |
| Holtville--------- | 0-12 | Loam---------- | ML | A-4 | 0 | 100 | 100 | 85-100 | 55-95 | 25-35 | NP-10 |
| | 12-24 | Clay, silty clay | CH, CL | A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 40-65 | 20-35 |
| | 24-36 | Silt loam, very fine sandy loam. | ML | A-4 | 0 | 100 | 100 | 95-100 | 55-85 | 25-35 | NP-10 |
| | 36-60 | Loamy very fine sand, loamy fine sand. | SM, ML | A-2, A-4 | 0 | 100 | 100 | 75-100 | 20-55 | --- | NP |
| 124, 125---------- Niland | 0-23 | Gravelly sand--- | SM, SP-SM | A-2, A-3 | 0 | 90-100 | 70-95 | 50-65 | 5-25 | --- | NP |
| | 23-60 | Silty clay, clay, clay loam. | CL, CH | A-7 | 0 | 100 | 100 | 85-100 | 80-95 | 40-65 | 20-40 |
| 126---------- Niland | 0-23 | Fine sand------- | SM, SP-SM | A-2, A-3 | 0 | 90-100 | 90-100 | 50-65 | 5-25 | --- | NP |
| | 23-60 | Silty clay------ | CL, CH | A-7 | 0 | 100 | 100 | 85-100 | 80-95 | 40-65 | 20-40 |
| 127---------- Niland | 0-23 | Loamy fine sand | SM | A-2 | 0 | 90-100 | 90-100 | 50-65 | 15-30 | --- | NP |
| | 23-60 | Silty clay------ | CL, CH | A-7 | 0 | 100 | 100 | 85-100 | 80-95 | 40-65 | 20-40 |
| 128*: Niland---------- | 0-23 | Gravelly sand--- | SM, SP-SM | A-2, A-3 | 0 | 90-100 | 70-95 | 50-65 | 5-25 | --- | NP |
| | 23-60 | Silty clay, clay, clay loam. | CL, CH | A-7 | 0 | 100 | 100 | 85-100 | 80-100 | 40-65 | 20-40 |
| Imperial---------- | 0-12 | Silty clay------ | CH | A-7 | 0 | 100 | 100 | 100 | 85-95 | 50-70 | 25-45 |
| | 12-60 | Silty clay loam, silty clay, clay. | CH | A-7 | 0 | 100 | 100 | 100 | 85-95 | 50-70 | 25-45 |
| 129*: Pits | | | | | | | | | | | |
| 130, 131---------- Rositas | 0-27 | Sand---------- | SP-SM | A-3, A-1, A-2 | 0 | 100 | 80-100 | 40-70 | 5-15 | --- | NP |
| | 27-60 | Sand, fine sand, loamy sand. | SM, SP-SM | A-3, A-2, A-1 | 0 | 100 | 80-100 | 40-85 | 5-30 | --- | NP |

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Frag- ments > 3 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plas- ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | | | | | Pct | |
| 132, 133, 134, 135-- Rositas | 0-9 | Fine sand------- | SM | A-3, A-2 | 0 | 100 | 80-100 | 50-80 | 10-25 | --- | NP |
| | 9-60 | Sand, fine sand, loamy sand. | SM, SP-SM | A-3, A-2, A-1 | 0 | 100 | 80-100 | 40-85 | 5-30 | --- | NP |
| 136---------- Rositas | 0-4 | Loamy fine sand | SM | A-1, A-2 | 0 | 100 | 80-100 | 40-85 | 10-35 | --- | NP |
| | 4-60 | Sand, fine sand, loamy sand. | SM, SP-SM | A-3, A-2, A-1 | 0 | 100 | 80-100 | 40-85 | 5-30 | --- | NP |
| 137---------- Rositas | 0-12 | Silt loam------- | ML | A-4 | 0 | 100 | 100 | 90-100 | 70-90 | 20-30 | NP-5 |
| | 12-60 | Sand, fine sand, loamy sand. | SM, SP-SM | A-3, A-2, A-1 | 0 | 100 | 80-100 | 40-85 | 5-30 | --- | NP |
| 138*: | | | | | | | | | | | |
| Rositas---------- | 0-4 | Loamy fine sand | SM | A-1, A-2 | 0 | 100 | 80-100 | 40-85 | 10-35 | --- | NP |
| | 4-60 | Sand, fine sand, loamy sand. | SM, SP-SM | A-3, A-2, A-1 | 0 | 100 | 80-100 | 40-85 | 5-30 | --- | NP |
| Superstition------ | 0-6 | Loamy fine sand | SM | A-2 | 0 | 100 | 95-100 | 70-85 | 15-25 | --- | NP |
| | 6-60 | Loamy fine sand, fine sand, sand. | SM | A-2 | 0 | 100 | 95-100 | 70-85 | 15-25 | --- | NP |
| 139---------- Superstition | 0-6 | Loamy fine sand | SM | A-2 | 0 | 100 | 95-100 | 70-85 | 15-25 | --- | NP |
| | 6-60 | Loamy fine sand, fine sand, sand. | SM | A-2 | 0 | 100 | 95-100 | 70-85 | 15-25 | --- | NP |
| 140*: | | | | | | | | | | | |
| Torriorthents | | | | | | | | | | | |
| Rock outcrop | | | | | | | | | | | |
| 141*: | | | | | | | | | | | |
| Torriorthents | | | | | | | | | | | |
| Orthids | | | | | | | | | | | |
| 142---------- Vint | 0-10 | Loamy very fine sand. | SM, ML | A-4 | 0 | 100 | 100 | 85-95 | 40-65 | 15-25 | NP-5 |
| | 10-60 | Loamy fine sand | SM | A-2 | 0 | 95-100 | 95-100 | 70-80 | 20-30 | --- | NP |
| 143---------- Vint | 0-12 | Fine sandy loam | ML, CL-ML, SM, SM-SC | A-4 | 0 | 100 | 100 | 75-85 | 45-55 | 15-25 | NP-5 |
| | 12-60 | Loamy sand, loamy fine sand. | SM | A-2 | 0 | 95-100 | 95-100 | 70-80 | 20-30 | --- | NP |
| 144*: | | | | | | | | | | | |
| Vint---------- | 0-10 | Very fine sandy loam. | SM, ML | A-4 | 0 | 100 | 100 | 85-95 | 40-65 | 15-25 | NP-5 |
| | 10-40 | Loamy fine sand | SM | A-2 | 0 | 95-100 | 95-100 | 70-80 | 20-30 | --- | NP |
| | 40-60 | Silty clay------ | CL, CH | A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 40-65 | 20-35 |
| Indio---------- | 0-12 | Very fine sandy loam. | ML | A-4 | 0 | 95-100 | 95-100 | 85-100 | 75-90 | 20-30 | NP-5 |
| | 12-40 | Stratified loamy very fine sand to silt loam. | ML | A-4 | 0 | 95-100 | 95-100 | 85-100 | 75-90 | 20-30 | NP-5 |
| | 40-72 | Silty clay------ | CL, CH | A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 40-65 | 20-35 |

* See description of the map unit for composition and behavior characteristics of the map unit.




LANDMARK
Geo-Engineers and Geologists

Project No.: LE20083

Topographic Map

Plate
A-4

# APPENDIX B

DATE DRILLED 10/10/11 BORING NO. B-1

GROUND ELEVATION -15' ± (MSL) SHEET 1 OF 4

METHOD OF DRILLING 8" Diameter Hollow Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY BTM LOGGED BY BTM REVIEWED BY JG

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | DESCRIPTION/INTERPRETATION |
|---|---|---|---|---|---|---|---|---|
| 0 | ■ | | | | | | CL | FILL:<br>Brown, moist, very stiff, sandy CLAY; fine sand; scattered gravel. |
| 5 | | ■ | 26 | 17.4 | 109.3 | | | |
| | | | | | | | CL | LAKE BED DEPOSITS:<br>Brown, moist to wet, stiff, silty CLAY. |
| 10 | ■ | | 9 | 27.6 | 93.1 | | | Wet. |
| 15 | ■ | ■ | 18 | 27.2 | 97.1 | | | Very stiff. |
| 20 | | | | | | | | |

Ninyo & Moore

**BORING LOG**

HOLTVILLE WATER TREATMENT PLANT, 1.5 MG RESERVOIR REPLACEMENT
HOLTVILLE, CALIFORNIA

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| 106193003 | 11/11 | A-1 |

DATE DRILLED 10/10/11 BORING NO. B-1

GROUND ELEVATION -15' ± (MSL) SHEET 2 OF 4

METHOD OF DRILLING 8" Diameter Hollow Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY BTM LOGGED BY BTM REVIEWED BY JG

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | DESCRIPTION/INTERPRETATION |
|---|---|---|---|---|---|---|---|---|
| 20 | | ■ | 16 | ▽ | | | CL | LAKE BED DEPOSITS: (Continued)<br>Brown to gray, saturated, very stiff, silty CLAY. |
| 25 | | | | | | | | |
| | | | | | | | ML | Reddish brown to gray, saturated, very stiff, clayey SILT. |
| 30 | | ■ | 22 | | | | | |
| | | | | | | | CL | Gray to reddish brown, saturated, very stiff, silty CLAY. |
| 35 | | | | | | | | |
| 40 | | | | | | | | |

Ninyo & Moore

**BORING LOG**

HOLTVILLE WATER TREATMENT PLANT, 1.5 MG RESERVOIR REPLACEMENT
HOLTVILLE, CALIFORNIA

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| 106193003 | 11/11 | A-2 |

| DATE DRILLED | 10/10/11 | BORING NO. | B-1 |
|---|---|---|---|
| GROUND ELEVATION | -15' ± (MSL) | SHEET 3 | OF 4 |
| METHOD OF DRILLING | 8" Diameter Hollow Stem Auger (CME-75) (Baja Exploration) | | |
| DRIVE WEIGHT | 140 lbs. (Auto-Trip) | DROP | 30" |
| SAMPLED BY | BTM | LOGGED BY BTM | REVIEWED BY JG |

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | DESCRIPTION/INTERPRETATION |
|---|---|---|---|---|---|---|---|---|
| 40 | | ■ | 14 | | | | CL | LAKE BED DEPOSITS: (Continued)<br>Gray to reddish brown, saturated, very stiff, silty CLAY. |
| 45 | | | | | | | | |
| 50 | | ■ | 19 | | | | | Grayish brown. |
| 55 | | | | | | | | |
| 60 | | | | | | | | |

Ninyo & Moore

**BORING LOG**

HOLTVILLE WATER TREATMENT PLANT, 1.5 MG RESERVOIR REPLACEMENT
HOLTVILLE, CALIFORNIA

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| 106193003 | 11/11 | A-3 |

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | DESCRIPTION/INTERPRETATION |
|---|---|---|---|---|---|---|---|---|
| 60 | | ■ | 43 | | | | CL | LAKE BED DEPOSITS: (Continued)<br>Brown, saturated, hard, silty CLAY. |
| | | | | | | | | Total Depth = 61.5 feet.<br>Groundwater encountered at approximately 20 feet during drilling. This reading is not considered the stabilized groundwater depth. Previous subsurface evaluations have encountered groundwater at a depth of 5 feet. The stabilized groundwater depth should be evaluated by performing additional measurements within piezometer P-4.<br>Backfilled with bentonite and concrete shortly after drilling on 10/10/11.<br><br>Note: Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report.<br><br>Please refer to the report for groundwater monitoring recommendations. |
| 65 | | | | | | | | |
| 70 | | | | | | | | |
| 75 | | | | | | | | |
| 80 | | | | | | | | |

DATE DRILLED 10/10/11 BORING NO. B-1

GROUND ELEVATION -15' ± (MSL) SHEET 4 OF 4

METHOD OF DRILLING 8" Diameter Hollow Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY BTM LOGGED BY BTM REVIEWED BY JG

Ninyo & Moore

**BORING LOG**

HOLTVILLE WATER TREATMENT PLANT, 1.5 MG RESERVOIR REPLACEMENT
HOLTVILLE, CALIFORNIA

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| 106193003 | 11/11 | A-4 |

DATE DRILLED 10/10/11 BORING NO. B-2

GROUND ELEVATION -15' ± (MSL) SHEET 1 OF 4

METHOD OF DRILLING 8" Diameter Hollow Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY BTM LOGGED BY BTM REVIEWED BY JG

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | DESCRIPTION/INTERPRETATION |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | CL | FILL:<br>Brown, moist, very stiff, silty CLAY. |
| | | | | | | | | Scattered gravel. |
| 5 | | ■ | 20 | 16.1 | 110.8 | | | |
| 10 | | ■ | 15 | 26.9 | 91.9 | | | Wet. |
| 15 | | ■ | 40 | 24.9 | 95.6 | | | Grayish brown to reddish brown; hard. |
| | | | | | | | SM | Brown, wet, medium dense, silty fine SAND. |
| 20 | | | | | | | | |

Ninyo & Moore

**BORING LOG**

HOLTVILLE WATER TREATMENT PLANT, 1.5 MG RESERVOIR REPLACEMENT
HOLTVILLE, CALIFORNIA

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| 106193003 | 11/11 | A-5 |

DATE DRILLED 10/10/11 BORING NO. B-2

GROUND ELEVATION -15' ± (MSL) SHEET 2 OF 4

METHOD OF DRILLING 8" Diameter Hollow Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY BTM LOGGED BY BTM REVIEWED BY JG

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | DESCRIPTION/INTERPRETATION |
|---|---|---|---|---|---|---|---|---|
| 20 | | ■ | 21 | ▼ 26.7 | 95.2 | | SM | LAKE BED DEPOSITS: (Continued)<br>Brown, saturated, medium dense, silty fine SAND. |
| | | | | | | | CL | Brown to reddish brown, saturated, very stiff, silty CLAY. |
| 25 | | ■ | 40 | | | | | Hard. |
| | | | | | | | ML | Grayish brown, saturated, medium dense, sandy SILT; fine sand. |
| 30 | | ■ | 41 | | | | | |
| 35 | | ■ | 19 | | | | | Brown; very stiff; clayey. |
| | | | | | | | | Brown to gray. |
| 40 | | | | | | | | |

Ninyo & Moore

**BORING LOG**

HOLTVILLE WATER TREATMENT PLANT, 1.5 MG RESERVOIR REPLACEMENT
HOLTVILLE, CALIFORNIA

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| 106193003 | 11/11 | A-6 |

DATE DRILLED 10/10/11 BORING NO. B-2

GROUND ELEVATION -15' ± (MSL) SHEET 3 OF 4

METHOD OF DRILLING 8" Diameter Hollow Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY BTM LOGGED BY BTM REVIEWED BY JG

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | DESCRIPTION/INTERPRETATION |
|---|---|---|---|---|---|---|---|---|
| 40 | | ■ | 22 | | | | ML | LAKE BED DEPOSITS: (Continued)<br>Brown to gray, saturated, very stiff, clayey SILT. |
| 45 | | ■ | 31 | | | | | Grayish brown; hard. |
| | | | | | | | CL | Brown to gray, saturated, very stiff, silty CLAY. |
| 50 | | ■ | 23 | | | | | |
| 55 | | ■ | 41 | | | | | Hard. |
| 60 | | | | | | | | |

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**BORING LOG**

HOLTVILLE WATER TREATMENT PLANT, 1.5 MG RESERVOIR REPLACEMENT
HOLTVILLE, CALIFORNIA

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| 106193003 | 11/11 | A-7 |

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | DESCRIPTION/INTERPRETATION |
|---|---|---|---|---|---|---|---|---|
| 60 | | ■ | 32 | | | ▨ | CL | LAKE BED DEPOSITS: (Continued)<br>Brown, saturated, hard, silty CLAY. |
| | | | | | | | | Total Depth = 61.5 feet.<br>Groundwater encountered at approximately 20 feet approximately 3 hours after drilling. This reading is not considered the stabilized groundwater depth. Previous subsurface evaluations have encountered groundwater at a depth of 5 feet. The stabilized groundwater depth should be evaluated by performing additional measurements within piezometer P-4.<br>Backfilled with bentonite and concrete shortly after drilling on 10/10/11.<br><br>Note: Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report.<br><br>Please refer to the report for groundwater monitoring recommendations. |
| 65 | | | | | | | | |
| 70 | | | | | | | | |
| 75 | | | | | | | | |
| 80 | | | | | | | | |

DATE DRILLED 10/10/11 BORING NO. B-2

GROUND ELEVATION -15' ± (MSL) SHEET 4 OF 4

METHOD OF DRILLING 8" Diameter Hollow Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY BTM LOGGED BY BTM REVIEWED BY JG

Ninyo & Moore

**BORING LOG**

HOLTVILLE WATER TREATMENT PLANT, 1.5 MG RESERVOIR REPLACEMENT
HOLTVILLE, CALIFORNIA

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| 106193003 | 11/11 | A-8 |

DATE DRILLED 10/11/11 BORING NO. B-3

GROUND ELEVATION -15' ± (MSL) SHEET 1 OF 4

METHOD OF DRILLING 8" Diameter Hollow Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY BTM LOGGED BY BTM REVIEWED BY JG

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | DESCRIPTION/INTERPRETATION |
|---|---|---|---|---|---|---|---|---|
| 0 | ■ | | | | | | CL | FILL:<br>Brown, moist, very stiff, sandy CLAY; fine sand; scattered gravel. |
| 5 | | ■ | 28 | 21.4 | 102.5 | | | Moist to wet; hard; no gravel. |
| | | | | | | | CL | LAKE BED DEPOSITS:<br>Brown, moist to wet, hard, silty CLAY. |
| 10 | | ■ | 39 | 24.7 | 99.8 | | | Wet. |
| 15 | | ■ | 30 | 24.3 | 99.1 | | | |
| 20 | | | | | | | | |

Ninyo & Moore

**BORING LOG**

HOLTVILLE WATER TREATMENT PLANT, 1.5 MG RESERVOIR REPLACEMENT
HOLTVILLE, CALIFORNIA

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| 106193003 | 11/11 | A-9 |

| DATE DRILLED | 10/11/11 | BORING NO. | B-3 |
|---|---|---|---|
| GROUND ELEVATION | -15' ± (MSL) | SHEET 2 | OF 4 |
| METHOD OF DRILLING | 8" Diameter Hollow Stem Auger (CME-75) (Baja Exploration) | | |
| DRIVE WEIGHT | 140 lbs. (Auto-Trip) | DROP | 30" |
| SAMPLED BY | BTM | LOGGED BY BTM | REVIEWED BY JG |

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | DESCRIPTION/INTERPRETATION |
|---|---|---|---|---|---|---|---|---|
| 20 | | ■ | | ▽ | | | CL | LAKE BED DEPOSITS: (Continued)<br>Grayish brown, saturated, very stiff, silty CLAY. |
| | | ■ | 25 | 28.7 | 95.5 | | | |
| 25 | ■ | | | | | | | Brown to grayish brown. |
| 30 | ■ | ■ | 22 | | | | | |
| 35 | | | | | | | | |
| 40 | | | | | | | | |

Ninyo & Moore

**BORING LOG**

HOLTVILLE WATER TREATMENT PLANT, 1.5 MG RESERVOIR REPLACEMENT
HOLTVILLE, CALIFORNIA

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| 106193003 | 11/11 | A-10 |

| DATE DRILLED | 10/11/11 | BORING NO. | B-3 |
|---|---|---|---|
| GROUND ELEVATION | -15' ± (MSL) | SHEET 3 | OF 4 |
| METHOD OF DRILLING | 8" Diameter Hollow Stem Auger (CME-75) (Baja Exploration) | | |
| DRIVE WEIGHT | 140 lbs. (Auto-Trip) | DROP | 30" |
| SAMPLED BY BTM | LOGGED BY BTM | REVIEWED BY JG | |

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | DESCRIPTION/INTERPRETATION |
|---|---|---|---|---|---|---|---|---|
| 40 | | ■ | 22 | | | | CL | LAKE BED DEPOSITS: (Continued)<br>Grayish brown, saturated, very stiff, silty CLAY. |
| 45 | | | | | | | | |
| 50 | | ■ | 38 | | | | | Hard. |
| 55 | | | | | | | | |
| 60 | | | | | | | | |

Ninyo & Moore

**BORING LOG**

HOLTVILLE WATER TREATMENT PLANT, 1.5 MG RESERVOIR REPLACEMENT
HOLTVILLE, CALIFORNIA

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| 106193003 | 11/11 | A-11 |

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | DESCRIPTION/INTERPRETATION |
|---|---|---|---|---|---|---|---|---|
| 60 | | ■ | 46 | | | | CL | LAKE BED DEPOSITS: (Continued)<br>Grayish brown, saturated, hard, silty CLAY. |
| | | | | | | | | Total Depth = 61.5 feet.<br>Groundwater encountered at approximately 20 feet during drilling. This reading is not considered the st bilized groundwater depth. Previous subsurface evaluations have encountered groundwater at a depth of 5 feet. The stabilized groundwater depth should be evaluated by performing additional measurements within piezometer P-4.<br>Backfilled with bentonite and concrete shortly after drilling on 10/11/11.<br><br>Note: Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report.<br><br>Please refer to the report for groundwater monitoring recommendations. |
| 65 | | | | | | | | |
| 70 | | | | | | | | |
| 75 | | | | | | | | |
| 80 | | | | | | | | |

DATE DRILLED 10/11/11 BORING NO. B-3

GROUND ELEVATION -15' ± (MSL) SHEET 4 OF 4

METHOD OF DRILLING 8" Diameter Hollow Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY BTM LOGGED BY BTM REVIEWED BY JG

Ninyo & Moore

**BORING LOG**

HOLTVILLE WATER TREATMENT PLANT, 1.5 MG RESERVOIR REPLACEMENT
HOLTVILLE, CALIFORNIA

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| 106193003 | 11/11 | A-12 |

DATE DRILLED 10/11/11 BORING NO. B-4/P-4

GROUND ELEVATION -16' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING 8" Diameter Hollow Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY BTM LOGGED BY BTM REVIEWED BY JG

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | DESCRIPTION/INTERPRETATION |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | ML | FILL:<br>Brown, moist, medium dense, sandy SILT; fine sand; scattered gravel. |
| | | | | | | | CL | LAKE BED DEPOSITS:<br>Brown, moist, very stiff, silty CLAY. |
| | | | | | | | SM | Brown, wet, loose to medium dense, silty SAND. |
| 5 | | ■ | 14 | | | | CL | Brown, moist, very stiff, silty CLAY. |
| 10 | | ■ | 19 | | | | | |
| 15 | | ■ | 22 | | | | | Brown to grayish brown. |
| | | | | | | | SM | Brown, moist, medium dense, silty SAND. |
| 20 | | ■ | 24 | ▽ | | | CL | Brown, moist, very stiff, silty CLAY. |

Ninyo & Moore

**BORING LOG**

HOLTVILLE WATER TREATMENT PLANT, 1.5 MG RESERVOIR REPLACEMENT
HOLTVILLE, CALIFORNIA

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| 106193003 | 11/11 | A-13 |

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | DESCRIPTION/INTERPRETATION |
|---|---|---|---|---|---|---|---|---|
| 20 | | | | | | | | Total Depth = 20 feet.<br>Groundwater encountered at approximately 19 feet during drilling. This reading is not considered the stabilized groundwater depth. Previous subsurface evaluations have encountered groundwater at a depth of 5 feet. The stabilized groundwater depth should be evaluated by performing additional measurements within piezometer P-4.<br>Piezometer set on 10/11/11.<br><br><u>Note:</u> Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report.<br><br>Please refer to the report for groundwater monitoring recommendations. |
| 25 | | | | | | | | |
| 30 | | | | | | | | |
| 35 | | | | | | | | |
| 40 | | | | | | | | |

DATE DRILLED 10/11/11 BORING NO. B-4/P-4

GROUND ELEVATION -16' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING 8" Diameter Hollow Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY BTM LOGGED BY BTM REVIEWED BY JG

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**BORING LOG**

HOLTVILLE WATER TREATMENT PLANT, 1.5 MG RESERVOIR REPLACEMENT
HOLTVILLE, CALIFORNIA

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| 106193003 | 11/11 | A-14 |

# APPENDIX A

## BORING AND PIEZOMETER LOGS

**Field Procedure for the Collection of Disturbed Samples**

Bulk samples of representative earth materials were obtained from the exploratory borings. The samples were bagged and transported to the laboratory for testing.

**Field Procedure for the Collection of Relatively Undisturbed Samples**

Relatively undisturbed soil samples were obtained in the field using a modified split-barrel drive sampler. The sampler, with an external diameter of 3.0 inches, was lined with 1-inch long, thin brass rings with inside diameters of approximately 2.4 inches. The sample barrel was driven into the ground with the weight of a hammer of the drill rig in general accordance with ASTM D 3550. The driving weight was permitted to fall freely. The approximate length of the fall, the weight of the hammer or bar, and the number of blows per foot of driving are presented on the boring logs as an index to the relative resistance of the materials sampled. The samples were removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

# BORING LOG EXPLANATION SHEET

| DEPTH (feet) | SAMPLES Bulk | SAMPLES Driven | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION U.S.C.S. | |
|---|---|---|---|---|---|---|---|---|
| 0 | ■ | | | | | | | Bulk sample. |
| | | ■ | | | | | | Modified split-barrel drive sampler. |
| | | ☒ | | | | | | No recovery with modified split-barrel drive sampler. |
| | | ▮ | | | | | | Sample retained by others. |
| | | ◤ | | | | | | Standard Penetration Test (SPT). |
| 5 | | ◥ | | | | | | No recovery with a SPT. |
| | | ▯ | XX/XX | | | | | Shelby tube sample. Distance pushed in inches/length of sample recovered in inches. |
| | | ◥ | | | | | | No recovery with Shelby tube sampler. |
| | | ▯ | | | | | | Continuous Push Sample. |
| | | | | ♀ | | | | Seepage. |
| 10 | | | | ▽ | | | | Groundwater encountered during drilling. |
| | | | | ▼ | | | | Groundwater measured after drilling. |
| | | | | | | ▦ | SM | ALLUVIUM: Solid line denotes unit change. |
| | | | | | | | | Dashed line denotes material change. |
| 15 | | | | | | | | Attitudes: Strike/Dip<br>b: Bedding<br>c: Contact<br>j: Joint<br>f: Fracture<br>F: Fault<br>cs: Clay Seam<br>s: Shear<br>bss: Basal Slide Surface<br>sf: Shear Fracture<br>sz: Shear Zone<br>sbs: Sheared Bedding Surface |
| 20 | | | | | | | | The total depth line is a solid line that is drawn at the bottom of the boring. |

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**BORING LOG**

EXPLANATION OF BORING LOG SYMBOLS

| PROJECT NO. | DATE | FIGURE |
|---|---|---|
| | Rev. 01/03 | |

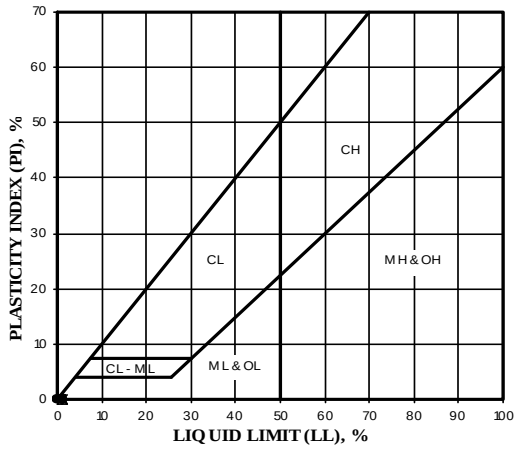
# U.S.C.S. METHOD OF SOIL CLASSIFICATION

| MAJOR DIVISIONS | | SYMBOL | TYPICAL NAMES |
|---|---|---|---|
| COARSE-GRAINED SOILS (More than 1/2 of soil > No. 200 Sieve Size) | GRAVELS (More than 1/2 of coarse fraction > No. 4 sieve size | GW | Well graded gravels or gravel-sand mixtures, little or no fines |
| | | GP | Poorly graded gravels or gravel-sand mixtures, little or no fines |
| | | GM | Silty gravels, gravel-sand-silt mixtures |
| | | GC | Clayey gravels, gravel-sand-clay mixtures |
| | SANDS (More than 1/2 of coarse fraction < No. 4 sieve size | SW | Well graded sands or gravelly sands, little or no fines |
| | | SP | Poorly graded sands or gravelly sands, little or no fines |
| | | SM | Silty sands, sand-silt mixtures |
| | | SC | Clayey sands, sand-clay mixtures |
| FINE-GRAINED SOILS (More than 1/2 of soil < No. 200 sieve size) | SILTS & CLAYS Liquid Limit <50 | ML | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity |
| | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays |
| | | OL | Organic silts and organic silty clays of low plasticity |
| | SILTS & CLAYS Liquid Limit >50 | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts |
| | | CH | Inorganic clays of high plasticity, fat clays |
| | | OH | Organic clays of medium to high plasticity, organic silty clays, organic silts |
| HIGHLY ORGANIC SOILS | | Pt | Peat and other highly organic soils |

## GRAIN SIZE CHART

| CLASSIFICATION | RANGE OF GRAIN | |
|---|---|---|
| | U.S. Standard Sieve Size | Grain Size in Millimeters |
| BOULDERS | Above 12" | Above 305 |
| COBBLES | 12" to 3" | 306 to 76.2 |
| GRAVEL | 3" to No. 4 | 76.2 to 4.76 |
| Coarse | 3" to 3/4" | 76.2 to 19.1 |
| Fine | 3/4" to No. 4 | 19.1 to 4.76 |
| SAND | No. 4 to No. 200 | 4.76 to 0.075 |
| Coarse | No. 4 to No. 10 | 4.76 to 2.00 |
| Medium | No. 10 to No. 40 | 2.00 to 0.420 |
| Fine | No. 40 to No. 200 | 0.420 to 0.075 |
| SILT & CLAY | Below No. 200 | Below 0.075 |

## PLASTICITY CHART




Ninyo & Moore

U.S.C.S. METHOD OF SOIL CLASSIFICATION

Updated Nov. 2011

## 28. TECHNICAL SPECIFICATIONS

**DIVISION 1 - GENERAL REQUIREMENTS**

| | |
|---|---|
| 01010 | PROJECT DESCRIPTION |
| 01070 | ABBREVIATIONS |
| 01090 | REFERENCE STANDARDS |
| 01300 | CONTRACTOR SUBMITTALS |
| 01312 | PROJECT MEETINGS |
| 01505 | MOBILIZATION |
| 01520 | TEMPORARY FACILITIES |
| 01530 | PROTECTION OF EXISTING FACILITIES |
| 01550 | SITE ACCESS AND STORAGE |
| 01560 | PROJECT ENVIRONMENTAL CONTROLS |
| 01660 | MECHANICAL EQUIPMENT - INSTALLATION AND START-UP |
| 01700 | PROJECT CLOSEOUT |
| 01730 | OPERATION AND MAINTENANCE MANUALS |
| 01783 | AS-BUILTS |
| 01810 | FUNDAMENTAL COMMISSIONING REQUIREMENTS |

**DIVISION 2 - SITEWORK**

| | |
|---|---|
| 02050 | DEMOLITION AND SALVAGE |

| | |
|---|---|
| 02150 | SHEETING, SHORING AND BRACING |
| 02200 | EARTHWORK |
| 02221 | TRENCHING, BACKFILLING AND COMPACTING |
| 02630 | DUCTILE IRON PIPE |
| 02640 | PVC PIPE |
| 02650 | PIPE FITTINGS, TRANSITION COUPLINGS, MECHNICAL RESTRAINED JOINT FITTINGS, FLANGED COUPLINGS ADAPTERS AND HARDWARE |
| 02666 | PRESSURE PIPELINE WATER TESTING |
| 02670 | DISINFECTION OF POTABLE WATER PIPELINES |

**DIVISION 3 - CONCRETE**

| | |
|---|---|
| 03100 | CONCRETE FORMWORK |
| 03200 | REINFORCEMENT STEEL |
| 03300 | CAST-IN-PLACE CONCRETE |
| 03315 | GROUT |

**DIVISION 5 - METALS**

| | |
|---|---|
| 05120 | STRUCTURAL STEEL |
| 05220 | CONCRETE BOLTS |
| 05400 | LIGHT METAL FRAMING |
| 05500 | MISCELLANEOUS METALS |
| 05650 | PRE-ENGINEERED SHADE STRUCTURE |

**DIVISION 7 - THERMAL AND MOISTURE PROTECTION**

| | |
|---|---|
| 07900 | SEALANTS AND CAULKING |

**DIVISION 9 - FINISHES**

| | |
|---|---|
| 09800 | PROTECTIVE COATINGS |

**DIVISION 11 - EQUIPMENT**

| | |
|---|---|
| 11900 | IN-RESERVOIR THM REMOVAL SYSTEM |

**DIVISION 13 – SPECIAL CONSTRUCTION**

| | |
|---|---|
| 13290 | REHABILITATION OF EXISTING STEEL TANK |
| 13500 | CATHODIC PROTECTION SYSTEMS |
| 13600 | FABRIC BAFFLE WALL |

**DIVISION 15 - MECHANICAL**

| | |
|---|---|
| 15380 | MOTORS |
| 15615 | VALVES |

**DIVISION 16 - ELECTRICAL**

| | |
|---|---|
| 16000 | GENERAL ELECTRICAL REQUIREMENTS |
| 16010 | ELECTRICAL: BASIC REQUIREMENTS |
| 16111 | CONDUITS |

| | |
|---|---|
| 16123 | 600 VOLT CLASS CABLE |
| 16124 | INSTRUMENTATION CLASS CABLE |
| 16130 | OUTLET, PULL, AND JUCTION BOXES |
| 16170 | GROUNDING |
| 16190 | SUPPORTING DEVICES |
| 16195 | ELECTRICLA IDENTIFICATION |
| 16474 | MOTOR CONTROL EQUIPMENT |
| 16622 | STANDBY DIESEL ELECTRICAL GENERATOR |
| 16902 | ELECTRICAL CONTROLS, RELAYS, AND ALARMS |
| 16904 | VARIABLE FREQUENCY DRIVES – LOW VOLTAGE |
| 16906 | PLC AND RIO CABINETS |
| 16907 | PROGRAMMING & CONTROL DESCRIPTION |
| 16920 | ELECTRICAL ACCEPTANCE TESTING |

**DIVISION 17 – INSTRUMENTATION**

| | |
|---|---|
| 17000 | INSTRUMENTATION |
| 17123 | ULTRASONIC LEVEL TRANSMITTER |
| 17134 | FLOW SWITCHES |
| 17501 | HUMAN MACHINE INTERFACE SOFTWARE AND HARDWARE |
| 17790 | FIBER OPTIC CABLING |

# SECTION 01010 – PROJECT DESCRIPTION

The City of Holtville has approved for bidding of improvements to the Water Treatment Plant. Improvements include the following: Install a shade structure over the clarifier/mix media filters; Replacement of Finish Water Pump Station Motors; Install a baffling system in the 1.5 MG Water Storage Tank; Finish water piping alignment to allow the water storage tanks to operate in series; Rehabilitate the 2.4 MG Water Storage Tank with the addition of a Cathodic Protection System, TTHM System, and recoat of the tank; Replacement of two emergency standby generators; and Electrical and Controls for Automation. The following items are the basis of this Project:

A. Clarifier/Mix Media Filters Shade Structure

A shade structure is to be installed over the clarifier/mix media filter facility. The shade structure would assist in reducing water evaporation, and algal species and bacterial levels within the clarifier/mix media filter units.

B. Finished Water Transfer Pumps

Finish water transfer pumps – motor and starter replacement: The two (2) existing finish water pump motors shall be removed and replaced with variable speed motors and variable frequency drives to improve efficiency of operation.

C. Baffles for 1.5 MG Water Storage Tank

A full depth baffling system will be installed in the 1.5 MG Finished Water Reservoir to provide serpentine plug flow through the tank to achieve improved CT performance. The installation will require suspending the baffles from pipes attached to the tank roof and welded connections to the steel floor and walls of the tank to stabilize the baffles. The installation will compromise the existing coating system. Rather than do a problematic patch repair job on the coating, the entire tank interior will be cleaned and recoated to provide a durable installation.

D. Finish Water Piping

The City of Holtville currently uses the existing 12-inch diameter backwash water pipelines to operate the existing 1.5 MG and 2.4 MG steel reservoir water tanks in series. The finish water piping alignment will provide the existing 1.5 MG and 2.4 MG steel reservoir water tanks to operate in series with each tanks finish water outlet being on the opposite side of the tank.

E. Cathodic Protection System for 2.4 MG Tank

A cathodic protection system is to be installed in the 2.4 MG Tank to protect the steel from future coating failures.

F. In-Reservoir Trihalomethane Removal System for 2.4 MG Tank

An In-Reservoir Trihalomethane (THM) Removal System is to be installed for the 2.4 MG Tank in order to reduce the THM within the potable water system. The THM Removal System will include a tank mixing system, a spray system to strip out the volatile THM chemicals, and ventilation system to remove the stripped chemicals.

G. Rehabilitation of the 2.4 MG Water Storage Tank

The coating system is currently in very poor condition due to the chlorine levels applied over a period of time in an attempt to address the TTHM Violations. Large sections of the coating system have peeled from the steel substrate, and minor corrosion is evident where the substrate is exposed to water.

The Contractor shall rehabilitate the existing 2.4 MG water storage tank. The rehabilitation of the 2.4 MG water storage tank shall consist of removing and disposing the existing epoxy coating on the interior tank side wall, interior tank bottom, and other interior coated tank appurtenances. The removal, disposal of, and replacement shall be required of the interior tank ladder, vent screens, roof clip shoe supports and hatch gaskets. Renovation should include an abrasive blasting to coated interior, testing and disposal of blasting waste material and

coating of the interior tank wall, bottom, and other interior coated tank appurtenances.

H. Water Treatment Plant Emergency Standby Generator

The City of Holtville is equipped with emergency standby power at the Water Treatment Plant and at the raw water ponds site. Emergency standby power is provided by means of stationary diesel generators. The standby generator at the water treatment plant and raw water ponds site are in need of replacement. The Contractor shall remove and replace the existing diesel emergency generators with new diesel emergency generators.

I. Water Plant Electrical Improvements

The existing electrical system was constructed in 1991 and is significantly outdated. The improved controls system is to be comprised of a new master PLC cabinet in conjunction with an associated remote I/O cabinet and PC based HMI System. In conjunction, the Contractor shall be responsible for providing and installing various instruments and devices throughout the controls system as denoted on the P&ID's of the Electrical and Instrumentation Plans and Specifications. The Contractor shall be responsible for all system programming, configuration, testing and commissioning as defined in Electrical and Instrumentation Plans and Specifications.

**END OF SECTION 01010**

# SECTION 01070 - ABBREVIATIONS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. Wherever in these Contract Documents the following abbreviations or acronyms are used, they shall have the meanings indicated as follows in this specification.

### 1.02 ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| AA | Aluminum Association |
| AAMA | Architectural Aluminum Manufacturer's Association |
| AASHTO | American Association of the State Highway and Transportation Officials |
| A2LA | American Association of Laboratory Accreditation |
| A.C. | Asphalt Concrete |
| ACI | American Concrete Institute |
| ADWR | California Division of Water Resources |
| AGC | Associated General Contractors |
| AGMA | American Gear Manufacturer's Association |
| AI | The Asphalt Institute |
| AIA | American Institute of Architects |
| AISC | American Institute of Steel Construction |
| AISI | American Iron and Steel Institute |
| AITC | American Institute of Timber Construction |
| AMCA | Air Moving and Conditioning Association |
| ANSI | American National Standards Institute, Inc. |
| AOS | Apparent Opening Size |
| APA | American Plywood Association |
| API | American Petroleum Institute |
| APN | Assessor's Parcel Number |
| APWA | American Public Works Association |
| ASA | Acoustical Society of America |
| ASAE | American Society of Agriculture Engineers |
| ASCE | American Society of Civil Engineers |
| ASHRAE | American Society of Heating, Refrigerating and Air Conditioning Engineers |
| ASLE | American Society of Lubricating Engineers |
| ASME | American Society of Mechanical Engineers |
| ASQC | American Society for Quality Control |
| ASSE | American Society of Sanitary Engineers |
| ASTM | American Society for Testing and Materials |
| AWPA | American Society for Preservers Association |
| AWPI | American Wood Preservers Institute |

| | |
|---|---|
| AWS | American Welding Society |
| AWWA | American Water Works Association |
| BHMA | Builders Hardware Manufacturer's Association |
| CBC | California Building Code |
| CBR | California Bearing Ratio |
| CDX | Apa Rated Plywood Sheathing Exposure |
| CGA | Compressed Gas Association |
| CLFMI | Chain Link Fence Manufacturer's Institute |
| CMA | Concrete Masonry Association |
| CRSI | Concrete Reinforcing Steel Institute |
| ETL | Electrical Test Laboratories |
| ETL | Extract, Transform Load |
| EPDM | Ethylene Propylene Diene M-Class |
| FHWA | Federal Highway Administration |
| GAI | Geosynthetic Accreditation Institute |
| GCP | Construction General Permit |
| GPM | Gallons per Minute |
| GRI | Geosynthetic Research Institute |
| HDPE | High Density Polyethylene |
| HPC | Heterotrophic Plate Count |
| ICBO | International Conference of Building Officials |
| IEEE | Institute of Electrical and Electronics Engineers |
| IES | Illuminating Engineering Society |
| IID | Imperial Irrigation District |
| IPC | Institute of Printed Circuits |
| IPCEA | Insulated Power Cable Engineers Association |
| IPS | Iron Pipe Size |
| ISA | Instrument Society of America |
| LAP | Laboratory Accreditation Program |
| LLDPE | Linear Low Density Polyethylene |
| MARV | Minimum Average Roll Value |
| MD | Machine Direction |
| MGD | Million Gallons per Day |
| MPA | Mega Pascal |
| MBMA | Metal Building Manufacturer's Association |
| NACE | National Association of Corrosion Engineers |
| NBS | National Bureau of Standards |
| NEC | National Electrical Code |
| NEMA | National Electrical Manufacturer's Association |
| NFPA | National Fire Protection Association |
| NFPA | National Forest Products Association |
| NGLI | National Lubricating Grease Institute |
| No. | Number |
| NOI | Notice of Intent |
| NOT | Notice of Termination |
| NSF | National Sanitation Foundation |

| | |
|---|---|
| NTPEP | National Transportation Product Evaluation Program |
| OD | Outside Diameter |
| OEM | Original Equipment Manufacturer |
| OIT | Oxidative Induction Time |
| OS&Y | Outside Stem and York |
| OSHA | Occupational Safety and Health Administration |
| PCA | Portland Cement Association |
| PCC | Portland Concrete Cement |
| PSI | Pounds per Square Inch |
| PVC | Polyvinyl Chloride |
| SBR | Styrene Butadiene Rubber |
| SCH | Schedule |
| SDR | Standard Dimension Ratio |
| SMA | Screen Manufacturer's Association |
| SMACCNA | Sheet Metal and Air Conditioning Contractors National Association |
| SPDT | Single Pole-Double Throw |
| SSPC | Steel Structures Painting Council |
| SSPWC | Standard Specifications for Public Works Construction |
| SWPPP | Storm Water Pollution Prevention Plan |
| TRS | Trihalomethane Removal System |
| UBC | Uniform Building Code |
| UL | Underwriters Laboratories, Inc. |
| USEPA | United States Environmental Protection Agency |
| UV | Ultra-Violet Disinfection |
| WCRSI | Western Concrete Reinforcing Steel Institute |
| WRI | Wire Reinforcement Institute, Inc. |
| WWPA | Western Wood Products Association |
| XMD | Cross Machine Direction |

1.03 PLAN SHEET ABBREVIATIONS

| | |
|---|---|
| % | Percent |
| AASHTO | American Association of State Highway and Transportation Officials |
| A.C. | Asphalt Concrete |
| A.C.P. | Asbestos Cement Pipe |
| AC-FT | Acer Feet |
| Agg. | Aggregate |
| AOS | Apparent Opening Size |
| APP | Approximate |
| ASTM | American Society for Testing and Materials |
| AVE | Average |
| AWWA | American Water Works Association |
| BC | Beginning of Curve |
| BLDG. | Building |

| | |
|---|---|
| BTM | Bottom |
| B.V. | Butterfly Valve |
| C2B | Class 2 Base |
| CC | Cubic Centimeter |
| C.I. | Cast Iron |
| CIRC | Circumferential |
| CL | Centerline |
| CLR | Clear |
| C.M.C. | Cement Mortar Coated |
| C.M.L. | Cement Mortar Lined |
| CPVC | Chlorinated Polyvinyl Chloride |
| D.I. | Ductile Iron |
| DIA | Diameter |
| DWG | Drawing |
| D/W | Driveway |
| $\Delta$ | Delta |
| EC | End of Curve |
| EF | Each Face |
| EL. | Elevation |
| E.P. | Edge of Pavement |
| EPDM | Ethylene Propylene Diene M-Class |
| EW | Each Way |
| FF | Finish Floor Elevation |
| FG | Finished Grade |
| $F_L$ | Flowline |
| FL. | Flanged |
| F.M. | Flow Meter |
| FM | Force Main |
| FS | Finish Surface |
| GALV | Galvanized |
| GPH | Gallons per Hour |
| GPM | Gallons per Minute |
| GW | Ground Water |
| H.B. | Hose Bib |
| HDPE | High Density Polyethylene |
| HP | Horsepower |
| HW | High Water |
| I.D. | Inside Diameter |
| INV. EL. | Invert Elevation |
| INV. | Invert |
| IPS | Iron Pipe Size |
| L. | Length |
| LBS | Pounds |
| MAX. | Maximum |
| MG | Million Gallon |
| MGD | Million Gallons per Day |

| | |
|---|---|
| M.H. | Manhole |
| MIN. | Minimum |
| MISC. | Miscellaneous |
| M.J. | Mechanical Joint |
| MPH | Miles per Hour |
| N. RIM | North Rim |
| N.S. | Native Surface |
| N.T.S. | Not To Scale |
| O.C. | On Center |
| O.D. | Outside Diameter |
| OHC | Overhead Cable |
| OHE | Overhead Electric Line |
| OHT | Overhead Telephone Line |
| OS&Y | Outside Stem & York |
| P.C.C. | Portland Concrete Cement |
| P.E. | Plain End |
| PL | Property Line |
| P.P. | Power Pole |
| PP# | Power Pole Number |
| PPM | Parts per Million |
| PSI | Pounds per Square Inch |
| PT | Pressure Transmitter |
| PVC | Polyvinyl Chloride |
| P/S | Prestressing |
| R.C. | Reinforced Concrete |
| ROW | Right-of-Way |
| S. | Slope |
| SCH | Schedule |
| SCHED | Schedule |
| SD | Storm Drain |
| SDFM | Storm Drain Force Main |
| SDR | Standard Dimension Ratio |
| SM | Static Mixer |
| SQ | Square |
| SS | Sanitary Sewer |
| SST | Stainless Steel |
| STA | Station |
| S/W | Sidewalk |
| SWPPP | Storm Water Pollution Prevention Plan |
| TBD | To Be Determined |
| TBM | Temporary Benchmark |
| T.C. | Top of Curb or Top of Concrete |
| TDH | Total Dynamic Head |
| TF | Top of Footing |
| TMH | Top of Manhole |
| TOE | Top of Slope |

| | |
|---|---|
| TOF | Top of Floor |
| TOW | Top of Wall |
| T.P. | Top of Pavement |
| TRS | Trihalomethane Removal System |
| TV | Television |
| TYP. | Typical |
| UE | Underground Electricity |
| UNO | Unless Noted Otherwise |
| UT | Underground Telephone |
| VERT | Vertical |

**END OF SECTION 01070**

# SECTION 01090 - REFERENCE STANDARDS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. All work and materials shall be in accordance with applicable codes, ordinances and regulations of the City of Holtville, the State of California, American Water Works Association, and all other public authorities having jurisdiction. Codes governing this work include, but are not limited to, the latest approved edition of the following: Standard Specifications for Public Works Construction (Greenbook) latest edition; Occupational Safety and Health Act (OSHA); and the City of Holtville ordinances and regulations including the City of Holtville Standard Details and Specifications.

B. Whenever in these Specifications references are made to published specifications, codes, standards or other requirements, it shall be understood that when no date is specified, only the latest published specifications, standards or requirements of the respective issuing agencies, as of the date that the Work is advertised for bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the drawings shall be waived because of any provision of, or omission from, said standards or requirements.

### 1.02 REFERENCE SPECIFICATIONS, CODE AND STANDARDS

A. All work specified herein shall conform to or exceed the requirements of the referenced specifications, codes and standards to the extent that the provisions of such documents are not in conflict with the requirements of these Specifications.

B. References herein to “Building Code” or UBC shall mean the Uniform Building Code of the International Conference of Building Officials (ICBO). The latest edition of the code, as of the date of award, as approved and adopted by the agency having jurisdiction, including all addenda, modifications, amendments or other lawful changes thereto, shall apply to the Work.

C. References herein to American Water Works Association or AWWA shall comply with the latest edition of the code, as of the date of award.

D. In case of conflict between codes, reference standards, drawings and other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or labor. The contractor shall bid the most stringent requirements.

E. Applicable Standard Specifications: The Contractor shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards and specifications listed herein; except, that wherever references to "Standard Specifications" are made, the provisions therein for measurement and payment shall not apply.

F. References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

G. References herein to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

H. All materials and equipment appurtenances that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.

I. References in the Contract Documents to "Standard Specifications" shall mean the Greenbook, formally known as the "Standard Specifications for Public Works Construction" as published by the American Public Works Association, including all current supplements, addenda and revisions thereof, latest edition.

**END OF SECTION 01090**

# SECTION 01300 - CONTRACTOR SUBMITTALS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. All submittals by the Contractor shall be submitted to the Engineer at the Site.

B. Within ten (10) days after the date of Notice to Proceed, the Contractor shall submit the following items to the Engineer:

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.

C. Equipment submittals shall comply with Section 01660 – Mechanical Equipment – Installation and Start-Up

### 1.02 SUBMITTAL REQUIREMENTS AND PROCESS

A. Wherever called for in the Contract Documents or when requested by the Engineer the Contractor shall furnish to the Resident Project Representative for review, six (6) copies of each submittal.

B. All submittals shall be accompanied by a submittal transmittal form. This form may be obtained from the Engineer. 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 Engineer. 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 Engineer 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.

C. Multiple-page submittals shall be collated into sets with each set stapled or bound.

D. The Engineer will return copies of each submittal to the Contractor with review comments within fifteen (15) calendar days following their receipt by the Resident Project Representative. There will be three (3) copies of a 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 number of copies of said revised submittal to the Engineer.

E. Fabrication of an item shall commence only after the 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.

F. The 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 Resident Project Representative 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 Engineer may request that the Contractor provide a revised or updated Construction Schedule if, at any time, the Engineer 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 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 Engineer will include the following:

1. If proposed substitute material or equipment has been judged to be unacceptable by the 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 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 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 01730 – Operation and Maintenance Manuals.

B. All technical manuals shall be submitted to the Engineer not later than the seventy-five percent (75%) of construction completion date or fourteen (14) days prior to start-up of equipment if started before seventy-five percent (75%) completion of project. All discrepancies found in the technical manuals shall be corrected by the Contractor

within thirty (30) days from the date of written notification by the Engineer.

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 Engineer at all times during the construction period and shall be delivered to the Engineer 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 Engineer.

1.08 SUPERINTENDENT SUBMITTAL

A. A letter designating the Project Superintendent shall be forwarded to the Engineer for his review. The letter shall also include emergency contact information for the Project Superintendent and other Contractor Representative.

1.09 MATERIAL AND EQUIPMENT SUBMITTAL LIST

A. At a minimum, the following material and equipment list shall be submitted for review and approval.

1. General Requirements

1.1 Construction Schedule

1.2 Schedule of Values

1.3 Letter Designation Project Superintendent

1.4 Emergency Contact Number

1.5 Operation and Maintenance Manuals

1.6 Project Sign

2. Sitework

    2.1 Class 2 Base Gradation, Maximum Density and Sand Equivalent

    2.2 Granular Sand Gradation, Maximum Density and Sand Equivalent

    2.3 Ductile Iron Pipe

    2.4 PVC Pipe

    2.5 Pipe Fittings

    2.6 Magnetic Detector Tape

    2.7 Pipe Supports

    2.8 Fence Material

3. Concrete

    3.1 Reinforcement Steel

    3.2 Cast-in-Place Concrete

    3.3 Grout

4. Metals

    5.1 Structural Steel

    5.2 Concrete Bolts

    5.3 Pre-Engineered Metal Shade Structure

9. Finishes

    9.1 Protective Coatings

    9.2 Paint Finishes

10. Equipment

    10.1 Baffle System

10.2 Finish Water Pump Motors

10.3 Shade Structure

10.4 Generator Set

11. Special Construction

11.1 Tank Appurtenances

10.5 Trihalomethane Removal System

11.2 Cathodic Protection Systems

12. Mechanical

12.1 Motors

12.2 Miscellaneous Valves

13. Electrical

13.1 Bill of Materials for conduits and wires

13.2 Motor Control Equipment

13.3 Controls, Relays, and Alarms

13.4 Variable Frequency Drives

13.5 PLC and Remote I/O Cabintes

14. Instrumentation

14.1 Ultrasonic Level Transmitter

14.2 Flow Switches

14.3 Human Machine Interface Software and Hardware

14.4 Fiber Optic Cable

**END OF SECTION 01300**

# SECTION 01312 - PROJECT MEETINGS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. Work Included:

1. Required to enable orderly review during pre-design phase and design phase and progress of the Work, and to provide for systematic discussion of installation problems and other construction problems arisen, the Owner and/or Representative will conduct project meetings throughout the construction period.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Division 1 – General Requirements.

2. The Contractor's relations with his Subcontractors and materials suppliers, and discussions relative thereto, are the Contractor's responsibility and normally are not part of project meetings content.

### 1.03 SUBMITTALS

A. Conform to provisions of Section 01330 – Submittals/Shop Drawings.

B. Agenda Items:

1. To the maximum extent practicable, advise the Owner and/or Representative at least twenty-four (24) hours in advance of project meetings regarding items to be added to the agenda or requesting the cancellation of any Meeting.

C. Minutes:

1. The Owner and/or Representative will compile minutes of each project meeting and will furnish one copy to the Contractor, Resident Project Representative, and all other involved parties.

2. Recipients of copies may make and distribute such other copies as they wish.

1.04 QUALITY ASSURANCE

A. For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings.

PART TWO - PRODUCTS (NOT APPLICABLE)

PART THREE - EXECUTION

3.01 MEETING SCHEDULE

A. Except as noted below for Preconstruction Meeting, progress meetings are to be held every once every two weeks or as otherwise directed by the Owner and/or Representative.

B. Coordinate as necessary to establish mutually acceptable schedule for additional meetings.

3.02 MEETING LOCATION

A. The Owner and/or Representative will establish the meeting location. To the maximum extent practicable, meetings will be held in Contractor's office at the Site.

3.03 PRE- DESIGN AND CONSTRUCTION MEETING

A. A Pre-Design and Construction Meeting will be scheduled to be held within twenty-one (21) working days after the Notice to Proceed has been issued.

1. Provide attendance by authorized representatives of the Contractor and major Subcontractors.

2. The Owner and/or Representative will advise other interested parties.

B. Minimum Agenda: Data will be distributed and discussed on at least the following items.

1. Organizational arrangement of Contractor's forces and personnel, and those of the subcontractors, and materials suppliers.

2. Organizational arrangement of the Owner's forces and personnel and other authorized representatives.

3. Channels and procedures for communication.

4. Construction Schedule, including sequence of events and critical work.

5. Contract Documents, including distribution of required copies of original Documents and revisions.

6. Processing of Shop Drawings and other data submitted to the Owner and/or Representative for review.

7. Processing of bulletin, addenda, field decisions, Requests for Information and Change Orders.

8. Rules and regulations governing performance of the Work.

9. Procedures for site security, project quality control, housekeeping, and related matters.

10. It is the responsibility of the Contractor for Site Safety & First Aid; however, it shall be on the agenda.

11. Procedures for Contractor's request.

12. Emergency Information: The name, addresses, telephone and fax numbers of the Contractor, and Subcontractors, or their representatives, shall be filed with the Owner and/or Representative prior to start of the Work.

3.04 PROJECT MEETINGS

A. Attendance:

1. To the maximum extent practicable, the Project Superintendent and other representatives who have full knowledge of the project and full authority to act for the Contractor shall represent the Contractor at Project Meetings throughout the progress of the Work.

2. Subcontractors, materials suppliers, and others may be invited to attend these Project Meetings in which their aspect of the Work is involved.

3. The Contractor may not cancel or be absent from any meeting without advanced approval from the Owner and/or Representative. The Contractor must submit a written request with reason to the Owner and/or Representative twenty-four (24) hours before the scheduled meeting. If approved, the Contractor shall notify all parties of the cancellation.

B. Minimum Agenda:

1. Review progress of the Work since last meeting. Review actual starts and finish dates of activities. Review progress of design.

2. Review status (total complete and outstanding) of submittal for approval, Request for Information and Change Orders.

3. Identify old and new problems, which impede planned progress**,** identify responsible party for the follow-up actions. Mutually agree to a common solution and date of correction.

4. Develop corrective measures and procedures to regain lost time on the planned schedule.

5. Review Weekly Progress Reports including the forecasts.

6. Status of As-Builts.

7. Project site Walk-Through. Record all discussion and follow-up actions.

8. Any project site health and/or accident or safety issues.

## 3.05 SPECIFIC SITE MEETINGS

A. Required when necessary to enable orderly review and discussion of site conditions and problems requiring solution during the progress of the contracted work. Notify the Owner and/or Representative of the need for additional site meetings as early as possible to resolve the problem without any impact to the Project Schedule.

B. Provide necessary labor, tools, and equipment such as shoring, scaffolding, ladder, etc. to gain access to the specific sites.

C. The Contractor and it's authorized representative shall be present at all times.

All discussion and follow-up actions shall be recorded by the Owner and/or Representative, and the minutes shall be distributed at the next meeting or at earliest time

**END OF SECTION 01312**

# SECTION 01505 - MOBILIZATION

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. Mobilization shall include obtaining all permits; moving plant equipment on-site; furnishing and erecting plants, temporary buildings and other construction facilities; all as required for the proper performance and completion of the Work. Mobilization shall include, but not be limited to, the following principal items:

1. Moving on to the site, Contractor's and subcontractor's equipment and materials required for first month operations.

2. Installing temporary construction power, wiring and lighting facilities.

3. Establishing fire protection equipment and instructing designated personnel in the operation of such apparatus.

4. Providing field office trailer for the Contractor's and subcontractor's complete with furnishings and utility services when applicable. Contractor will furnish the temporary power, water, telephone, copier, facsimile machine and other items for the Contractor's field offices. Contractor to furnish and install necessary piping, wiring and disconnects.

5. Providing all on-site Contractor communication facilities.

6. Providing on-site Contractor's sanitary facilities.

7. Arranging and setting up the Contractor's work and storage yard.

8. Obtaining all required permits.

9. Posting all OSHA required notices and establishment of safety programs.

10. Have Contractor's superintendent at the Site full time.

11. Fabricate and install Project Sign.

12. Proof of Permits, Freight and similar expenses.

1.02 PAYMENT FOR MOBILIZATION

A. Payment for Mobilization, as noted in the Proposal Forms and approved Schedule of Values, shall not be released to the Contractor unless all items in Paragraph “A” above have been satisfied.

**END OF SECTION 01505**

# SECTION 01520 - 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 the Owner, 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 the Owner. 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. General: The Contractor shall provide an adequate supply of water of a quality suitable for all domestic and construction purposes. Utility or plant effluent water may be used for hydraulic structures and pipeline testing as approved, in writing, by the Owner. Potable water shall be furnished by the Owner without charge.

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 Owner 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 install 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 Resident Project Representative. 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 one (1) telephone line. 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 Construction Trailer shall be moved on the Site within **ten (10) days** of the Notice to Proceed. Drinking water 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 or subcontractors. 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. Contractor may install temporary piping for toilet facilities to discharge into the incoming sewer.

1.06 COMMUNICATIONS

A. Telephone Services: The Contractor shall provide and maintain a phone line.

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 Owner.

1.08 CONTRACTOR PARKING

The Contractor shall not park his equipment, nor allow his personnel to park, in any area except those specifically designated by the Owner.

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

The Contractor shall remove temporary office facilities, toilets, storage sheds and other temporary construction from the site as soon as, in Owner's opinion, the progress of Work permits. Contractor shall recondition and restore those portions of the site occupied by the same to a condition equal to or better than it was prior to construction.

**END OF SECTION 01520**

# SECTION 01530 - 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 Engineer 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 Engineer 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 a Resident Project 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 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 Owner or appointed representative. If directed by the Owner or appointed representative repairs shall be made by the Contractor under the provisions for changes and extra work contained in Articles 10, 11 and 13 of the 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 01530**

# SECTION 01550 - SITE ACCESS AND STORAGE

## PART 1 - GENERAL

### 1.01 HIGHWAY AND STREET LIMITATIONS TO PROJECT SITE

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 Owner 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 plant operating personnel 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. The Owner will designate and arrange, for the Contractor's use, a portion(s) of the property on or adjacent to the Site for its exclusive use during the term of the Contract. The area is designated for an

office, storage and shop area for construction operations relative to this Contract. Contractor shall be solely responsible for the security of its tools, supplies and equipment at the site. The staging area(s) for this project will be located within the Water Treatment Plant site.

**END OF SECTION 01550**

# SECTION 01560 - PROJECT ENVIRONMENTAL CONTROLS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. Controls outlined in the Environmental Report, if any, developed for this project shall be implemented throughout the course of construction. A copy of the Environmental Report, if any, is included in the Special Conditions.

### 1.02 EXPLOSIVES AND BLASTING

A. The use or storage of explosives on the Work or site will not be permitted.

B. Controls outlined in the Environmental Report developed for this project shall be implemented throughout the course of construction. A copy of the Environmental Report is included in the Special Conditions.

### 1.03 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 dispose of all rubbish and waste materials of any nature occurring at the Site, and shall establish regular intervals of collection and disposal of such materials and waste. 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.

1.04 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 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.

1.05 CULTURAL RESOURCES

A. The Contractor's attention is directed to the National Historic Preservation Act of 1966 (16 U.S.C. 470) and 36 CFR 800 which provides for the preservation of potential historical, architectural, archeological or cultural resources (hereinafter called "cultural resources). If potential cultural resources are discovered during subsurface excavations at the site of construction, the following procedures shall be instituted:

1. The Contractor shall immediately notify the Owner or representative.

2. The Owner or representative will issue a Field Order directing the Contractor to cease all construction operations at the location of such potential cultural resources find.

3. Such Field Order shall be effective until such time as a qualified archeologist can be called to assess the value of these potential cultural resources and make recommendations to the California State Historical Society Archeologist.

B. If the archeologist determines that the potential find is a bona fide cultural resource, at the direction of the California State Historical Society Archeologist, the Contractor shall suspend work at the location of the find under the provisions for changes contained in Articles 4, 9 and 14 of the Standard General Conditions and Supplementary Conditions.

**END OF SECTION 01560**

# SECTION 01660 - MECHANICAL EQUIPMENT - INSTALLATION AND START-UP

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. This section contains general information required for the installation of mechanical equipment as specified within the various individual specifications. The plans and/or performance specifications describe equipment and general layout based on certain commercially available equipment. It shall be the responsibility of the Contractor to ascertain the compatibility of all equipment and utilization of available space based on the Contractor's approved design and/or shop drawings and intent of these Contract Documents.

B.. Included shall be all supervision, labor, materials, tools, equipment and services as required for the furnishing, installation, testing and operation of equipment including the services of manufacturer service engineers, receiving, unloading, storage, protection, installation and complete erection of all mechanical equipment required in these Contract Documents.

C. Installation shall include, but not be limited to placing, core drilling, shimming, anchoring, grouting, cleaning, painting, lubricating, assembling, testing and adjusting of all mechanical equipment. Installation shall also include providing all required miscellaneous parts and appurtenances.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 11900 – In Reservoir THM Removal System

B. Section 13500 – Cathodic Protection Systems

C. Section 15380 – Motors

B. Divisions 16 & 17

### 1.03 DESCRIPTION

A. General:

1. The Contractor shall be liable for all damage to the equipment which is to be furnished and installed under this

Contract, as well as for any damage to the building structures, existing equipment or other property, real or personal, resulting from the movement of equipment or installation work. This liability shall continue until the installed equipment is accepted by the Owner.

2. The Contractor shall cause the equipment to be furnished under this division to be the product of firms regularly engaged in the design and manufacture of the type of item specified, possessing the required technical competence, skill, resources and ability to complete the work specified herein with the requisite degree of quality and in a timely and efficient manner. The Contractor shall be prepared to adequately document the qualification of the manufacturers nominated to provide equipment specified under this division. All documentation shall be submitted to the Owner or representative for review and acceptance prior to design, fabrication and shipment of any component specified herein. Nothing contained within these provisions shall be construed as relieving the Contractor of his responsibility for any portion of the work covered by this division.

B. Arrangement:

1. This arrangement of equipment as described by the specifications is based upon the best information available to the Owner at the time of the preparation of the concept drawings and specifications and is not intended to show exact dimensions peculiar to any specific manufacturer unless otherwise shown or specified. The Conceptual Drawings are, in part, diagrammatic, and, therefore, it is to be expected that the illustrated equipment, if any, be installed be per the Contractor's design and conform adequately to actual equipment installation requirements. The Owner or representative will review all equipment shope drawings, and installations to assure compliance with these requirements. It is to be anticipated that structural supports, equipment pads, foundations, connected piping and valves shown, in part or in whole, may have to be altered in order to accommodate the equipment furnished. Equipment pads shall be increased or reduced in size to properly suit the actual equipment. No additional payment will be made for such changes. All necessary calculations and drawings shall be submitted to the Owner or representative prior to beginning of the construction phase.

## 1.04 QUALITY ASSURANCE

A. Equipment and appurtenances shall be designed in conformity with the conceptual documents and performance specifications. Equipment shall be constructed of materials for the conditions of exposure and of such strength to withstand all stress which may occur during testing, installation, all conditions of operation, including start-up, shut-down and power failure.

B. All equipment shall be installed true and level and to the locations shown on the Plans. All work shall be performed to the satisfaction of the Owner. Precision gauges and levels shall be used in setting all equipment.

C. The Contractor shall be responsible for installation of the equipment in a manner consistent with the requirements of performance warranties and equipment workmanship of the manufacturer.

D. Machinery parts shall conform exactly to the dimensions shown on the Shop Drawings. The corresponding parts of identical machines shall be made interchangeable. Clearance shall be provided for repairs, inspection and adjustment.

E. Exposed surfaces shall be finished in appearance. All exposed welds shall be ground smooth at the corners for personnel protection.

F. All machinery and equipment shall comply in all respects with the provisions of the Occupational Safety and Health Act of 1970, and other applicable Federal, State and local laws and regulations.

G. Conformance to Design Criteria and Performance Guarantee.

1. In submitting a bid, the Contractor shall formally acknowledge receipt of and understanding of the design criteria presented in the Conceptual Drawings and Performance Specifications and guarantees that the equipment to be supplied shall be designed and performs in compliance with the design criteria.

2. Contractor shall guarantee all equipment provided under this Contract in accordance with the Contract Documents.

## 1.05 SUBMITTALS AND MISCELLANEOUS REQUIREMENTS

A. General:

1. All mechanical equipment provided under this division shall be submitted for review by the Owner or Representative. The submittal package for each individual equipment or groups of related equipment shall be complete and in accordance with Section 01330 – Submittals/Shop Drawings.

# PART 2 - PRODUCTS

## 2.01 ANCHORS AND SUPPORTS

A. The Contractor shall furnish, install and protect all guides, bearing plates, anchor and attachment bolts, and all other appurtenances required for the installation of equipment. Anchors and supports shall be of ample size and strength for the purpose intended and shall be approved by the Owner or Representative.

B. Anchor bolts shall be furnished and set in concrete foundations where required. All anchor bolts, studs and fasteners shall be Class 316 stainless steel.

C. Anchor bolts, flange bolts, and other fasteners using nuts and threaded bolts shall have no more than 1 ½ to 2 threads extending beyond the nut when fully tightened.

D. The Contractor shall obtain and use shop drawings and suitable templates when required for installation of equipment.

## 2.02 LUBRICATION

A. The Contractor shall thoroughly lubricate all equipment in accordance with the equipment manufacturer's instructions. Lubricating oils and greases shall be of the type and viscosity recommended by the equipment manufacturer.

B. All lubricants shall be furnished with flushing oils as recommended by the manufacturer. This includes, but is not limited to, all gearing and bearings, regardless of whether they have been shipped with or without oil soluble protective coatings.

C. Following flushing, oil lubricating systems shall be filled with “run-in” oil as recommended by the equipment manufacturer. The equipment shall be “run-in” at the no load condition for a minimum of two (2) hours. Following “run-in” and inspection, the equipment is to be drained and flushed again with flushing oil and refilled with lubricant as recommended by the manufacturer.

D. The grease fittings on all mechanical equipment shall be such that they can be serviced with a single type of grease gun. Grease fittings shall be standard zirt type.

E. Where locally mounted grease fittings would be difficult to service, the fitting shall be extended by adequately sized 316 stainless steel tubing to a point that shall provide accessibility for normal maintenance. Such points shall be located and installed as per the Owner or Representative’s directive.

2.03 PROTECTIVE COATING AND PAINTING

A. All equipment and materials shall be shop painted. Particular attention shall be directed to wetted surfaces and other areas exposed to corrosive, extreme temperature or other hazardous environments.

B. Painting shall be in strict accordance with Section 09800 unless otherwise indicated in the detailed equipment specifications. If there is no Section 09800, coating shall be as follows:

1. Ferrous Metals: Exterior Exposure (Non-submerged and non-buried)

a. Surface preparation: SSPC-SP 6.

b. Product: Devoe:

(1) Primer: Bar Rust 231 - 2 coats (3-5 mils DFT)

(2) Intermediate: Devran 224 HS (4-5 mils DFT)

(3) Finish: Devthane 378H - 1 coat (3-5 mils DFT) or approved equal.

c. Color to be selected by the Owner.

2. All Piping and Valves that have a factory epoxy coating shall receive a final coating in the field with a product compatible with the existing coating.

a. Color to be selected by the Owner.

C. All machined surfaces and shafting shall be cleaned and protected from corrosion by the proper type and amount of coating necessary to assure a minimum protection for two (2) years after shipment.

D. Oil lubricated gearing, bearings, and other lubricated components shall be shipped with an oil soluble protective coating as recommended by the manufacturer. The coating shall be selected to provide protection for two (2) years.

E. Motors, reducers and electric controls shall have the standard factory finish prior to delivery except where specific exception is noted in the individual equipment specifications.

F. Provide two (2) gallons of paint compatible with the equipment finish coat for field touch-up and provide blend numbers for primer coat and finish coat paints.

## 2.04 COUPLINGS

A. Unless otherwise specified, mechanical equipment with a driver greater than ½ horsepower, and where the input shaft of a driven unit is directly connected to the output shaft of the drive, shall have its two shafts connected by a flexible coupling which can accommodate angular misalignment, parallel misalignment and end float, and which cushions shock loads and dampens torsional vibrations. The flexible member shall consist of a tire with synthetic tension members bonded together in rubber. The flexible member shall be attached to flanges by means of clamping rings and cap screws, and the flanges shall be attached to the sub shaft by means of taperlock bushings which shall give the equivalent of a shrunk-on fit. There shall be no metal-to-metal contact between the driver and the driven unit.

B. Coupling sizes shall be as recommended by the manufacturer for the specific application, considering horsepower, speed of rotation, and type of service, and shall be installed as recommended by the manufacturer.

## 2.05 GUARDS

A. All exposed moving parts shall be provided with guards in accordance with the requirements of CAL/OSHA. Guards shall be fabricated of 14 gage steel, ½-13-15 expanded metal screen to provide visual inspection of moving parts without removal of the guard. Guards shall be galvanized after fabrication and shall be designed to be readily removable to facilitate maintenance of moving parts. Reinforced holes shall be provided.

## 2.06 NAMEPLATES

A. A nameplate shall be provided on all items of equipment and shall contain approved equipment name or abbreviation and equipment number. Equipment nameplates shall be engraved or stamped on stainless steel and fastened to the equipment in an accessible location with No. 4 or larger oval head stainless steel screws or drive pins. Nameplates for motor-driven equipment shall include capacity, head, horsepower, bearing data, model number and serial number of pump, blower, compressor and motor. The main sewage pump nameplates shall also include the impeller diameter.

## 2.07 TOOLS AND ACCESSORIES

A. The Contractor shall supply one (1) complete set of any special wrenches or other special tools necessary for the assembly, adjustment, and dismantling of the equipment. Special tools shall include any type of tool that has been specifically made for use on an item of equipment for assembly, disassembly, repair, and maintenance or is not available in current Snap-On Catalogue or Proto Professional Tools Full-Line Catalogue. When special tools are provided, they shall be marked or tagged, and a list of such tools shall be included with the maintenance and operation manuals describing he use of each marked tool. All wrenches and spanners shall be of best quality, hardened steel forgings with bright, finished heads and with work faces dressed to fit nuts. Each set of tools shall be neatly mounted in a toolbox of suitable design provided with a hinged cover.

# PART 3 - EXECUTION

## 3.01 INSTALLATION

A. The Contractor shall cause each item of equipment provided as a part of the Contract Documents to be installed, aligned and tested

by skilled workmen to the tolerances recommended by the equipment manufacturer. In addition, the equipment shall be installed, aligned and tested under the direction of installation engineers who have been factory trained by the equipment manufacturer. Upon completion of the Work and as a condition precedent to final acceptance, the Contractor shall furnish written certification from each equipment manufacturer that each item has been installed, aligned and tested correctly and that the installation meets all the manufacturer's requirements for efficient, trouble-free operation. This provision, however, shall not be construed as relieving the Contractor of his overall responsibility for the Work.

3.02 NOISE REQUIREMENTS

A. All equipment specified shall be tested for noise generation after installation. When tested, equipment shall include the complete driver and driven equipment. Three (3) certified copies of the test shall be submitted to the Owner for approval prior to final acceptance.

3.03 SHOP INSPECTION AND SHOP TESTING

A. The Owner shall be granted reasonable access to the production and shop test areas of the equipment manufacturer's facility during manufacturing and testing.

B. The Contractor shall notify the Owner in writing, at least ten (10) working days prior to commencement of shop tests, of the time and place of all shop tests.

C. Inspection by the Owner will not relieve the Contractor of his responsibility for workmanship, materials and Conceptual Drawings and Specification requirements.

D. Manufacturer's standard test procedures shall be required and the manufacturer shall demonstrate that equipment meets all the requirements of these Conceptual Drawings and Specifications.

3.04 SHIPPING AND IDENTIFICATION

A. All shipments shall be "tagged" by the Contractor with "wired-on" metal or plastic tag clearly stenciled or lettered with paint or waterproof ink. The information on the tags and cartons shall include Contractor's order number, purchase order number, manufacturer's number, and equipment number. Any expense

incurred by the Owner due to the Contractor's failure to do so will be backcharged or deducted from his Contract.

B. Each piece of equipment shall be provided with a substantial stainless steel nameplate, securely fastened in a conspicuous location and clearly inscribed with the manufacturer's name, year of manufacturer, serial number, principal rating data and equipment item number.

C. The equipment covered in these Specifications shall be fabricated in the minimum number of sub-assemblies necessary for transportation. Small components or assemblies shall be adequately boxed or crated to prevent damage during shipment.

D. Each assembly or package shall be identified with a durable shipping tag securely attached and plainly marked with the Contractor's order number, manufacturer's purchase order number and equipment number.

E. All openings shall be covered with plywood, plastic or wood plugs or shields to prevent debris from entering the assemblies. Each assembly or sub-assembly shall have lifting lugs to facilitate erection and subsequent removal when necessary.

3.05 OPERATION AND MAINTENANCE MANUALS

A. Operation and Maintenance manuals shall be furnished in accordance with Section 01730.

3.06 OPERATION AND MAINTENANCE INSTRUCTION

A. The Contractor shall provide instruction time in accordance with the detailed equipment specifications, after the equipment has been accepted by the Owner. The time shall be used to instruct the Owner's personnel in the proper operation and maintenance of the equipment. The manufacturer shall provide technical personnel familiar with the operation and maintenance of the equipment in making this presentation.

B. Training shall consist of on-site operation training, classroom training, operational, safety and emergency drills.

## 3.07 INSTALLATION OF EQUIPMENT

A. The Contractor's work procedure shall conform to the manufacturer's installation instructions unless expressly directed otherwise by the Owner.

B. Equipment shall be erected level and plumb on the existing foundations and supports at the locations and elevations shown on the Plans, unless otherwise directed, in writing, by the Owner and Resident Project Representative during installation. Any additional pads, plates and other appurtenances necessary for the installation shall be provided by the Contractor.

C. The equipment shall be brought to proper level with leveling nuts. After the machine has been leveled and aligned, the nuts on the anchor bolts shall be tightened to anchor the machine firmly into place against the leveling nuts.

D. The grout shall be installed in accordance with the manufacturer's instructions.

E. All equipment shall be installed in such a manner as to provide access for routine maintenance and lubrication as specified in Section 2.02 of this specification.

F. Equipment of a portable nature which requires no installation shall be delivered to a location designated by the Owner.

## 3.08 MECHANICAL START-UP

A. Once the equipment has been installed, complete with all auxiliary and support systems, and is ready for operation, the Contractor shall mechanically check out the equipment to verify that the equipment functions correctly under "non-process" conditions. The equipment shall be fine-tuned, adjusted, water tested, where applicable, and completely checked out before the equipment and support systems are considered ready for process start-up.

B. The Contractor will be responsible for coordinating this effort and providing all support services and facilities necessary for this work effort.

C. The equipment will not be considered ready for process start-up until the Owner is satisfied that the equipment has been satisfactorily checked out and successfully passed leakage and

non-process test runs and appropriate training has been completed per the detailed equipment specifications.

## 3.09 FIELD SERVICE

It is understood that the Contractor and manufacturer share a joint responsibility in this Work. The Contractor shall provide the Manufacturer's qualified field representative and supporting personnel as required for the equipment furnished and installed under this Contract to perform the following:

A. Assistance during equipment installation shall be provided to align the equipment or check the alignment of pre-aligned equipment prior to making connections to or anchoring of the equipment.

B. Inspection during equipment installation work shall be provided to determine compliance with equipment erection methods and procedures recommended by the manufacturer.

C. Conduct the process start-up necessary to operate, adjust, calibrate and tune the equipment and systems into operating service in accordance with the design criteria described in each detailed equipment specification.

D. Conduct performance tests to demonstrate compliance with design criteria and performance guarantee set forth in the Specifications.

## 3.10 PROCESS START-UP

A. Once the equipment has been considered ready for process start-up and the support system can deliver the process material, the Contractor shall start up the equipment under process conditions and conduct performance tests to verify compliance with the Specifications. The Contractor shall give the Owner forty-eight (48) hours written notice of his intent to start up equipment under process conditions and conduct performance testing.

B. The Contractor shall provide the necessary supervision and technical personnel and services required to perform the work. The Owner shall coordinate this phase of the work with the Contractor and provide all necessary support services and facilities to assist the Contractor in performing the work.

C. The equipment shall be considered ready for a performance test only after the Contractor has demonstrated to the Owner that the equipment can operate continuously, without mechanical

interruption under the process flow conditions for up to three (3) days, or such time as may be mutually agreeable to the Owner and Contractor.

D. After it has been determined that the equipment will operate satisfactorily under process conditions, the performance test shall be made by the Contractor to verify that the equipment can meet the requirements outlined in the Specifications. The performance test shall be based on maintaining the design requirements for a time period mutually agreeable to the Owner and the Contractor, or such period as is stipulated in the General Provisions.

## 3.11 OWNER FURNISHED EQUIPMENT

A. The Contractor shall notify the Owner when Owner furnished equipment is completely installed in accordance with the Owner furnished manufacturer's instruction and requirements of the Contract Documents and ready for operation testing. The Owner or Representative will schedule the manufacturer's representative to visit the site of the Work and inspect, check adjust if necessary and approve the equipment installation. If the manufacturer's representative cannot complete the testing and startup services due to the Contractor's negligence in installing the equipment, the Contractor shall be responsible for the costs of the service representatives' revisit to the site of the Work.

## 3.12 PERFORMANCE TESTS

A. Performance test procedures shall be prepared by the Contractor and approved (in writing) by the Owner a minimum of fourteen (14) days before performance tests are conducted.

B. Costs of all inspections, field service, mechanical start-up, run-in work, process start-up and performance tests shall be borne by the Contractor and shall be included in the total price bid for the Work.

C. The Contractor shall also agree to repay the Owner installation costs for any rejected equipment. The installation costs will be derived by the Owner based on actual costs charged for the installation of the equipment.

## 3.13 ACCEPTANCE OF EQUIPMENT BY THE OWNER

After all the conditions of the Performance Specifications have been satisfied, the Owner will designate in writing that the equipment is accepted, and at such time the Owner will be responsible for all further maintenance and operation of same. The warranty period for all equipment shall start on the date of final acceptance by the Owner.

**END OF SECTION 01660**

# SECTION 01700 - 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.

### 1.02 FINAL SUBMITTALS

A. The Contractor, prior to requesting final payment shall obtain and submit the following items to the Owner's representative for transmittal to the Owner:

1. Written guarantees, where required.

2. Operating manuals, technical manuals and instructions. The Contractor's attention is directed to the condition that one percent (1%) of the contract price will be deducted from any monies due the Contractor as progress payments if at the seventy-five percent (75%) construction completion point the approved technical manuals have not been submitted in accordance with Section 01330 – Submittals/Shop Drawings. The aforementioned amount will be retained by the Owner as the agreed estimated value of the approved technical manuals. Any such retention of money for failure to submit the approved technical manuals on or before the seventy-five percent (75%) construction completion point shall be in addition to the retention of any payments due to the Contractor as specified in Article 13 of the Standard General Conditions and the Agreement.

3. Manufacturers representatives' installation, testing and startup report.

4. Keying.

5. Maintenance stock items, spare parts and special tools.

6. Completed As-Builts, as approved by the Resident Engineer.

7. Certificates of inspection and acceptance by local governing agencies having jurisdiction.

8. Releases from all parties who are entitled to claims against the subject project, property or improvement pursuant to the provisions of law.

9. Extension of Performance Bond in accordance with Article 5.01A of the Standard General Conditions, if applicable.

1.05 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 01700**

# SECTION 01730 - OPERATION AND MAINTENANCE MANUALS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

The Contractor shall furnish to the Owner's representative six (6) 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 (Submit through Owner's representative):

1. Operation and Maintenance Manuals shall be prepared for the project.

   A. Three (3) sets to the Owner's representative.

   B. Three (3) sets to Owner.

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 (Holtville Water System Improvement Project) and volume number if more than one volume

3. Owner’s name

4. Owner’s representative’s name

5. General Contractor’s name (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 | Treatment Plant and System Descriptions |
| Part II | Purchased Equipment Data |
| Part III | Test Reports and Valve 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 are herein. 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:** _____

| | |
|---|---|
| **COMPONENT INFORMATION:**<br>**NAMEPLATE DATE:** **MANUFACTURER:** | |
| **EQUIPMENT MODEL NO.:** | **EQUIPMENT SERIAL NO.:** |
| **EQUIPMENT MODEL DESIGNAITON:** | **TYPE:** |
| **SIZE:** | **RATED OUTPUT:** |
| **CAPACITY:** | **SERVICE:** |
| **COMPONENT INFORMATION: DRIVE MOTOR DATA**<br>**MANUFACTURER:** | |
| **SERIAL NO.:** | **HORSEPOWER:** |
| **MODEL:** | **FRAME:** |
| **TYPE:** | **VOLTAGE:** |
| **ENCLOSURE:** | **AMPERAGE:** |
| **PHASE:** **HERTZ:** | **SERVICE FACTOR:** |
| **LUBRICATION REQUIREMENTS: MOTOR** | |
| **COMMENTS:** | |

## 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 in 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 date (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 APPROPIATE

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).

| OPERATION | FREQUENCY | COMMENTS |
|---|---|---|
| | | |
| | | |

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 01730**

# SECTION 01783 - 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 Requests 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 Owner, 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 Owner 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 Owner's inspection and copying at all times. The Owner will review the As-Builts prior to submittal of all Monthly Payment Requests. If, in the opinion of the Owner, the As-Builts are not current, approval of the Monthly Payment may be withheld until the drawings are made current. In addition, the Contractor shall submit a signed certification with each Monthly Payment Request stating that all As-Builts are complete and accurate as of the date of the payment request.

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 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 Owner, 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 01783**

# SECTION 01810 – FUNDAMENTAL COMMISSIONING REQUIREMENTS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. This section includes administrative and procedural requirements as well as a detailed description of the commissioning process. This section supplements other Division 1 Commissioning Sections and applies to Sections in Divisions 11, 13 and 16 that specify testing of components and systems.

B. Basic Commissioning is intended to achieve the following objectives:

1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installation contractors.

2. Verify and document proper performance of equipment and systems.

3. Verify that Operations and Maintenance (O&M) data is complete.

4. Verify that the plant's operating and maintenance personnel are trained in accordance with the specifications.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

The following section contains requirements that relate to:

A. Section 01330 - Submittals/Shop Drawings

B. Section 01700 - Project Closeout

C. Division 11 'Equipment'

D. Division 13 'Special Construction'

E. Division 15 'Mechanical'

F. Division 16 'Electrical'

G. Division 17 'Instrumentation'

## 1.03 SUBMITTALS

A. Provide submittal documentation relative to commissioning as described in Section 01330 – Submittals/Shop Drawings.

## 1.04 COORDINATION

Items listed below require the Contractor to coordinate between the sub-contractors, Owner, City Engineer, CM, and the Plant Supervisor. Note that Commissioning Authority (CA) shall include the City Engineer, Plant Supervisor and Construction Manager. Details regarding each item are given elsewhere in this Section and/or other commissioning sections of the specifications.

A. Pre-Commissioning Meeting: Conducted by the CM during which the review of the commissioning process is conducted with the commissioning team members.

B. Coordination Meetings: Attend meetings throughout construction, scheduled by the CM, to plan, coordinate, schedule future activities, and resolve problems.

C. Start-up Plans: Work with the CM to develop startup plans and startup documentation formats, including prefunctional checklists.

D. Equipment Start-up: Utilize start-up plans to coordinate equipment start-up, manufacturers' testing, and other required testing to minimize duplication of work.

E. Testing, Adjusting, and Balancing: Coordinate testing, adjusting, and balancing with the Commissioning Authority so that the CA can witness the processes.

F. Functional Testing: Coordinate functional testing with the CM so that they can witness testing.

G. Training: Coordinate training of owner's staff so that the CM can verify that training is conducted per commissioning requirements.

## 1.05 SYSTEMS TO BE COMMISSIONED

A. The following systems will be commissioned in this project:

1. Cathodic Protection System

2. THM Removal System

3. Electrical and Control Systems, as applicable.

    a. New Laboratory Control Panel.

        i. SCADA monitoring system for:

        ii. SCADA alarm call out system

        iii. PLC settings & set points

    b. Finish Water Pump Starters & Motors.

4. Emergency Standby Generators

PART 2 – PRODUCTS

2.01 TEST EQUIPMENT

A. Provide all testing equipment required for testing of the units to be commissioned.

B. Provide any special equipment, tools, and instruments that are only available from the equipment supplier, which are specific to the equipment, and which are required for testing.

PART 3 – EXECUTION

3.01 MEETINGS

A. Commissioning Pre-Construction Meeting: Within 60 days of commencement of construction, the OWNER will schedule a commissioning pre-construction meeting with the commissioning team in attendance. CM shall distribute meeting minutes to commissioning team. Attendance is mandatory for the following team members:

1. Commissioning Authority (CA) – City Engineer, Plant Supervisor and Construction Manger

2. Contractor's Site Supervisor

3. Contractor's Project Scheduling personnel

4. Mechanical sub-contractor

5. Electrical sub-contractor

6. Plant Operator representative

7. Inspector

B. Miscellaneous Meetings. The OWNER will schedule other meetings, generally in conjunction with regularly scheduled site meetings as construction progresses. Meetings will cover coordination, deficiency resolution, and planning issues with particular subcontractors.

3.02 START-UP AND PREFUNCTIONAL CHECKLISTS

A. Perform a full pre-functional checkout of each piece of equipment. The pre-functional testing for a given system must be successfully completed prior to formal functional testing.

B. Equipment shall not be “temporarily” started (for heating and cooling) until the Start-Up Plan is completed.

C. The Contractor shall prepare start-up plans for equipment to be commissioned. Subcontractors responsible for pre-functional checklists and startup will be identified at the pre-commissioning meeting. Submit start-up plans to the Engineer for review and approval; start-up plans shall consist of, but not be limited to:

1. The manufacturer’s standard written start-up procedures copied from the installation manuals, with check boxes by each procedure and a signature block at the end.

2. Field checkout sheets normally used by the sub-contractor.

3. Forms normally issued by the sub-contractor to document tests required in the specifications.

4. Final pre-functional checklists (drafts are included in the specifications).

5. Schedule that includes equipment installation, Contractor start-up, manufacturer start-up, and other tests required by the specifications. Schedule shall state when documents in the start-up plan will be completed.

D. At least 90 days prior to the start of commissioning, the Contractor shall submit a commissioning package for the equipment to be commissioned. This package shall include the following information:

1. Equipment manufacturer's operating & maintenance instructions.

2. Equipment manufacturer's installation and start-up manual.

3. Start-up plans as required in this section.

3.03 REQUIREMENTS FOR FUNCTIONAL TESTING

A. Complete the following prior to functional testing:

1. Arrange for commissioning observations to be performed by the Commissioning Authority.

2. Complete and approve the Start-up Plan.

3. Correct deficiencies identified during start-up.

4. Record pretest set points.

3.04 FUNCTIONAL TESTING

A. Perform functional testing after the testing requirements listed in Paragraph 3.03 are completed.

B. Perform functional testing under the observation of the commissioning authority who will record the results of the functional test procedures.

C. Perform all specified tests according to approved testing procedures.

1. Verify and test performance using actual conditions whenever possible.

2. Simulate conditions by imposing an artificial load when it is not practical to test under actual conditions and when written approval for simulated conditions is received from Commissioning Authority. Before simulating conditions, calibrate testing instruments. Set and document simulated conditions and methods of simulation. After test, return settings to normal operating conditions.

3. Alter set points when simulating conditions is not practical and when written approval to do so is received from Commissioning Authority.

4. Overwrite sensor values with a signal generator when actual or simulated conditions and altering set points are not practical. Do not use the sensor to act as the signal generator to simulate conditions or overwrite values.

E. The Commissioning Authority will review and approve functional testing results. Deficiencies found during testing shall be corrected by the Contractor and retested. Where there is a dispute over a deficiency, the City Engineer shall be the final authority.

F. Problem Solving: The CM will recommend solutions to problems found, however, the burden of responsibility to solve, correct and retest problems is with the Contractor and the design team.

3.05 COST OF RETESTING

A. Costs for retesting beyond one retest will be the responsibility of the Contractor, if the City Engineer determines that the Contractor is responsible for the deficiency. These costs shall include charges for the CM's time, Engineer and Inspector.

B. For a deficiency identified during functional testing but not included in the approved Start-up Plan: The CM will direct the retesting of the equipment once the deficiencies are corrected.

C. Retesting will not be considered a reason for a claim of delay or for a time extension by the Contractor.

3.06 DEFERRED TESTING

A. Unforeseen Deferred Tests: Checks or tests not completed due to unforeseen condition may be delayed upon approval of the City Engineer. These tests will be conducted in the same manner as the seasonal tests as soon as possible.

B. Seasonal Testing: Complete seasonal testing (tests delayed until weather conditions are closer to the system's design conditions) during the warranty period, as part of this contract. The City Engineer will coordinate this activity. Tests shall be executed, documented and deficiencies corrected by the appropriate Subs, with facilities staff and the CM witnessing. The Contractor shall make adjustments to the Operations and Maintenance Data, as necessary.

**END OF SECTION 01810**

# SECTION 02050 - DEMOLITION AND SALVAGE

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. The Contractor shall provide demolition and removal of existing structural materials, piping, fencing, electrical gear, equipment and structures in accordance with the requirements of the Contract Documents. The Contractor shall conduct demolition operations so that existing facilities to remain and new work to be completed will not be damaged or disturbed.

B. It is vital that the existing treatment plant system remain in operation at all times. Any proposed shut-down of any one of the systems facilities shall be coordinated and approved by the Owner and the Owners Representative.

C. If during demolition operations the Contractor becomes aware of any asbestos, hazardous waste or toxic material at the Site to which the Contractor or any subcontractor, supplier or Owner's personnel may be exposed, the Contractor follow procedures as noted in Articles 4 and 8 of the Standard General Conditions. *P.C.C. concrete to be demolished is to be tested for asbestos content by a laboratory approved by the National Voluntary Laboratory Accreditation Program. The contractor shall bear the expense of the laboratory testing. Concrete which is free of asbestos shall be allowed to be demolished. Concrete which contains asbestos shall be demolished by a Division of Occupational Safety and Health Certified Asbestos Demolition Contractor. Concrete which is asbestos free shall be removed and disposed of by the contractor. Concrete which contains asbestos shall be removed and disposed of by a Division of Occupational Safety and Health Certified Demolition Contractor.*

D. The Contractor shall repair or replace, without cost to the Owner and to the satisfaction of the Owners Representative, existing facilities disturbed or damaged during demolition and removal operations.

E. Immediately upon removal of demolition items, the Contractor shall legally dispose of demolished items not to be salvaged. Demolished items not to be salvaged shall be removed from the Site within two (2) calendar days of the commencement of demolition activities. ***Unless noted in the Plans, the Owner reserves the right to salvage any of the existing material or***

***equipment. The Contractor, upon being notified by the Owners Representative, shall salvage and relocate to an Owner-designated, on-site storage area any materials or equipment the Owner desires to keep. The cost of the removal and relocation of the items shall be included in the contract price.*** No demolished items shall be sold while on the Owner's property.

F. The Contractor shall patch and seal abandoned openings and holes left as a result of removal and demolition to match the existing surrounding structure. Openings in concrete shall be patched with a non-shrink grout and if necessary grouted openings in floors shall be supported in a manner approved by the Owners Representative. Large openings shall be supported by ¾-inch minimum treated plywood bolted to the structure underneath the opening prior to the placement of the non-shrink grout.

G. Existing concrete structures exhibiting spalls or holes not related to previously installed mechanical equipment shall be patched with a non-shrink grout.

**END OF SECTION 02050**

# SECTION 02150 - 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 Owner's Representative 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 leave 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 Owner's Representative, 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 Owner's Representative.

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 timers 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 timers 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 02150**

# SECTION 02200 - 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: P.C.C. concrete and underlying material to a subbase design grade, the installation of subbase material to a subbase grade beneath concrete infrastructure, the excavation of pipeline trenches, the installation of backfill material within pipeline trenches, 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. Structural excavation and backfills.

2. Trench excavation and backfills.

3. Disposal of surplus and/or unsuitable materials.

4. 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 Rammer and Drop |
| 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 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 |
| CAL-OSHA | Title 8 General Industry Safety Orders |

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02150 - Sheeting, Shoring and Bracing

B. Section 02221 - Trenching, Backfilling and Compacting

C. Section 02630 - Ductile Iron Pipe

D. Section 02640 - PVC Pipe

1.04 DEFINITIONS

A. Site: The property owned by the City of Holtville. The site includes the City of Holtville Water Treatment Plant.

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 Owner's Representative, 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 shall be prepared by a Geotechnical Engineer and be acquired by the Contractor. Soil preparation and compaction requirements shall be provided by the Geotechnical Report.

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 Drawings 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. Any inaccuracies or discrepancies between the actual field conditions and the Plans, or between the Plans and Specifications must be brought to the Owner's Representative'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. The Contractor shall be responsible for the construction of Project Environmental Control facilities in accordance with Section 01560 of the Technical Specifications, as applicable.

## 1.08 GEOTECHNICAL TESTING

*The Contractor shall provide the services of a qualified Geotechnical Consultant 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 Owner's Representative within two (2) days after the testing is complete. Geotechnical Earthwork Testing shall include in-situ native soil compaction testing, moisture-density soils testing, compaction testing, gradation testing, sand equivalent testing and similar testing. 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. 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 Geotechnical Engineer).

B. 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 Geotechnical Engineer).

C. 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 Geotechnical Engineer).

D. Borrow:

1. Classification - ASTM D 2487.

2. Other properties - as determined by requirements at point of use.

E. 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 Geotechnical 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 Consultant engaged by the Contractor during the filling and compacting operations.

The Geotechnical Consultant shall be required to be present at the site on a full-time basis for several work activities and conduct intermittent testing for other work activities. The following chart indicates the earthwork items which will require full time or intermittent geotechnical testing.

| NO. | ITEM | GEOTECHNICAL TESTING |
|---|---|---|
| 1. | Installation of Class 2 Base and Granular Sand Fill material beneath Pipe Support foundations. | Intermittent Testing |
| 2. | Installation of Class 2 Base and Granular Sand Fill material beneath the Shade Structure footings. | Intermittent Testing |
| 3. | Installation of Class 2 Base beneath the any Concrete Pads. | Intermittent Testing |
| 4. | Backfill for Water Pipe Trenches. The Specification requires that the backfill be compacted in lifts. Additional lifts shall not be allowed to be placed until previous lifts have been satisfactorily tested for compaction. | Intermittent Testing |
| 5. | Backfill for Electrical Conduit Trenches, if applicable. The specification requires that the backfill be compacted in lifts. Additional lifts shall not be allowed to be placed until | Intermittent Testing |

previous lifts have been satisfactorily tested for compaction. This requirement shall be strictly enforced and the Contractor shall be required to remove all backfill from the electrical conduit trench if this specification is violation.

| | | |
|---|---|---|
| 5. | Installation of Granular Sand for Water Pipelines. | Intermittent Testing |

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. 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.

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:

| SIEVE SIZE | GRANULAR SAND % PASSING |
|---|---|
| 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 Owner’s Representative. 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 Owner’s Representative 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 Owner’s Representative.

Crusher fines shall be allowed to be utilized in lieu of sand if approved by the Owner’s Representative.

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:

| SIEVE SIZE | PERCENT PASSING |
|---|---|
| 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 Owner's Representative 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 ¼" Sieve shall be 2 percent.

The fine gravel shall conform to the following gradation percentages:

| SIEVE SIZE | PERCENT PASSING |
|---|---|
| 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 Owner's Representative 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:

| SIEVE SIZE | CLASS 2 BASE % PASSING |
|---|---|
| 1” | 100 |
| ¾” | 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 Owner’s Representative. 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, R-value, sand equivalent and durability index of the Class 2 Base. A copy of the test results shall be forwarded to the Owner’s Representative by the Geotechnical Consultant for review. The gradation of the Class 2 Base shall be determined and the test results forwarded to the Owner’s Representative 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:

| SIEVE SIZES | 3/4-INCH MAX. CRUSHED ROCK % PASSING |
|---|---|
| 1” | 100 |
| 3/4” | 90-100 |
| 1/2” | 30-60 |
| 3/8” | 0-20 |
| No. 4 | 0-5 |
| No. 8 | - |

The ¾-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 ¾-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 Owner's Representative 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:

| SIEVE SIZES | 1-INCH ROUND ROCK % PASSING |
|---|---|
| 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 Owner's Representative 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 Owner's Representative 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. Section 01560 Project Environmental Controls elaborates on dust control requirements.

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 accomplished 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. The Work shall also include all pumping, ditching and other required methods for the removal or exclusion of water. See Technical Specifications Section 02150 - Sheeting, Shoring and Bracing, respectively.

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 02150 - 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 optimum moisture content and compacted to a minimum of 90 percent relative compaction if required by the Geotechnical Investigation Report or the Plans.

All surfaces to receive concrete slabs-on-grade shall be underlain by a minimum compacted controlled fill thickness of 18 inches or greater if indicated in the referenced Geotechnical Investigation Report or as required by the Plans. This shall be accomplished by combination of over-excavation and recompaction of native material to 90% of relative compaction or as required by the Geotechnical Investigation Report or as required by the Plans.

Contingent upon locations, all surfaces to receive compacted fill shall be scarified, brought to near optimum moisture content and compacted to required percentage of relative compaction as specified herein unless otherwise indicated on the 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 90% relative compaction unless otherwise indicated on the Plans.

## 3.06 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 Owner's Representative prior to the placement of the structure fill or structure backfill material. The Owner's Representative shall determine the number and location of points to check for the subbase grade elevation compliance. Prior to the Owner's Representative's inspection of the subbase grade the Contractor shall establish bluetop stakes on a 20-foot by 20-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. 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 Owner's Representative.

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, 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.

## 3.07 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 Owner's Representative prior to the placement of the suitable material or waste excavation material. The Owner's Representative shall determine the number and location of points to check for the subbase grade elevation compliance. Prior to the Owner's Representative's inspection of the subbase grade the Contractor shall establish bluetop stakes on a 20-foot by 20-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. 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 Owner's Representative.

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 1-foot lifts. 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, 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 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 Contractor shall place bluetop stakes on a 20-foot x 20-foot grid across the top of the finish grade surface during final grading. A bluetop stake is defined as a stake placed at the finish grade elevation within the tolerance of plus or minus 0.02 feet of finish grade. The Owner's Representative shall obtain elevations across finish grade surfaces at locations determined by the Owner's Representative prior to accepting and approving the finish grade surfaces. The Contractor shall rework areas not conforming to the finish surface grade tolerance as required. Work items to occur after the establishment of finish grade shall not occur until the Owner's Representative 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. Bluetop stakes shall be placed on a 20-foot x 20-foot grid pattern across rectangular or square facilities such as parking lots and access roads. The Owner's Representative shall obtain elevations across the subgrade surfaces at locations determined by the Owner's Representative prior to accepting and approving the subgrade surfaces. The Contractor shall rework areas

not conforming to the subgrade tolerance as required. Work items to occur after the establishment of subgrade shall not occur until the Owner's Representative has approved the finish subgrade.

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 20-foot x 20-foot grid pattern across rectangular or square facilities such as parking lots, access roads, sludge beds, structures, building pads, etc. The Owner's Representative shall obtain elevations across the subbase surfaces at locations determined by the Owner's Representative prior to accepting and approving the subbase surfaces. The Contractor shall rework 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 Owner's Representative has approved the subbase grade.

3.09. 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 02200**

# SECTION 02221 - TRENCHING, BACKFILLING AND COMPACTING

## 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 in a professional manner 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 02150 – Sheeting, Shoring and Bracing

B. Section 02200 – Earthwork

C. Piping & Conduit Work specified in other Sections

### 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. The Geotechnical Engineer shall be engaged by the Contractor, 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 Owner's Representative 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 by approved means of conveyance away from the working area.

B. Protection of Existing Utilities:

1. Utilities: Unless otherwise illustrated on the Plans or stated in the Specifications, all utilities, either 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 shall make the necessary arrangements, agreements and approvals with the utility purveyor, Owner and the Owner's Representative 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 Owner's Representative, 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 Owner's Representative 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 Owner's Representative. 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 02200, of the specifications.

B. Crusher Fines: Crusher fines material shall consist of imported decomposed granite complying with Section 02200, 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 02200, of the Specifications.

D. Crushed Rock Bedding: Crushed rock bedding shall consist of imported rock complying with Section 02200, of the Specifications.

E. 1-inch Round Rock: 1-inch Round Rock material shall consist of import rock material complying with Section 02200, 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 other pertinent Sections of the Specifications.

## 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 Owner's Representative'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 Owner's Representative, the Owner's Representative 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 Owner's Representative 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 500 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 Owner's Representative 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, and unstable or does not afford solid foundation for pipe, the Contractor shall excavate as directed by the Owner's Representative and provide stable base by excavating any unsuitable material 18" minimum below the subgrade base or as the Owner's Representative 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 Owner's Representative 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. 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 Owner's Representative prior to use. The Contractor shall bear all cost of removal of rejected material, it's 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. The backfill material shall be granular sand or Class 2 Base as specified in Paragraph 2.01 and illustrated on the Plans. Care shall be taken to ensure that no voids remain under, around or near the pipe.

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.

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 Owner's Representative, 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 Owner’s Representative.

## 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 the Owner’s Representative. 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 Owner’s Representative 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 Owner’s Representative. Should any deviations in line and grade be permitted by the Owner’s Representative 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 insure 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 Owner's Representative 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 Owner's Representative. Any corrective work shall be approved by the Owner's Representative. 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 relaid at the Contractor's expense. Pipe shall be laid upgrade with the socket ends of the pipe upgrade unless otherwise authorized by the Owner's Representative. 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 ± 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 Owner's Representative 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 02200), the following compaction test for piping shall be required.

A. One (1) compaction test for the granular sand fill pipe bedding along each 100 lineal foot of water, sewer or stormwater pipe placed for each 1 foot lift of material installed.

B. One (1) compaction test shall be obtained for each 1 foot lift of Class 2 Base material along each 100 foot section of water, sewer or stormwater pipeline installed.

C. One (1) compaction test shall be required for each 1 foot of vertical sand fill material placed along each 100 feet of water, sewer or stormwater pipeline installed.

D. One (1) compaction test shall be obtained for each 1 foot lift of native material along each 100 foot section of water, sewer or stormwater pipeline installed.

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 02221**

# SECTION 02630 - DUCTILE IRON PIPE

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. The Contractor shall furnish and install all ductile iron 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 02200 - Earthwork

B. Section 02221 - Trenching, Backfilling and Compacting

C. Section 02650 – Pipe Fittings

D. Section 02666 – Pressure Pipeline Water Testing

E. Section 02670 – Disinfection of Potable Water Pipelines

F. Section 09800 – Protective Coatings

### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

| | |
|---|---|
| ANSI/AWWA C 104/A 21.4 | Cement-mortar lining for Ductile Iron and Gray Iron Pipe and Fittings for Water. |
| ANSI/AWWA C 105/A 21.5 | Polyethylene Encasement for Gray and Ductile Cast Iron Piping for Water and Other Liquids. |
| ANSI/AWWA C 110/A 21.10 | Fittings, 3-inch through 48-inch for Water and Other Liquids, Gray Iron and Ductile Iron. |
| ANSI/AWWA C 111/A 21.11 | Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings |
| ANSI/AWWA C 115/A 21.15 | Flanged Ductile Iron and Gray Iron Pipe with Threaded Flanges. |

| | |
|---|---|
| ANSI/AWWA C 150/A 21.50 | Thickness Design of Ductile Iron Pipe. |
| ANSI/AWWA C 151/A 21.51 | Ductile Iron Pipe, Centrifugally Cast, in Metal Molds or Sand-Lined Molds for Water and Other Liquids. |
| ANSI/AWWA C 209 | Cold Applied Coatings for the Exterior of Special Sections, Connections and Fittings for Steel Water Pipelines. |
| ANSI/AWWA C 214 | Tape Coating Systems for the Exterior of Steel Water Pipelines. |
| ANSI/AWWA C 600 | Water Mains and Appurtenances, Installation of Ductile Iron. |
| ANSI/ASTM D 1248 | Polyethylene Lining Material for Ductile Iron Pipe and Fittings. |
| ASTM C 150 | Specification for Portland Cement. |
| ASTM A 746 | Installation of Ductile Iron Pipe for Gravity Sewers. |

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 pipe shall be manufactured with the material, have the dimensions, be within the tolerances and meet the testing requirements set forth in ASTM A 746 and ANSI A 21.51. Ductile

iron pipe shall be manufactured in nominal 18 foot or 20 foot laying lengths and shall have the lining called for in the Contract Documents.

B. All pipe 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.

C. In addition to those tests specifically required, the Owner's Representative 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

### 2.01 GENERAL

A. Mortar lined and polyethylene encased ductile iron pipe shall conform to ANSI/AWWA C 151, C 104, C 105, C 214 and D 1248, subject to the following supplemental requirements. The pipe shall be of the diameter and class shown, shall be furnished complete with rubber gaskets as indicated in the Contract Documents and all specials and fittings shall be provided as required under the Contract Documents. Any ductile iron pipes used as air lines and connected after the blowers shall have EPDM gaskets.

B. The pipe shall be handled by use of wide slings, padded cradles or other devices acceptable to the Owner's Representative, designed and constructed to prevent damage to the pipe lining and/or coating. The use of chains, hooks or other equipment which might injure the pipe lining and coating will not be permitted. Stockpiled pipe shall be safely and properly supported to prevent accidental rolling. The Contractor shall be fully liable for the cost of replacement or repair of pipe which is damaged.

C. Maximum pipe laying lengths shall be 20 foot with shorter lengths provided as required by the Design.

D. The pipe shall have a smooth dense interior surface and shall be free from fractures, defects and roughness.

### 2.02 MATERIALS

A. Ductile iron pipe materials shall conform to the requirements of ANSI/AWWA C 151/A 21.51.

B. Fittings for ductile iron pipe shall conform to the requirements of ANSI/AWWA C 110/A 21.10 for diameters 3 inch through 48 inch. Ductile iron fittings larger than 48 inch shall conform to the above-referenced standard with the necessary modifications for the larger size.

C. Cement for mortar lining shall conform to the requirements of ANSI/AWWA C 104/A 21.4; provided, that cement for mortar lining shall be Type V. A fly ash or pozzolan shall not be used as a cement replacement.

D. Material for the polyethylene encasement shall conform to the requirements of ANSI/AWWA C 105/A 21.5.

E. All elastomer gaskets used for ductile iron pipe shall be of neoprene material.

F. All buried bolts and nuts used in the assembly of ductile iron pipe and fittings shall be 316 stainless steel bolts.

2.03 DESIGN OF PIPE

A. Ductile iron pipe shall be designed in accordance with the requirements of ANSI/AWWA C 150/A 21.50, as applicable and as modified in this Section. The pipe furnished shall be cement-mortar lined. Buried ductile iron pipe shall be polyethylene encased.

B. The pipe shall be designed, manufactured, tested, inspected and marked according to applicable requirements previously stated and except as hereinafter modified, shall conform to ANSI/AWWA C 151.

C. The pipe and fittings shall be of the diameter shown and shall be of pressure Class 350 for pipe sizes twelve inches and below and pressure Class 250 for pipe fourteen inches to twenty inches and pressure Class 200 for twenty-four inch pipe and pressure Class 150 for thirty inch and above, except that where mechanical couplings are used and the pipe is grooved, the ductile iron pipe shall be of special thickness Class 53.

D. Ductile iron pipe and fittings shall be furnished with mechanical joints, push-on joints, flanged joints and restrained joints as required.

1. Mechanical and push-on joints shall conform to ANSI/AWWA C 111/A 21.11.

2. Flanged joints shall conform to ANSI/AWWA C 115/A 21.15.

3. Restrained joints shall be “Lok-Ring” Restrained Joint by American Ductile Iron Pipe, “TR FLEX” Restrained Joint by U.S. Pipe, “Mechanical/Lock Joint” by Pacific States Cast Iron Pipe Company, or equal.

E. For bell-and-spigot ends with rubber gaskets, the clearance between the bells and spigots shall be such that when combined with the gasket groove configuration and the gasket itself will provide watertight joints under all operating conditions when properly installed. The Contractor shall require the pipe manufacturer to submit details complete with significant dimensions and tolerances and also to submit performance data indicating that the proposed joint has performed satisfactorily under similar conditions. In the absence of a history of field performance, the results of a test program shall be submitted.

2.04 CEMENT-MORTAR LINING

A. Except as otherwise provided herein, interior surfaces of ductile iron pipe, fittings and specials to be furnished with cement-mortar lining shall be cleaned and lined in the shop with cement-mortar lining applied centrifugally in conformity with ANSI/AWWA C 104. If lining is damaged or found faulty at delivery site, the damaged or unsatisfactory portions shall be replaced with lining conforming to these Specifications.

B. The minimum lining thickness shall be as follows:

| Nominal Pipe Diameter (inches) | Minimum Lining Thickness (inches) |
|---|---|
| 3-12 | 1/8 |
| 14-24 | 3/16 |
| 30-54 | 1/4 |

C. For all pipe and fittings with plant-applied cement-mortar linings, the Contractor shall provide a polyethylene or other suitable bulkhead on the ends of the pipe and on all special openings. All bulkheads shall be substantial enough to remain intact during shipping and storage until the pipe is installed.

## 2.06 EXTERIOR COATING OF PIPE

A. *The exterior surfaces of ductile iron pipe which will be exposed to the atmosphere inside structures or above ground shall be thoroughly cleaned and then given a shop coat of rust-inhibitive primer conforming to the requirements of Division 9. This exposed piping shall not be coated with the bituminous coating by the manufacturer prior to delivery.*

B. Buried ductile iron pipe shall be polyethylene encased in accordance with the requirements of ANSI/AWWA C 105/A 21.5.

# PART 3 - EXECUTION

## 3.01 INSTALLATION OF PIPE

A. All pipe, fittings, etc. shall be carefully handled and protected against damage, impact shocks and free fall. All pipe handling equipment shall be acceptable to the Owner's Representative. Pipe shall not be placed directly on rough ground, but shall be supported in a manner which will protect the pipe against damage whenever stored at the trench site in accordance with Paragraph 2.01, herein. 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. No pipe shall be installed where the lining or coating exhibit defects that may be harmful as determined by the Owner's Representative. Such damaged lining or coating shall be repaired, or a new undamaged pipe shall be furnished and installed.

C. The pipe shall be installed in accordance with ANSI/AWWA C 600. 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 and disinfecting the completed pipeline.

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. Excavations shall be made as needed to facilitate removal of handling devices after the pipe is laid. Bell holes shall be formed at the ends of the pipe to prevent joint loading at the bells or couplings. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coating on field joints.

E. Where necessary to raise or lower the pipe due to unforeseen obstructions or other cause, the Owner's Representative may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters 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 at 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. The openings of all pipe and specials where the pipe and specials have been cement-mortar lined in the shop shall be protected with suitable bulkheads to prevent unauthorized access by persons, animals, water or any undesirable substance. At all times, means shall be provided to prevent the pipe from floating.

H. Immediately before jointing pipe, the bell end of the pipe shall be thoroughly cleaned and a clean rubber gasket lubricated with an approved vegetable-based lubricant shall be placed in the bell groove. The spigot end of the pipe shall be carefully cleaned and lubricated with a vegetable-based lubricant. The spigot end of the pipe section shall then be inserted into the bell of previously laid joint and telescoped into its proper position. Tilting of the pipe to insert the spigot into the bell will not be permitted.

**END OF SECTION 02630**

# SECTION 02640 - PVC PIPE

## 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 02200 - Earthwork

B. Section 02221 - Trenching, Backfilling and Compacting

C. Section 02666 – Pressure Pipeline Water Testing

D. Section 02670 – Disinfect Potable Water Pipelines

### 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 |

### 1.04 CONTRACTOR SUBMITTALS

A. Contractor shall submit copies of the manufacturer's product specifications according to the requirements of Section 01330 - Contractor 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 AND AWWA C 905 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 or AWWA C 905 “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 (±1”) for all sizes.

The pipe stiffness using F/ΔY for PVC class water pipe is contained in the table below:

| CLASS | DR | FΔy (PSI) |
|---|---|---|
| 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):

| Pipe Size (IN.) | Impact (FT./LBS.) |
|---|---|
| 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.

| Class | Minimum Burst Pressure At 73°F (PSI) |
|---|---|
| 100 | 535 |
| 150 | 755 |
| 200 | 985 |

Pipe for this Project shall conform with the specifications for AWWA C 900, DR 18 PVC pipe material for diameter sizes 4-inches through 12 inches and AWWA C 905, DR 25 PVC pipe material for diameter sizes 14 inches through 36-inches 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 35 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.

## 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 Owner's Representative. 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 Owner's Representative 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 02221 - Trenching, Backfilling and Compacting. If this installation of pipe section and Section 02221 conflict, the most stringent specification shall apply.

**END OF SECTION 02640**

# SECTION 02650 - PIPE FITTINGS, TRANSITION COUPLINGS, MECHANICAL RESTRAINED JOINT FITTINGS, FLANGED COUPLING ADAPTERS AND HARDWARE

## PART 1 - GENERAL

### 1.01 DESCRIPTION

The Contractor shall provide and install pipe fittings, 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 02630 - Ductile Iron Pipe

B. Section 02640 - PVC Pipe

### 1.03 REFERENCE DOCUMENTS

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 |
| 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 61 | National Sanitation Foundation - Nitrile (Buna-N) Gasket for Transition Coupling and Flanged Coupling Adapter |
| 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.

C. In addition to those tests specifically required, the Owner's Representative 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 conforming to the requirements of Division 9. 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 all termination points, tees, bends, and angle points. Restrained joint fittings shall be placed for connection points of existing to new pipelines, unless noted in the plans. New pipeline-to-pipeline connections shall not be required to have restrained 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 steel or ductile iron bolts and nuts.

*For above ground and underground, 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.

316 stainless steel hardware shall be used if specified for a given pipe, valve, fitting or other 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.*

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 Owner's Representative. 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 02650**

# SECTION 02666 – PRESSURE PIPELINE WATER TESTING

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. The Contractor shall perform flushing and testing of all pipelines and appurtenant piping complete, including conveyance of test water from Engineer-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 Owner's Representative prior to the commencement of the test.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02221 - Trenching, Backfilling and Compaction

B. Section 02630 - Ductile Iron Pipeline

C. Section 02640 - PVC Pipe

## 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 Owner's Representative's review.

## PART 3 – EXECUTION

### 3.01 GENERAL

A. The Contractor shall notify the Owner's Representative at least four (4) days in advance of any planned testing and shall review the testing procedures with the Owner's Representative. 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 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 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 outlet 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.

D. All pipelines shall be tested. All testing operations shall be performed in the presence of the Owner's Representative.

E. The disposal or release of test water from pipelines, after testing, shall be acceptable to the Owner's Representative. The conveyance items to dispose of the testing water shall be provided by the Contractor.

## 3.02 HYDROSTATIC TESTING OF PIPELINES

A. Prior to hyrdrostatic testing, all pipelines shall be thoroughly flushed of all sand, dirt and material to the satisfaction of the Owner's Representative. The Contractor shall test all pipelines either in sections or as a unit. The Contractor shall be responsible to insure 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 insure 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 Owner's 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 150 PSI or 1.5 times the rated pipe pressure class which ever is greater. 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 not be allowed after the test begins. Test pressures shall be held for at least two (2) hours after the test commences without additional pumping and observed for not less than four (4) hours. Approved gauges shall be provided by the 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.

## 3.03 AIR TESTING OF WATER PIPELINE

In lieu of hydrostatic testing of water pipeline sections within the water treatment plant area, air testing shall be allowed.

A. The Contractor shall leak test 100% of the pipeline installed. The leak testing shall be accomplished after any required deflection testing of the pipeline is completed.

B. Pipelines shall be subject to acceptance testing after backfilling has been completed but prior to the placement of the finish surface material (i.e. Class 2 Base, A.C. pavement and P.C.C. concrete).

C. The cost of repairs or corrections necessary to conform to the testing requirements will be borne by the Contractor at no cost to the Owner.

D. Air testing will be accomplished by the 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 Owner’s Representative.

E. 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 pipe beginning and termination point. Test plugs

must be securely braced at the beginning and termination points of the pipeline.

3. A minimum of two (2) connection hoses to link the air inlet test plug with an aboveground test-monitoring panel must be provided.

   a) One (1) 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 area of the braced pipeline beginning and termination points while pressure testing 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 for a minimum of 2 minutes.

6. After the stabilization period, adjust the internal air pressure to 3.5 PSI, disconnect the air supply and begin timing the test.

7. Refer to the following pipeline air test table to determine the length of time (minutes) the pipeline section being tested must sustain air pressure while not 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.

**PIPELINE AIR TEST TABLE**

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

**END OF SECTION 02666**

# SECTION 02670 - DISINFECTION OF POTABLE WATER PIPELINES

## PART 1 - GENERAL

### 1.01 DESCRIPTION

Potable pipelines within the water distribution system, Water Treatment Plant, 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 he pipeline has been satisfactorily hydrostatically tested, leak tested (if required) and disinfected. The pipelines shall by hydrostatically and leak tested as a separate procedure from 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 bacteria.

### 1.03 REFERENCE SECTIONS

Reference sections pertaining to the disinfection testing are as follows:

| | |
|---|---|
| Section 02630 | Ductile Iron Pipe |
| Section 02640 | PVC Pipe |
| Section 02666 | Pressure Pipeline Water 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 | *Simplified Procedures for Water Examination,* 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:

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. This Project shall allow chlorination of pipelines by the continuous feed method. The tablet method and slug method shall not be allowed.

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.

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.

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.

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 Owner's Representative.

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 Owner's Representative 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 California Health Department 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

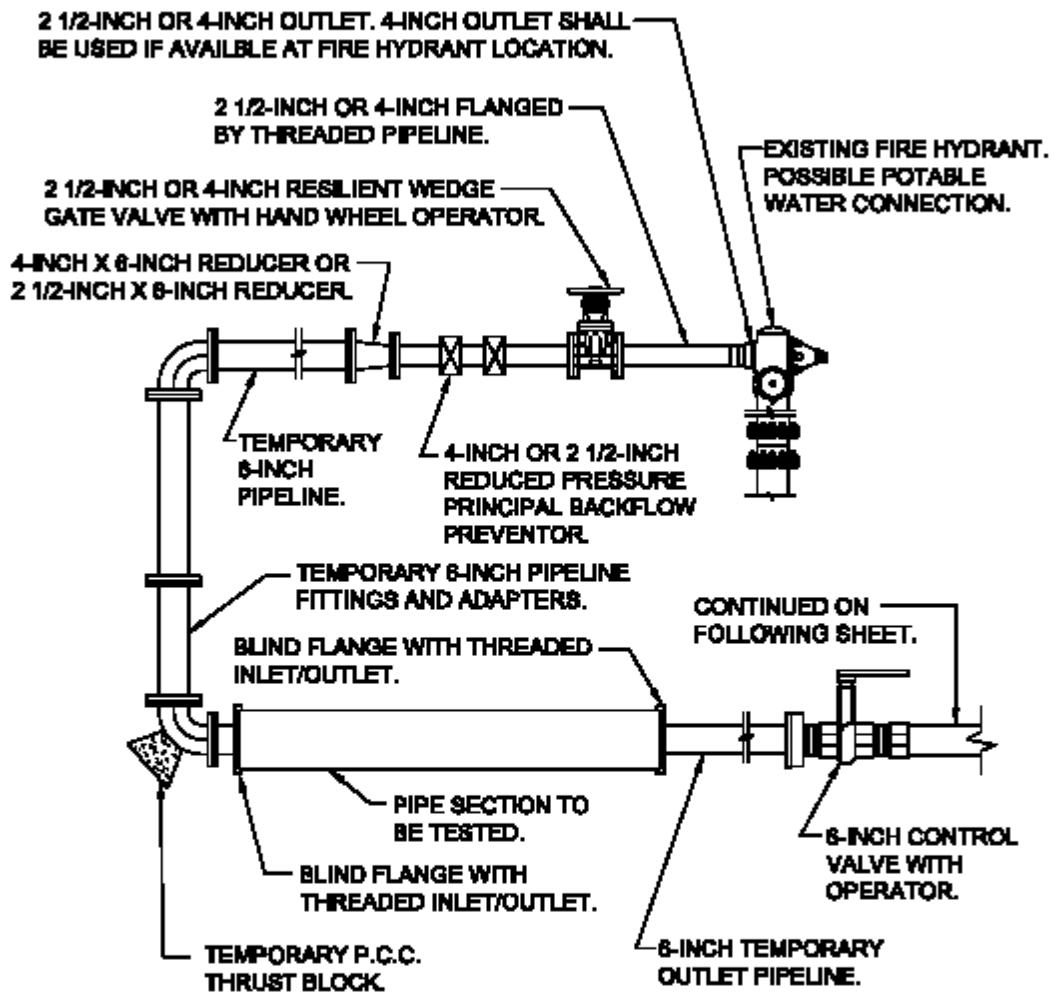
The water pipeline shall be thoroughly flushed with potable water prior to the chlorination of the pipeline. Prior to the flushing of the water pipeline it may be necessary to construct temporary flushing and testing connections

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 properly positioned fire hydrants allow for the adequate flushing of the pipeline and allow for the dispersion of chlorine by the continuous-feed method. This method is particularly applicable to new commercial or residential developments which occur within an existing pipe distribution system.

If new pipelines are to be connected to existing in-service pipelines, concrete structures and 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 and 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 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, 4 inch control valve, 4 inch backflow preventer based upon a reduced pressure principal, 4 inch supply hose or pipeline, temporary testing block, blind flange with 4 inch threaded outlet, 4 inch discharge piping, 4 inch 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. The discharge pipeline shall extend to a discharge point acceptable to the Owner's Representative. If the discharge pipeline extends through on-site roadways or into the public right of way then the Contractor shall place the temporary discharge pipeline below grade. The Contractor shall perform all cutting, demolition and replacement of P.C.C. infrastructure as required by Division 1 of the Technical Specifications. The Contractor shall core the side of manholes, install the discharge pipeline to the interior wall face of the manhole and grout the annular space between the exterior circular core and the exterior of the pipeline for the full thickness of the manhole shaft with a non-shrink grout. 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. The

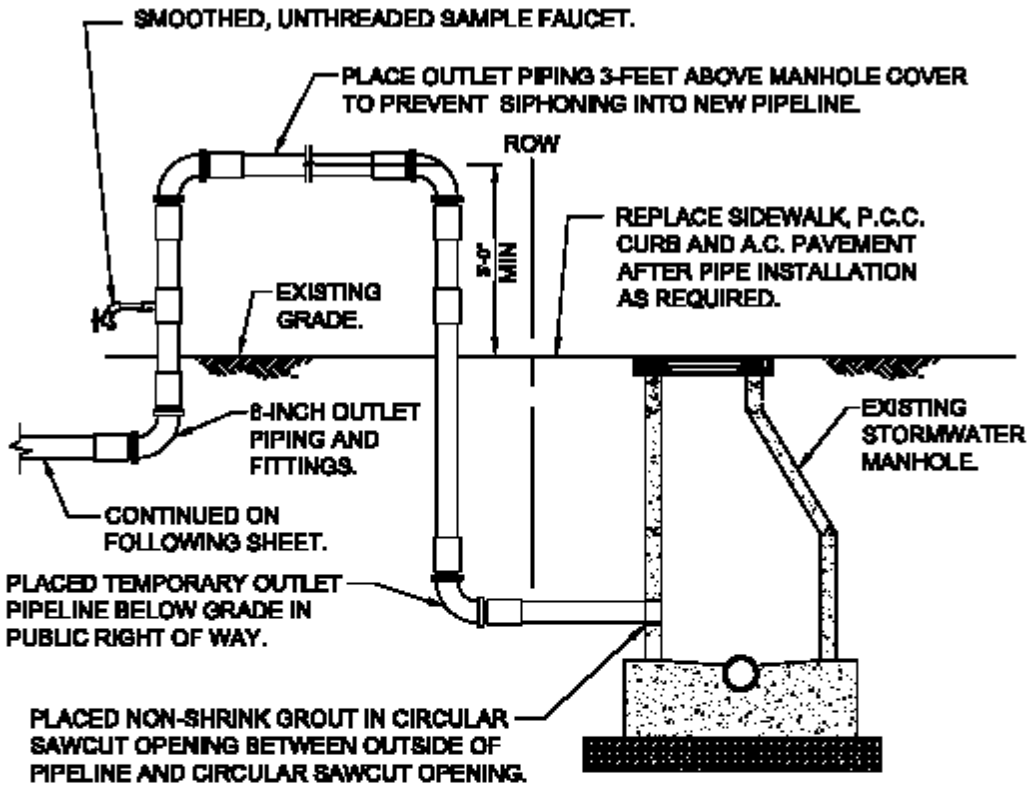
interior of any discharge pipeline extending into manholes shall be plugged for the full width of the manhole shaft wall width with a non-shrink grout.

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:




**TEMPORARY FLUSHING/ TESTING AND BLOWOFF/ SAMPLING FITTINGS AND PIPING SCHEMATIC**

**SHEET 1 OF 2**




**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. 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 Owner's Representative, 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.

The environment to which the heavily chlorinated water is to be discharged shall be inspected. In the opinion of the Owner's Representative, if there is a possibility that the chlorinated water will result in damage to the environment, then the Owner's Representative shall require a neutralizing chemical be applied to the water to be wasted (prior to discharge) by means of a neutralizing chemical. 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.

The Contractor shall be responsible for the discharging of the heavily chlorinated water. The Contractor shall provide all piping, fittings, etc. to convey the heavily chlorinated 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 organisms; and chlorine residual. Turbidity, pH, and a standard heterotrophic plate count (HPC) test shall be required. New pipeline does not typically contain coliforms but does 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. The costs of re-testing shall also be borne by the Contractor. The City or District Water Department within which the disinfected pipeline is located shall coordinate obtaining the tests and select the testing laboratory to perform the tests. 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 Owner's Representative. The Owner's Representative shall allow the disinfected pipeline(s) to be connected to the in-service pipeline after the evidence is presented to him/her 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 FINAL CONNECTION PIPE SEGMENT DISINFECTION REQUIREMENTS

If approved by the Owner's Representative, final connection pipe segments (measuring 18.5 feet or less) located between the existing in-service pipeline and the valve or temporary termination point of a successfully disinfected pipe section 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 Owner's Representative. If dirt, debris or any contaminating substances enter the pipe section between the disinfection process and installation process the pipe section shall be removed and re-disinfected. The Contractor shall immediately remove the pipe section from the pipe trench and re-disinfect the pipe section if required by the Owner's 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 Owner's Representative approves the witnessed disinfection of the pipeline section.

**END OF SECTION 02670**

# SECTION 03100 - CONCRETE FORMWORK

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. The Contractor shall provide concrete formwork, bracing, shoring, supports, and false work, in accordance with the Contract Documents.

B. Work included in this Section: Principal items are:

1. Furnishing, erection, and removal of forms.

2. Shoring and bracing of formwork.

3. Setting of embedded items and pipe sleeves for mechanical and electrical work under direction of respective trade.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. The Work of the following Sections apply to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of the Work.

1. Section 03200 - Reinforcement Steel

3. Section 03300 - Cast-in-Place Concrete

### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this Section of the Specifications, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.

B. The current edition of the Uniform Building Code (UBC) of International Conference of Building Officials (ICBO).

C. Except as otherwise indicated, the current editions of the following apply to the Work of this Section:

1. PS 1 U.S. Product Standard for Concrete Forms, Class 1

2. PS 20 American Softwood Lumber Standard

3. ACI 117 Standard Tolerances for Concrete Construction and Materials

4. ACI 347 Recommended Practice for Concrete Formwork

1.04 CONTRACTOR SUBMITTALS

A. The Contractor shall, in accordance with the requirements in the Specification Section 01330 – Submittals/Shop Drawings, submit detailed drawings of the false work proposed to be used. Such drawings shall be in sufficient detail to indicate the general layout, sizes of members, anticipated stresses, grade of materials to be used in the false work, means of protecting existing construction which supports false work, and typical soil conditions.

B. The Contractor shall, in accordance with the requirements in the Specification Section 01330 – Submittals/Shop Drawings, submit the following:

1. Form ties and all related accessories, including taper tie plugs, if taper ties are used.

2. Form gaskets.

C. The Contractor shall submit shop drawings showing the proposed location and type of required construction for any joints not shown on the Plans, and the sequence of forming and concrete placing operations.

D. Forms and false work to support the roof and floor slabs shall be designed for the total dead load, plus a live load of 50 PSF (minimum). The minimum design load for combined dead and live loads shall be 100 PSF.

E. The Contractor shall design formwork prior to fabrication, placing the order, or use on the jobs.

F. The Contractor shall design joints in forms to remain mortar-tight and withstand placing pressures without bulging outward or creating surface patterns.

G. Calculations shall be signed and sealed by a Professional Civil or Structural Engineer registered in the State of California for both the forming system and the stresses induced on the form system.

H. Suitable and effective means shall be provided for holding adjacent edges and end panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets or similar surface defects in the finished concrete. The forms shall be tight so as to prevent the loss of water, cement, and fines during placing and vibrating of the concrete.

## 1.05 QUALITY ASSURANCE

A. The Contractor shall comply with the requirements of California Division of Occupational Health and Safety Construction Safety Orders Section 1717 and OSHA Part 1926, Section 1926.701 that apply to the Work of this Section. The Contractor shall prepare and maintain at least one copy of the required Plans at the site. Design of the structures shown on the Plans does not include any allowance or consideration for imposed construction loads. The Contractor shall provide forms, shoring and false work adequate for imposed live and dead loads, including equipment, height of concrete drop, concrete and foundation pressures, stresses, lateral stability, and other safety factors during construction.

B. Tolerances: The Contractor shall employ formwork complying with ACI 347 Guide to Formwork for Concrete, except as exceeded by the requirements of regulatory agencies, or as otherwise indicated or specified. The Contractor shall design and construct formwork to produce finished concrete conforming to tolerances given in ACI 117.

# PART 2 - PRODUCTS

## 2.01 GENERAL

A. Except as otherwise accepted by the Owner's Representative, all lumber brought on the Site for use as forms, shoring, or bracing shall be new material. All forms shall be smooth surface forms and shall be of the following materials:

| | |
|---|---|
| Walls: | Steel or plywood panel |
| Columns: | Steel, plywood or fiberglass |
| Roof and Floor: | Plywood |
| All Other Work: | Steel panels, plywood or tongue and groove lumber |

B. Form materials which may remain or leave residues on or in the concrete shall be classified as acceptable for potable water use by the Environmental Protection Agency within 30 days of application or use.

## 2.02 FORM AND FALSE WORK MATERIALS

A. Materials for concrete forms, formwork, and false work shall conform to the following requirements:

1. Lumber shall be Douglas Fir or Southern Yellow Pine, construction grade or better, in conformance with U.S. Product Standard PS 20.

2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded; exterior type Douglas Fir or Southern Yellow Pine plywood manufactured especially for concrete formwork and shall conform to the requirements of PS 1 for Concrete Forms, Class I, and shall be edge sealed.

3. Form materials shall be metal, wood, plywood, or other approved material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade shown. Metal forms shall be an approved type that will accomplish such results. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Ext. Grade.

## 2.03 FORM TIES

A. Form ties with integral waterstops shall be provided with a plastic cone or other suitable means for forming a conical hole to ensure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 1-1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming. Form ties shall be Burke Penta-Tie System by The Burke Company; Richmond Snap-Tys by the Richmond Screw Anchor Company; or equal.

B. Form ties for water-retaining structures shall have integral waterstops. Removable taper ties may be used when approved by the Owner's Representative or Resident Project Representative. A preformed neoprene or polyurethane tapered plug sized to seat at the center of the wall shall be inserted in the hole left by the

removal of the taper tie. Use Burke Taper-Tie System by The Burke Company; Taper-Ty by the Richmond Screw Anchor Company; or equal.

2.04 FORM COATING

A. Non-grainrising and nonstaining resin or polymer type that will not leave residual matter on surface of concrete or adversely effect bonding to concrete of paint, plaster, mortar, protective coatings, waterproofing or other applied materials. Coatings containing mineral oils, paraffins, waxes or other nondrying ingredients, are not permitted. For concrete surfaces contacting potable stored water, use only coatings and form-release agents that are completely nontoxic.

2.05 FORM JOINT SEALERS

A. For joints between form panels, use resilient foam rubber strips, non-hardening plastic-type caulking compound free of oil, or waterproof pressure-sensitive plastic tape of minimum 8 mil thickness and 2 inches width. For form tie holes, use rubber plugs, plastic caulking compound, or equal.

PART 3 - EXECUTION

3.01 GENERAL

A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The Contractor shall assume full responsibility for the adequate design of all forms, and any forms which are unsafe or inadequate in any respect shall promptly be removed from the Work and replaced at no increased cost to the Owner. The Contractor shall provide worker protection from protruding reinforcement bars in accordance with applicable safety codes. A sufficient number of forms of each kind shall be provided to permit the required rate of progress to be maintained. The design and inspection of concrete forms, false work, and shoring shall comply with applicable local, state and Federal regulations. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by Contractor's personnel and by the or Resident Project Representative and shall be in sufficient number and properly installed. During concrete placement, the Contractor shall continually monitor plumb and string line form positions and immediately correct deficiencies.

B. Concrete forms shall conform to the shape, lines, and dimensions of members as called for on the Drawings, and shall be substantial, free from surface defects, and sufficiently tight to prevent leakage. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly placed concrete. If adequate foundation for shores cannot be secured, trussed supports shall be provided.

C. Unless otherwise indicated, exterior corners in concrete members shall be provided with ¾ inch chamfers. Re-entrant corners in concrete members shall not have fillets unless otherwise indicated.

D. The Contractor shall notify the Owner's Representative or Resident Project Representative at least 48 hours prior to concrete placement so the completed formwork can be inspected.

E. Final inspection will be made only after all formwork, embeds, blowouts, screeds, ties, final adjustments, and related work have been completed by the Contractor.

F. The Contractor shall correct defective work identified by the Owner's Representative or Resident Project Representative, prior to delivery of the concrete.

G. Neither the review of the Contractor's drawings nor inspection of forms by the Owner's Representative or Resident Project Representative shall relieve the Contractor of responsibility for the adequacy of the forms nor from the necessity for remedying all defects which may develop or become apparent with use. The Owner's Representative or Resident Project Representative may at any time condemn any section or sections of the forms found deficient. The Contractor shall promptly remove the condemned forms from the Work and replace them.

## 3.02 FORM DESIGN

A. All forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Plywood, 5/8 inch and greater in

thickness, may be fastened directly to studding if the studs are spaced close enough to prevent visible deflection marks in the concrete. The forms shall be tight so as to prevent the loss of water, cement and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1- to 1-1/2 inch diameter polyethylene rod held in position to the underside of the wall form. Adequate clean-out holes shall be provided at the bottom of each lift of forms. The size, number, and location of such clean-outs shall be as acceptable to the Owner's Representative or Resident Project Representative. Whenever concrete cannot be placed from the top of a wall form in a manner that meets the requirements of the Contract Documents, form windows shall be provided in the size and spacing needed to allow placement of concrete to the requirements of Section 03300 - Cast-in-Place Concrete. The size, number, and location of such form windows shall be as acceptable to the Owner's Representative.

B. Wall Forms:

1. All walls shall be formed by methods acceptable to the Owner's Representative or Resident Project Representative and to the correct elevations and location illustrated on the Plans.

2. Pouring Openings:

a) The minimum pouring opening size shall be 18" x 18".

b) The bottom of the lower openings shall be no more than 48 inches from the top of the wall-footing.

c) The horizontal centerline distance between such openings shall not exceed 96 inches nor shall the distance between the nearest opening and the bulkhead for the vertical joint exceed 36 inches.

d) The vertical centerline distance between horizontal rows of openings shall not exceed 96 inches.

e) Under no circumstances shall forming be such that the drop of concrete in the forms will exceed 4 feet in any one place.

## 3.03 CONSTRUCTION

A. Vertical Surfaces: All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is shown. Not less than 1 inch of concrete shall be added to the thickness of the concrete member as shown where concrete is permitted to be placed against trimmed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

B. Construction Joints: Concrete construction joints will not be permitted at locations other than those shown or specified, except as may be acceptable to the Owner's Representative or Resident Project Representative. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.

C. Form Ties:

1. Embedded Ties: Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with non-shrink grout as specified for "Finish of Concrete Surfaces" in Section 03315 - Grout. Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1 inch back from the formed face or faces of the concrete.

2. Removable Ties: Where taper ties are approved for use, the larger end of the taper tie shall be on the wet side of walls in water retaining structures. After the taper tie is removed, the

hole shall be thoroughly cleaned and roughened for bond. A precast neoprene or polyurethane tapered plug shall be located at the wall centerline. The hole shall be completely filled with non-shrink grout for water bearing and below-grade walls. The hole shall be completely filled with non-shrink or regular cement grout for above-grade walls which are dry on both sides. Exposed faces of walls shall have the outer 2 inches of the exposed face filled with a cement grout which shall match the color and texture of the surrounding wall surface.

D. Embedded Items:

1. Before the placement of concrete within the forms, each trade having embedded items, including waterstops within the forms and affected by the pour, shall certify that all items are properly located and braced. This certification shall be provided by the Contractor to the Owner's Representative or Resident Project Representative at least 48 hours in advance of placement.

## 3.04 EMBEDDED PIPING AND ROUGH HARDWARE

A. The Contractor shall consult with all trades which require openings for the passage of pipes, conduits and other inserts, and properly and accurately install the necessary pipe sleeves, anchors, or other required inserts, and properly size the equipment pads. The Contractor shall reinforce openings as indicated and required. The Contractor shall locate conduits or pipes so as not to reduce the strength of the construction, and in no case, place pipes, other than conduits in a slab 4-1/2 inches or less in thickness. The Contractor shall not embed conduit having an outside diameter greater than 1/3 of the thickness of the slab in a concrete slab, nor place conduit below bottom reinforcing steel or over top reinforcing steel. Conduits may be embedded in walls, provided they are not larger in outside diameter than 1/3 the thickness of the wall, are not spaced closer than three diameters on center, and do not impair the strength of the structure. The Contractor shall support embedded pipes and conduits independently from reinforcing steel in a manner to prevent metallic contact, and thereby, prevent electrolytic deterioration. The Contractor shall place embedded pipes and conduits as nearly as possible to the centerline of the concrete section. The Contractor shall submit all conduit, piping and other wall penetrations, reinforcements and anchor bolt sizing and locations for review and approval.

## 3.05 REMOVAL OF FORMS

A. Careful procedures for the removal of forms shall be strictly followed, and this Work shall be accomplished with care so as to avoid injury to the concrete. No heavy loading on green, insufficiently cured concrete will be permitted. In the case of roof slabs and above-ground floor slabs, forms for supported slab, but not shoring, shall remain in place until test cylinders for the roof concrete attain a minimum compressive strength of 75 percent of the 28 day strength specified in Section 03300 - Cast-in-Place Concrete; provided, that no forms shall be disturbed or removed under an individual panel or until before the concrete in the adjacent panel or unit has attained 75 percent of the specified 28 day strength and has been in place for a minimum of 7 days. The time required to establish said strength shall be as determined by the Owner's Representative from several test cylinders obtained by the Contractor for this purpose from concrete used in the first group of roof panels placed. If the time so determined is more than the 7 day minimum, then that time shall be used as the minimum length of time. Forms for all vertical walls and columns shall remain in place at least 2 days after the concrete has been placed. Forms for all parts of the Work not specifically mentioned herein shall remain in place for periods of time as determined by the Owner's Representative.

B. The Contractor shall not backfill against walls until the top slab is in place and all concrete has obtained compressive strength equal to the specified 28 day compressive strength.

C. Immediately upon removal of the forms, the concrete surfaces shall be thoroughly wetted and shall be kept wet until the curing compound is applied or other curing procedure made effective, in accordance with the specification requirements.

D. The Contractor shall assume the responsibility for damage resulting from improper and premature removal of forms.

## 3.06 REUSE OF FORMS

A. Forms may be reused only if in good condition and only if acceptable to the Owner's Representative or Resident Project Representative. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on all exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view. In the case of forms for the inside wall surfaces of hydraulic/water

retaining structures, unused tie rod holes in forms shall be filled with non-shrink grout.

3.07 MAINTENANCE OF FORMS

A. Forms shall be maintained at all times in good condition, particularly as to size, shape, strength, rigidity, tightness, and smoothness of surface. Forms, when in place, shall conform to the established alignment and grades. Before concrete is placed, the forms shall be thoroughly cleaned. The form surfaces shall be treated with a non-staining mineral oil or other lubricant acceptable to the Owner's Representative or Resident Project Representative. Any excess lubricant shall be satisfactorily removed before placing the concrete. Where field oiling of forms is required, the Contractor shall perform the oiling at least 2 weeks in advance of their use. Care shall be exercised to keep oil off the surfaces of steel reinforcement and other metal items to be embedded in concrete.

3.08 FALSE WORK

A. The Contractor shall be responsible for the design, engineering, construction, maintenance, and safety of all false work, including staging, walkways, forms, ladders, and similar appurtenances, which shall equal or exceed the applicable requirements of the provisions of the OSHA Safety and Health Standards for Construction, and the requirements of the California Division of Industrial Safety.

3.09 REMOVAL OF SHORING AND FALSE WORK

A. The Contractor shall not remove shoring and false work until 21 days after concrete placement, or concrete has attained at least 90 percent of the 28 day design compressive strength as demonstrated by control test cylinders, but not sooner than 14 days. If testing is competed to review the 90 percent compressive strength, the Contractor shall incur the cost.

3.10 LOAD RESTRICTION

A. The Contractor shall not impose construction, equipment or permanent loads on columns, supported slabs, or supported beams until concrete has attained the 28 day design compressive strength.

**END OF SECTION 03100**

# SECTION 03200 - REINFORCEMENT STEEL

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. The Contractor shall provide concrete reinforcement steel, welded wire fabric, couplers, concrete inserts, wires, clips, supports, chairs, spacers, and other accessories, complete, all in accordance with the Contract Documents.

B. Work Included in this Section: Principal items are:

1. Furnishing and placing bar and mesh reinforcing for cast-in-place concrete.

2. Furnishing reinforcing steel bars for masonry, including delivery to the site.

3. Submittals.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. The Work of the following Sections apply to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.

1. Section 03100 - Concrete Formwork

2. Section 03300 - Cast-in-Place Concrete

### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this Section of the Specifications, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.

B. The current edition of the Uniform Building Code (UBC) of International Conference of Building Officials (ICBO).

C. Commercial Standards (Current Edition):

1. ACI 315 Details and Detailing of Concrete Reinforcement

2. ACI 318 — Building Code Requirements for Structural Concrete

3. CRSI MSP — Concrete Reinforcing Steel Institute Manual of Standard Practice

4. CRSI PRB — Concrete Reinforcing Steel Institute Placing Reinforcing Bars

5. WRI — Manual of Standard Practice for Welded Wire Fabric

6. AWS D 1.4 — Structural Welding Code - Reinforcing Steel

7. ACI 117 — Standard Tolerance for Concrete Construction Materials

D. ASTM Standards in Building Codes (Current Edition):

1. ASTM A 82: Specification for Steel Wire, Plain, for Concrete Reinforcement

2. ASTM A 185: Specification for Welded Steel Wire Fabric, Plain, for Concrete Reinforcement

3. ASTM A 615: Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

4. ASTM A 706: Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement

5. ASTM A 775: Specification for Epoxy-Coated Reinforcing Steel Bars

E. National Sanitation Foundation

1. NSF / ANSI 61: Drinking Water System Components – Health Effects

## 1.04 CONTRACTOR SUBMITTALS

A. The Contractor shall furnish shop bending diagrams, placing lists, and drawings of all reinforcement steel before fabrication in

accordance with the requirements of the Specification Section 01330 – Submittals/Shop Drawings.

B. Details of the concrete reinforcement steel and concrete inserts shall be submitted at the earliest possible date after receipt of the Notice to Proceed. Details of reinforcement steel for fabrication and erection shall conform to ACI 315 and the requirements indicated. The shop bending diagrams shall show the actual lengths of bars, to the nearest inch, measured to the intersection of the extensions (tangents for bars of circular cross-section) of the outside surface. The shop drawings shall include bar placement diagrams which clearly indicate the dimensions of each bar splice.

C. Where mechanical couplers are required or permitted to be used to splice reinforcement steel, the Contractor shall submit manufacturer's literature including instructions and recommendations for installation for each type of coupler used; certified test reports which verify the load capacity of each type and size of coupler used; and shop drawings which show the location of each coupler with details of how they are to be installed in the formwork.

D. If reinforcement steel is spliced by welding at any location, the Contractor shall submit mill test reports which shall include the information necessary for the determination of the carbon equivalent as specified in AWS D 1.4. The Contractor shall submit a written welding procedure for each type of weld for each size of bar which is to be spliced by welding; a mere statement that AWS procedures will be followed will not be acceptable.

1.05 QUALITY ASSURANCE

A. If requested by the Owner's Representative or Resident Project Representative, the Contractor shall furnish samples from each heat of reinforcement steel delivered in a quantity adequate for testing. Costs of initial tests will be paid by the Contractor. Costs of additional tests due to material failing initial tests shall also be paid by the Contractor.

B. If reinforcement steel is spliced by welding at any location, the Contractor shall submit certifications of procedure qualifications for each welding procedure used and certification of welder qualifications, for each welding procedure, and for each welder performing the Work. Such qualifications shall be as specified in AWS D 1.4.

C. If requested by the Owner's Representative or Resident Project Representative, the Contractor shall furnish samples of each type of welded splice used in the Work in a quantity and of dimensions adequate for testing. At the discretion of the Owner's Representative or Resident Project Representative, radiographic testing of direct butt welded splices will be performed. The Contractor shall provide assistance necessary to facilitate testing. The Contractor shall repair any weld which fails to meet the requirements of AWS D 1.4. The costs of testing will be paid by the Contractor. The costs of all tests which fail to meet specified requirements shall also be paid by the Contractor.

## PART 2 - PRODUCTS

### 2.01 MATERIAL REQUIREMENTS

A. Materials which may remain or leave residues on or within the concrete shall be classified as acceptable for potable water use by the Environmental Protection Agency within 30 days of application or use.

### 2.02 REINFORCEMENT STEEL

A. Reinforcement steel for all cast-in-place reinforced concrete construction shall conform to the following requirements:

1. Bar reinforcement shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel Reinforcement or as otherwise indicated.

2. All welded reinforcement, specifically detailed or otherwise indicated, shall be low-alloy Grade 60 deformed bars conforming to the requirements of ASTM A 706.

3. Welded wire fabric reinforcement shall conform to the requirements of ASTM A 185 and the details indicated; provided, that welded wire fabric with longitudinal wire of W4 size wire and smaller shall be either provided in flat sheets or in rolls with a core diameter of not less than 10 inches; and provided further, that welded wire fabric with longitudinal wires larger than W4 size shall be provided in flat sheets only.

4. Spiral reinforcement shall be cold-drawn steel wire conforming to the requirements of ASTM A 82.

5. Tie wire shall be Annealed Steel, 14 gauge minimum.

B. Accessories:

1. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement. All bar supports shall meet the requirements of the CRSI Manual of Standard Practice, Chapter 3, including special requirements for supporting epoxy-coated reinforcing bars. Wire bar supports shall be CRSI Class 1 for maximum protection with a 1/8 inch minimum thickness of plastic coating which extends at least ½ inch from the concrete surface. Plastic shall be gray in color.

2. Concrete blocks (dobies), used to support and position reinforcement steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Wire ties shall be embedded in concrete block bar supports.

C. Epoxy coating for reinforcing and accessories, where indicated, shall conform to ASTM A 775.

## 2.03 MECHANICAL COUPLERS

A. Mechanical couplers shall be provided where indicated and where approved by the Owner's Representative or Resident Project Representative. The couplers shall develop a tensile strength which exceeds 125 percent of the yield strength of the reinforcement bars being spliced at each splice.

B. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be supplied. This shall apply to all mechanical splices, including those splices intended for future connections.

C. The reinforcement steel and coupler used shall be compatible for obtaining the required strength of the connection. Straight threaded type couplers shall require the use of the next larger size reinforcing bar or shall be used with reinforcing bars with specially forged ends which provide upset threads which do not decrease the basic cross-section of the bar.

## 2.04 WELDED SPLICES

A. Welded splices shall be provided where indicated and where approved by the Owner's Representative or Resident Project Representative. All welded splices of reinforcement steel shall develop a tensile strength which exceeds 125 percent of the yield strength of the reinforcement bars which are connected.

B. Provided materials shall be capable of conforming to the Weld Splice requirements of AWS D 1.4.

2.05 EPOXY GROUT

A. Epoxy for grouting reinforcing bars shall be specifically formulated for such application, for the moisture condition, application temperature, and orientation of the hole to be filled. Epoxy grout shall be in conformance with Section 03315 - Grout.

2.06 MANUFACTURERS

A. Couplers/welded splices shall be manufactured by one of the following or equal:

1. Lenton Form Saver by Erico Products

2. Dowel Bar Splicer System by Richmond Screw Anchor Company

2.07 NSF / ANSI STANDARD 61

A. All cementitious material, admixtures, curing compounds, and other industrial produced materials used in concrete, or for curing or repairing of concrete, that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.

PART 3 - EXECUTION

3.01 GENERAL

A. All reinforcement steel, welded wire fabric, couplers, and other appurtenances shall be fabricated, and placed in accordance with the requirements of the Uniform Building Code and the supplementary requirements indicated herein.

3.02 FABRICATION AND DELIVERY

A. The Contractor shall conform to CRSI MSP, Chapters 6 and 7, except as otherwise indicated or specified. The Contractor shall bundle reinforcement and tag with suitable identification to facilitate sorting and placing, and transport and storage at the site so as not to damage material. The Contractor shall keep a sufficient supply of tested, approved, and proper reinforcement at the site to avoid delays.

B. Bending and Forming: The Contractor shall bend bars of indicated size and accurately form in accordance with the requirements of ACI 315 and ACI 318 to shapes and lengths indicated on the Plans and required by methods not injurious to materials. The Contractor shall not heat reinforcement for bending. Bars with kinks or bends not conforming with approved shop drawings will be rejected.

C. Fabricating Tolerance: All fabrication of reinforcing bars shall meet the requirements of ACI 117.

D. Reinforcing Bars for Masonry: The Contractor shall detail and fabricate bars at the shop, ready for installation by masons.

## 3.03 PLACING

A. Reinforcement steel shall be accurately positioned and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcement steel shall be supported by concrete, plastic or metal supports, spacers or metal hangars which are strong and rigid enough to prevent any displacement of the reinforcement steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. All concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties which are embedded in the blocks. For concrete over formwork, the Contractor shall furnish concrete, metal, plastic, or other acceptable bar chairs and spacers.

B. Limitations on the use of bar support materials shall be as follows:

1. Concrete Dobies: Permitted at all locations except where architectural finish is required.

2. Wire Bar Supports: Permitted only at slabs over dry areas, interior dry wall surfaces, and exterior wall surfaces.

3. Plastic Bar Supports: Permitted at all locations except on grade.

C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.

D. Bars additional to those shown which may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position shall be provided by the Contractor at no additional cost to the Owner.

E. Unless otherwise specified, reinforcement placing tolerances shall be within the limits specified in Section 7.5 of ACI 318 except where in conflict with the requirements of the UBC.

F. Bars may be moved as necessary to avoid interference with other reinforcement steel, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangement of bars shall be subject to the approval of the Owner's Representative or Resident Project Representative.

G. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters. Slab bolsters shall be spaced not more than 30 inches on center, shall extend continuously across the entire width of the reinforcement mat, and shall support the reinforcement mat in the plane indicated.

H. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than 3 feet on center in any direction. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be allowed.

I. Epoxy-coated reinforcing bars shall be stored, transported, and placed in such a manner as to avoid chipping of the epoxy coating. Non-abrasive slings made of nylon and similar materials shall be used. Specially coated bar supports shall be used. All chips or cracks in the epoxy coating shall be repaired with a compatible epoxy repair material prior to placing concrete.

J. Accessories supporting reinforcing bars shall be spaced such that there is no deflection of the accessory from the weight of the supported bars. When used to space the reinforcing bars from wall forms, the forms and bars shall be located so that there is no

deflection of the accessory when the forms are tightened into position.

3.04 SPLICES

A. Splicing shall be in accordance with ACI 318, unless otherwise noted on the Plans.

B. Vertical Bars: Except as specifically detailed or otherwise indicated, splicing of vertical bars in concrete is not permitted, except at the indicated or approved horizontal construction joints or as otherwise specifically detailed.

C. Horizontal Bars: Except as specifically detailed or otherwise indicated, splicing of horizontal bars in concrete is not permitted.

D. Mechanical Couplers: Unless otherwise indicated or approved by the Owner's Representative or Resident Project Representative, use of mechanical couplers is not permitted.

E. Welding: Except as specifically detailed or otherwise indicated, welding of reinforcing bars is not permitted.

3.05 ADDITIONAL REINFORCING

A. The Contractor shall provide additional reinforcing bars at sleeves and openings as indicated on the Plans.

3.06 WELDED WIRE MESH

A. The Contractor shall install necessary supports and chairs to hold the wire mesh in place during concrete pours. The Contractor shall straighten mesh to lay in a flat plane and bend mesh as shown or required to fit work. The Contractor shall provide laps of no less than one complete mesh, unless otherwise detailed, and shall tie every other wire at laps. Roll mesh is not acceptable.

3.07 EMBEDMENT OF DRILLED REINFORCING STEEL DOWELS

A. Hole Preparation:

1. The hole diameter shall be as recommended by the epoxy manufacturer but shall be no larger than 0.25 inch greater than the diameter of the outer surface of the reinforcing bar deformations.

2. The depth of the hole shall be as recommended by the epoxy manufacturer to fully develop the bar but shall not be less than 12 bar diameters, unless noted otherwise.

3. The hole shall be drilled by methods which do not interfere with the proper bonding of epoxy.

4. Existing reinforcing steel in the vicinity of proposed holes shall be located prior to drilling. The location of holes to be drilled shall be adjusted to avoid drilling through or nicking any existing reinforcing bars.

5. The hole shall be blown clean with clean, dry compressed air to remove all dust and loose particles.

6. Epoxy shall be injected into the hole through a tube placed to the bottom of the hole. The tube shall be withdrawn as epoxy is placed but kept immersed to prevent formation of air pockets. The hole shall be filled to a depth that ensures that excess material will be expelled from the hole during dowel placement.

7. Dowels shall be twisted during insertion into the partially filled hole so as to guarantee full wetting of the bar surface with epoxy. The bar shall be inserted slowly enough to avoid developing air pockets.

## 3.08 CLEANING AND PROTECTION

A. Reinforcing steel delivered to the jobsite shall be suitably stored off the ground and protected from oils, mud, concrete splatter and all conditions conducive to corrosion until embedded in concrete.

B. The surfaces of all reinforcement steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcement shall be re-inspected and, if necessary, re-cleaned.

**END OF SECTION 03200**

# SECTION 03300 - CAST-IN-PLACE CONCRETE

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. The Contractor shall provide finished structural concrete, complete, in accordance with the Contract Documents.

B. The following types of concrete are covered in this Section:

1. STRUCTURAL CONCRETE: Normal weight (145 PCF) concrete to be used in all cases except where noted otherwise in the Contract Documents.

2. LEAN CONCRETE: Concrete to be used for thrust blocks, anchor blocks, pipe trench cut-off blocks and cradles, where the preceding items are detailed on the Plans as unreinforced. Concrete to be used as protective cover for dowels intended for future connection.

C. The term “hydraulic structure” used in these Specifications refers to environmental engineering concrete structures for the containment, treatment, or transmission of water, or other fluids.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. The Work of the following Sections applies to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.

1. Section 03100 - Concrete Formwork

2. Section 03200 - Reinforcement Steel

3. Section 03290 - Joints in Concrete Structures

4. Section 03315 – Grout

6. Section 09800 – Protective Coatings

### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this Section, the Contractor shall comply with the latest adopted edition of the Standard

Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.

B. The current edition of the Uniform Building Code (UBC) of International Conference of Buildings Officials (ICBO).

C. National Sanitation Foundation

1. NSF / ANSI 61: Drinking Water System Components – Health Effects

D. Federal Specifications:

1. UU-B-790A(1)(2): Building Paper, Vegetable Fiber (Kraft, Water-Proofed, Water Repellant and Fire Resistant)

E. Commercial Standards:

1. ACI 117: Standard Tolerances for Concrete Construction and Materials

2. ACI 214: Recommended Practice for Evaluation of Strength Test Results of Concrete

3. ACI 301: Specifications for Structural Concrete for Buildings

4. ACI 309: Consolidation of Concrete

5. ACI 315: Details and Detailing of Concrete Reinforcement

6. ACI 318: Building Codes Requirements for Reinforced Concrete

7. ACI 350R: Environmental Engineering Concrete Structures

F. ASTM Standards in Building Codes:

1. ASTM C 31: Practice for Making and Curing Concrete Test Specimens in the Field

2. ASTM C 33: Specification for Concrete Aggregates

3. ASTM C 39: Test Method for Compressive Strength of Cylindrical Concrete Specimens

4. ASTM C 40: Test Method for Organic Impurities in Fine Aggregates for Concrete

5. ASTM C 42: Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

6. ASTM C 88: Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

7. ASTM C 94: Specification for Ready-Mixed Concrete

8. ASTM C 136: Test Method for Sieve Analysis of Fine and Coarse Aggregates

9. ASTM C 138: Test Method for Unit Weight, Yield, and Air Content of Concrete

10. ASTM C 143: Test Method for Slump of Hydraulic Cement Concrete

11. ASTM C 150: Specification for Portland Cement

12. ASTM C 156: Test Method for Water Retention by Concrete Curing Materials

13. ASTM C 157: Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete

14. ASTM C 192: Practice for Making and Curing Concrete Test Specimens in the Laboratory

15. ASTM C 231: Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

16. ASTM C 260: Specification for Air-Entraining Admixtures for Concrete

17. ASTM C 289: Test Method for Potential Reactivity of Aggregates (Chemical Method)

18 ASTM C 309: Specification for Liquid Membrane-Forming Compounds for Curing Concrete

19. ASTM C 494: Specification for Chemical Admixtures for Concrete

20. ASTM C 107: Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

21. ASTM D 1751: Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types)

22. ASTM D 2419: Test Method for Sand Equivalent Value of Soils and Fine Aggregate

23. ASTM E 119: Method for Fire Tests of Building Construction and Materials

## 1.04 CONTRACTOR SUBMITTALS

A. Mix Designs: Before starting the Work and within 14 days of the Notice to Proceed, the Contractor shall submit to the Owner's Representative, for review, preliminary concrete mix designs which shall illustrate the proportions and gradations of all materials proposed for each class and type of concrete specified herein in accordance with Specification Section 01330 – Submittals/Shop Drawings. The mix designs shall be checked and certified to conform to these Specifications by an independent testing laboratory acceptable to the Owner's Representative or Resident Project Representative to be in conformance with these Specifications. All costs related to such checking and testing shall be borne by the Contractor at no cost to the Owner.

B. Delivery Tickets: Where ready-mix concrete is used, the Contractor shall furnish delivery tickets at the time of delivery of each load of concrete. Each ticket shall show the state-certified equipment used for measuring and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate added at the batching plant, and the amount of water allowed to be added at the site for the specific design mix. In addition, each ticket shall state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to the times when the batch was dispatched, when it left the plant, when it arrived at the site, when unloading began, and when unloading was finished.

C. The Contractor shall provide the following submittals in accordance with ACI 301:

1. Mill tests for cement.

2. Admixture certification. Chloride ion content must be included.

3. Aggregate gradation and certification.

4. Materials and methods for curing.

D. The Contractor shall provide catalog cuts and other manufacturer's technical data demonstrating compliance with the requirements indicated and specified herein for all admixtures used in the concrete mix design.

1.05 QUALITY ASSURANCE

A. GENERAL

1. Tests on component materials and for compressive strength and shrinkage of concrete will be performed as specified herein. Test for determining slump will be in accordance with the requirements of ASTM C 143.

2. The cost of all laboratory tests requested by the Owner's Representative or Resident Project Representative for cement, aggregates, and concrete, will be borne by the Contractor. The laboratory must meet or exceed the requirements of ASTM C 1077.

3. Concrete for testing shall be supplied by the Contractor at no cost to the Owner and the Contractor shall provide assistance to the independent testing laboratory acceptable to the Owner's Representative or Resident Project Representative in obtaining samples, and disposal and clean up of excess material.

4. A minimum of one (1) set of concrete cylinders and a slump test shall be obtained for every major concrete placement. A minimum of one (1) set of concrete cylinders shall be obtained for all concrete structures, foundations and slabs. One (1) set of cylinders shall be obtained for every forty (40) yards of concrete placed for a particular pour. For instance, if the walls of a structure require eighty (80) yards of

concrete; then two (2) sets of concrete cylinders shall be required.

B. Field Compression Tests:

1. Compression test specimens will be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the Owner's Representative or Resident Project Representative to ensure continued compliance with these Specifications. Each set of test specimens will consist of four (4) cylinders.

2. Compression test specimens for concrete shall be made in accordance with Section 9.2 of ASTM C 31. Specimens shall be 6-inch diameter by 12-inch high cylinders.

3. Compression tests shall be performed in accordance with ASTM C 39. One (1) test cylinder will be tested at 7 days and two (2) at 28 days. The remaining cylinder will be held to verify test results, if needed.

C. Evaluation and Acceptance of Concrete:

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 318, Chapter 5, "Concrete Quality", and as specified herein.

2. A statistical analysis of compression test results will be performed according to the requirements of ACI 214. The standard deviation of the test results shall not exceed 640 PSI, when ordered at equivalent water content as estimated by slump.

3. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for all subsequent batches of the type of concrete affected.

4. When the standard deviation of the test results exceeds 640 PSI, the average strength for which the mix is designed shall be increased by an amount necessary to satisfy the statistical requirement that the probability of any test being more than 500 PSI below or the average of any three (3) consecutive tests being below the specified compressive strength is 1 in 100. The required average strength shall be

calculated by Criterion No. 3 of ACI 214 using the actual standard deviation.

5. All concrete which fails to meet the ACI requirements and these Specifications is subject to removal and replacement at no cost to the Owner.

D. Construction Tolerances: Set and maintain concrete forms and perform finishing operations so as to ensure that the completed Work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades, or dimensions shown. Where tolerances are not stated in the Specifications, permissible deviations will be in accordance with ACI 117.

1. The following construction tolerances are hereby established and apply to finished walls and slab unless otherwise illustrated:

| Item | Tolerance |
|---|---|
| Variation of the constructed linear outline from the established position in plan. | In 10 feet: ¼ inch<br>In 20 feet or more: ½ inch |
| Variation from the level or from the grades shown. | In 10 feet: ¼ inch<br>In 20 feet or more: ½ inch |
| Variation from the plumb. | In 10 feet: ¼ inch<br>In 20 feet or more: ½ inch |
| Variation in the thickness of slabs and walls. | Minus ¼ inch;<br>Plus ½ inch |
| Variation in the locations and sizes of slabs and wall openings. | Plus or minus ¼ inch |

E. Floor Slab Surface Hardener:

1. Job Mockup: In a location designated by the Owner's Representative or Resident Project Representative, place a minimum 100 square feet floor mockup using materials and procedures proposed for use in the Project. Revise materials and procedures as necessary to obtain acceptable finish surface. Maintain the same controls and procedures used in the acceptable mockup throughout the Project.

2. Field Service: During job mockup and initial period of installation, the manufacturer of the surface hardener shall furnish the service of a trained, full-time representative to advise on proper use of the product. Notify surface hardener manufacturer at least three (3) days before initial use of the product.

3. Installer Qualifications: Installer shall have a minimum of three (3) years experience and shall be specialized in the application of dry shake surface hardeners.

## PART 2 - PRODUCTS

### 2.01 CONCRETE MATERIALS

A. General:

1. All materials specified herein shall be classified by the Environmental Protection Agency as acceptable for potable water use within 30 days of application.

2. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one (1) brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.

B. All materials furnished for the Work shall comply with the requirements of Sections 201, 203, and 204 of ACI 301, as applicable.

C. Storage of materials shall conform to the requirements of Section 2.5 of ACI 301 or the SSPWC.

D. Materials for concrete shall conform to the following requirements:

1. Cement shall be standard brand Portland Cement conforming to ASTM C 150 for Type V. A minimum of 85 percent of cement by weight shall pass a 325 screen. A single brand of cement shall be used throughout the Work, and before its use, the brand shall be acceptable to the Owner's Representative. The cement shall be suitably protected from exposure to moisture until used. Cement that has become lumpy shall not be used. Sacked cement shall

be stored in such a manner so as to permit access for inspection and sampling. Certified mill test reports, including fineness, for each shipment of cement to be used shall be submitted to the Owner's Representative or Resident Project Representative if requested regarding compliance with these Specifications.

2. Water for mixing and curing shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities. The water shall be considered potable, for the purposes of this Section, only if it meets the requirements of the local governmental agencies. Agricultural water with high total dissolved solids concentration (over 1,000 mg/l) shall not be used.

3. Aggregates shall be obtained from pits acceptable to the Owner's Representative, shall be nonreactive, and shall conform to ASTM C 33. Maximum size of coarse aggregate shall be as specified herein. Lightweight sand for fine aggregate will not be permitted.

   a) Coarse aggregates shall consist of clean, hard, durable gravel, crushed gravel, crushed rock or a combination thereof. The coarse aggregates shall be prepared and handled in two or more size groups for combined aggregates with a maximum size greater than ¾ inch. When the aggregates are proportioned for each batch of concrete the two size groups shall be combined. See the Paragraph in Part 2 entitled "Trial Batch and Laboratory Tests" for the use of the size groups.

   b) Fine aggregates shall be natural sand or a combination of natural and manufactured sand that are hard and durable. When tested in accordance with ASTM D 2419, the sand equivalency shall not be less than 75 percent for an average of three samples, nor less than 70 percent for an individual test. Gradation of fine aggregate shall conform to ASTM C 33, with 15 to 30 percent passing the number 50 screen and 5 to 10 percent passing the number 100 screen. The fineness modulus of sand used shall not be over 3.00.

   c) Combined aggregates shall be well graded from coarse to fine sizes, and shall be uniformly graded

between screen sizes to produce a concrete that has optimum workability and consolidation characteristics. Where a trial batch is required for a mix design, the final combined aggregate gradations will be established during the trial batch process.

d) When tested in accordance with ASTM C 33, the ratio of silica released to reduction in alkalinity shall not exceed 1.0.

e) When tested in accordance with ASTM C 33, the fine aggregate shall produce a color in the supernatant liquid no darker than the reference standard color solution.

f) When tested in accordance with ASTM C 33, the coarse aggregate shall show a loss not exceeding 42 percent after 500 revolutions, or 10.5 percent after 100 revolutions.

g) When tested in accordance with ASTM C 33, the loss resulting after five cycles shall not exceed 10 percent for fine or coarse aggregate when using sodium sulfate.

4. Ready-mix concrete shall conform to the requirements of ASTM C 94.

5. Admixtures: All admixtures shall be compatible and by a single manufacturer capable of providing qualified field service representation. Admixtures shall be used in accordance with manufacturer's recommendations. If the use of an admixture is producing an inferior end result, discontinue use of the admixture. Admixtures shall not contain thiocyanates nor more than 0.05 percent chloride ion, and shall be nontoxic after 30 days.

a) Set controlling and water reducing admixtures: Admixtures may be added at the Contractor's option to control the set, affect water reduction, and increase workability. The addition of an admixture shall be at no increase in cost to the Owner. The use of an admixture shall be subject to acceptance by the Owner's Representative. Concrete containing an admixture shall be first placed at a location determined by the Owner's Representative.

Admixtures specified herein shall conform to the requirements of ASTM C 494. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used.

1) Concrete shall not contain more than one water-reducing admixture. Concrete containing an admixture shall be first placed at a location determined by the Owner's Representative.

2) Set controlling admixture shall be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently over 80°*F*, a set retarding admixture such as Plastocrete by Sika Corporation; Pozzolith 300R by Master Builders; Daratard by W. R. Grace; or equal shall be used. Where the air temperature at the time of placement is expected to be consistently under 40°*F*, a noncorrosive set accelerating admixture such as Plastocrete 161FL by Sika Corporation; Pozzutec 20 by Master Builders; Daraset by W. R. Grace; or equal shall be used.

3) Normal range water reducer shall conform to ASTM C 494, Type A, WRDA 79 by W. R. Grace; Pozzolith 322-N by Master Builders; Plastocrete 161 by Sika Corporation; or equal. The quality of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.

4) High range water reducer shall conform to ASTM C 494, Type F or G. Daracem 100 or WDRA 19 by W. R. Grace; Sikament FF or Sikament 86 by Sika Corporation; Rheobuild 1000 or Rheobuild 716 by Master Builders; or equal. High range water reducer shall be added to the concrete after all other ingredients have been mixed and initial slump has been verified. No more than 14 ounces of water reducer per sack of cement shall be used. Water reducer shall be considered as part of

the mixing water when calculating water cement ratio.

5) If the high range water reducer is added to the concrete at the job site, it may be used in conjunction with the same water reducer added at the batch plant. Concrete shall have a slump of 3 inches + ½ inch before adding the high range water reducing admixture at the job site. The high range water-reducing admixture shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested before each day's operation of the job site system.

6) Concrete shall be mixed at mixing speed for a minimum of 30 mixer revolutions after the addition of the high range water reducer.

7) Fly ash: Fly ash shall not be allowed.

6. Shrinking Reducing Agent Admixture: All Structural Concrete shall include 0.5 gallons, per cubic yard of concrete, of W.R. Grace Eclipse, or an approved equal.

## 2.02 CURING MATERIALS

A. Materials for curing concrete as specified herein shall conform to the following requirements and ASTM C 309:

1. All curing compounds shall be white pigmented and resin based. Sodium silicate compounds shall not be allowed. Concrete curing compound shall be Spartan Cote Cure-Seal Hardener by the Burke Company; Super Rez Seal by Euclid Chemical Company; MB-429 as manufactured by Master Builders; or equal. Water-based resin curing compounds shall be used only where local air quality regulations prohibit the use of a solvent-based compound. Water-based curing compounds shall be Aqua Resincure by the Burke Company; Aqua-Cure by Euclid Chemical Company; Masterkure-W by Master Builders; or equal.

2. Polyethylene sheet for use as a concrete curing blanket shall be white, and shall have a nominal thickness of 6 mils. The loss of moisture when determined in accordance with the requirements of ASTM C 156 shall not exceed 0.055 grams per square centimeter of surface.

3. Polyethylene-coated water proof paper sheeting for use as concrete curing blanket shall consist of white polyethylene sheeting free of visible defects, uniform in appearance, having a nominal thickness of 2 mils and permanently bonded to waterproof paper conforming to the requirements of Federal Specification UU-B-790A(1)(2). The loss of moisture, when determined in accordance with the requirements of ASTM C156, shall not exceed 0.055 gram per square centimeter of surface.

4. Polyethylene-coated burlap for use as concrete curing blanket shall be 4 mils thick, white opaque polyethylene film impregnated or extruded into one side of the burlap. Burlap shall weigh not less than 9 ounces per square yard. The loss of moisture, when determined in accordance with the requirements of ASTM C 156, shall not exceed 0.055 gram per square centimeter of surface.

5. Curing mats for use in Curing Method 6 as specified herein, shall be heavy shag rugs or carpets or cotton mats quilted at 4 inches on center. Curing mats shall weigh a minimum of 12 ounces per square yard when dry.

6. Evaporation retardant shall be a material such as Confilm as manufactured by Master Builders; Eucobar as manufactured by Euclid Chemical Company; or equal.

## 2.03 NONWATERSTOP JOINT MATERIALS

A. Materials for nonwaterstop joints in concrete shall conform to the following requirements:

1. Preformed joint filler shall be a nonextruding, resilient, bituminous type conforming to the requirements of ASTM D 1751.

2. Mastic joint sealer shall be a material that does not contain evaporating solvents; that will tenaciously adhere to concrete surfaces; that will remain permanently resilient and pliable; that will not be affected by continuous presence of water and

will not in any way contaminate potable water; and that will effectively seal the joints against moisture infiltration even when the joints are subject to movement due to expansion and contraction. The sealer shall be composed of special asphalts or similar materials blended with lubricating and plasticizing agents to form a tough, durable mastic substance containing no volatile oils or lubricants and shall be capable of meeting the test requirements set forth hereinafter, if testing is required by the Owner's Representative.

2.04 MISCELLANEOUS MATERIALS

A. Damp-proofing agent shall be an asphalt emulsion, such as Hydrocide 600 by Sonneborn; Damp-proofing Asphalt Coating by Euclid Chemical Company; Sealmastic by W. R. Meadows Inc., or equal.

B. Bonding agents shall be epoxy adhesives conforming to the following products for the applications specified:

1. For bonding freshly-mixed, plastic concrete to hardened concrete, Sikadur 32 Hi-Mod Epoxy Adhesive, as manufactured by Sika Corporation; Concresive Liquid (LPL), as manufactured by Master Builders; BurkEpoxy MV as manufactured by The Burke Company; or equal.

2. For bonding hardened concrete or masonry to steel, Sikadur 31 Hi-Mod Gel as manufactured by Sika Corporation; BurkEpoxy NS as manufactured by The Burke Company; Concresive Paste (LPL) as manufactured by Master Builders; or equal

2.05 CONCRETE DESIGN REQUIREMENTS

A. Mix Design:

1. General: Concrete shall be composed of cement, admixtures, aggregates and water. These materials shall be of the qualities specified. The exact proportions in which these materials are to be used for different parts of the Work will be determined during the trial batch. In general, the mix shall be designed to produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage and, where deposited in forms, to have good consolidation properties and maximum smoothness of

surface. In mix designs, the percentage of sand of the total weight of fine and coarse aggregate shall not exceed 41 for hydraulic structures or 50 for all other structures, unless noted otherwise. The aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items. The proportions shall be changed whenever necessary or desirable to meet the required results at no additional cost to the Owner. All changes shall be subject to review by the Owner's Representative.

2. Water-Cement Ratio and Compressive Strength: The minimum compressive strength and cement content of concrete shall be not less than that specified in the following table:

| Type of Work | Min. 28-Day Compressive Strength (PSI) | Max Size Aggregate (in) | Minimum Cement Per CU YD (lb) | Max W/C Ratio (by weight) |
|---|---|---|---|---|
| StructuralConcrete: | | | | |
| Normal weight reinforced concrete (145 pcf) | 5,000 | 3/4 | 658 | 0.45 |
| Lean Concrete | 4,500 | 3/4 | 611 | 0.45 |

NOTE: The Contractor is cautioned that the limiting parameters specified above are not a mix design. Additional cement or water-reducing agent may be required to achieve workability demanded by the Contractor's construction methods and aggregates. The Contractor is responsible for any costs associated with furnishing concrete with the required workability.

3. Adjustments to Mix Design: The mixes used shall be changed whenever such chance is necessary or desirable to secure the required strength, density, workability, and surface finish and the Contractor shall be entitled to no additional compensation because of such changes.

B. Consistency:

1. The quantity of water entering into a batch of concrete shall be just sufficient, with a normal mixing period, to produce a concrete which can be worked properly into place without segregation, and which can be compacted by the vibratory methods herein specified to give the desired density, impermeability and smoothness of surface. The quantity of water shall be changed as necessary, with variations in the nature or moisture content of the aggregates, to maintain uniform production of a desired consistency. The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143. The slumps shall be as follows:

| Part of Work | Slump (in) |
|---|---|
| All concrete, unless noted otherwise | 4 inches + 1/2-inch |
| With high range water reducer added | 5 inches + 1/2-inch |

C. Trial Batch and Laboratory Tests:

1. Before placing any concrete, a testing laboratory approved by the Owner's Representative or Resident Project Representative will prepare a trial batch of each class of structural concrete, based on the preliminary concrete mixes submitted by the Contractor. During the trial batch the aggregate proportions may be adjusted by the testing laboratory using the two coarse aggregate size ranges to obtain the required properties. If one size range produces an acceptable mix, a second size range need not be used. Such adjustments shall be considered refinements to the mix design and shall not be the basis for extra compensation to the Contractor. All concrete shall conform to the requirements of this Section, whether the aggregate proportions are from the Contractor's preliminary mix design, or whether the proportions have been adjusted during the trial batch process. The trial batch will be prepared using the aggregates, cement and admixture proposed for the project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain 3 drying shrinkage, and six compression test specimens from each batch. The cost, of not more than three laboratory trial batch tests for each

specified concrete strength will be borne by the Contractor. The Contractor shall furnish and deliver the materials in steel drums to the approved testing laboratory. Any additional trial batch testing required shall be performed by the testing laboratory at no additional cost to the Owner.

2. The determination of compressive strength will be made by testing 6-inch diameter by 12 inch high cylinders; made, cured and tested in accordance with ASTM C 192 and ASTM C 39. Three compression test cylinders will be tested at 7 days and 3 at 28 days. The average compressive strength for the three cylinders tested at 28 days for any given trial batch shall not be less than 125 percent of the specified compressive strength.

3. A sieve analysis of the combined aggregate for each trial batch shall be performed according to the requirements of ASTM C 136. Values shall be given for percent passing each sieve.

4. In lieu of trial batch and laboratory tests specified in this Section, the Contractor may submit previously-designed, tested, and successfully-used concrete mixes, using materials similar to those intended for this project, together with a minimum of three certified test reports of the 28 day strength of the proposed concrete mix.

D. Shrinkage Limitation:

1. The maximum concrete shrinkage for specimens cast in the laboratory from the trial batch, as measured at 21 day drying age or at 28 day drying age shall be 0.036 percent or 0.042 percent, respectively. Use a mix design for construction that has first met the trial batch shrinkage requirements. Shrinkage limitations apply only to structural concrete.

2. The maximum concrete shrinkage for specimens cast in the field shall not exceed the trial batch maximum shrinkage requirement by more than 25 percent.

3. If the required shrinkage limitation is not met during construction, take any or all of the following actions, at no additional cost to the Owner for securing the specified shrinkage requirements. These actions may include changing the source of aggregates, cement and/or admixtures; reducing water content; washing of aggregate to

reduce fines; increasing the number of construction joints, modifying the curing requirements; or other actions designed to minimize shrinkage or the effects of shrinkage.

E. Measurement of Cement and Aggregate:

1. The amount of cement and of each separate size of aggregate entering into each batch of concrete shall be determined by direct weighing equipment acceptable to the Owner's Representative.

2. Weighing Tolerances:

| Material | Percent of Total Weight |
|---|---|
| Cement | 1 |
| Aggregates | 3 |
| Admixtures | 3 |

F. Measurement of Water:

1. The quantity of water entering the mixer shall be measured by a suitable water meter or other measuring device of a type acceptable to the Owner's Representative or Resident Project Representative and capable of measuring the water in variable amounts within a tolerance of one percent. The water feed control mechanism shall be capable of being locked in position so as to deliver constantly any specified amount of water to each batch of concrete. A positive quick-acting valve shall be used for a cut-off in the water line to the mixer. The operating mechanism must be such that leakage will not occur when the valves are closed.

## 2.06 READY-MIXED CONCRETE

A. At the Contractor's option, ready-mixed concrete may be used meeting the requirements as to materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94, including the following supplementary requirements.

B. Ready-mixed concrete shall be delivered to the site of the Work, and discharge shall be completed within one and one-half hour (90 minutes) after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever is first.

C. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.

D. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolution of mixing.

E. Truck mixers and their operation shall be such that the concrete throughout the mixed batch as discharged is within acceptable limits of uniformity with respect to consistency, mix, and grading. If slump tests taken at approximately the one-quarter (1/4) and three-quarter (3/4) points of the load during discharge give slumps differing by more than one inch (1") when the specified slump is 3 inches or less, or if they differ by more than 2 inches when the specified slump is more than 3 inches, the mixer shall not be used on the Work unless the causing condition is corrected and satisfactory performance is verified by additional slump tests. All mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.

F. Each batch of ready-mixed concrete delivered at the job site shall be accompanied by a delivery ticket furnished to the Owner's Representative or Resident Project Representative in accordance with Subsection 03300-1.04B.

G. The use of nonagitating equipment for transporting ready-mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the Owner's Representative.

2.07 <u>FLOOR HARDENER (SURFACE APPLIED)</u>

A. Surface hardener shall be a light reflective nonoxidizing metallic aggregate dry shake surface hardener.

1. Surface hardener shall be premeasured, premixed and packaged at the factory.

2. Apply surface hardener at the rate of 1.8 to 2.5 lb per square foot.

3. Surface hardener shall be Alumiplate@, by Master Builders, Inc., or equal.

B. Curing Compound shall meet the moisture retention requirements of ASTM C 309 and surface hardener manufacturer's recommendations.

C. Monomolecular Film: Evaporation retarder shall be used to aid in maintaining concrete moisture during the early placement stages of plastic concrete. Evaporation retarder shall be as recommended by surface hardener manufacturer.

2.08 NSF / ANSI STANDARD 61

A. All cementitious material, admixtures, curing compounds, and other industrial produced materials used in concrete, or for curing or repairing of concrete, that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.

PART 3 - EXECUTION

3.01 PROPORTIONING AND MIXING

A. Proportioning: Proportioning of the concrete mix shall conform to the requirements of Chapter 3, "Proportioning" of ACI 301.

B. Mixing: Mixing of concrete shall conform to the requirements of Chapter 7 of said ACI 301 Specifications.

C. Slump: Maximum slumps shall be as specified herein.

D. Retempering: Retempering of concrete or mortar which has partially hardened shall not be permitted.

3.02 PREPARATION OF SURFACES FOR CONCRETING

A. General: Earth surfaces shall be thoroughly wetted by sprinkling, before the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.

B. Joints in Concrete: Concrete surfaces upon or against which concrete is to be placed, where the placement of the concrete has been stopped or interrupted so that, as determined by the Owner's Representative, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bond. The joint surfaces shall be cleaned of all laitance, loose or defective concrete, foreign material, and roughened to a minimum of ¼ inch amplitude. Such cleaning and roughening shall be accomplished by hydroblasting or sandblasting (exposing aggregate) followed by thorough washing. All pools of water shall be removed from the surface of construction joints, and the joint surface shall be coated with an epoxy-bonding agent, unless indicated otherwise, before the new concrete is placed.

C. Placing Interruptions: When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means, that will secure proper union with subsequent Work; provided that construction joints shall be made only where acceptable to the Owner's Representative.

D. Embedded Items: No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and accepted by the Owner's Representative or Resident Project Representative at least 4 hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.

E. All inserts or other embedded items shall conform to the requirements herein.

F. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where illustrated on the Plans or by approved shop drawings and shall be acceptable to the Owner's Representative or Resident Project Representative before

any concrete is placed. Accuracy of placement is the responsibility of the Contractor.

G. Casting New Concrete Against Old: Where concrete is to be cast against old concrete (any concrete which is greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by hydroblasting or sandblasting (exposing aggregate). The joint surface shall be coated with an epoxy bonding agent unless indicated otherwise by the Owner's Representative.

H. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the Work. No concrete shall be deposited underwater nor shall the Contractor allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, will be subject to the review of the Owner's Representative.

I. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported before placement of concrete that there will be a minimum of 2 inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.

J. Openings for pipes, inserts for pipe hangars and brackets, and the setting of anchors shall, where practicable, be provided for during the placing of concrete.

K. Anchor bolts shall be accurately set, and shall be maintained in position by templates while embedded in concrete.

L. Cleaning: The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

## 3.03 HANDLING, TRANSPORTING AND PLACING

A. General: Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section. No aluminum materials shall be used in conveying any concrete.

B. Nonconforming Work or Materials: Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced at no additional expense to the Owner.

C. Unauthorized Placement: No concrete shall be placed except in the presence of duly authorized representative of the Owner's Representative. The Contractor shall notify the Owner's Representative or Resident Project Representative in writing at least 48 hours in advance of placement of any concrete.

D. Placement in Wall Forms: Concrete shall not be dropped through reinforcement steel or into any deep form, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, some means such as the use of hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete exceed 4 feet below the ends of ducts, chutes, or buggies. Concrete shall be uniformly distributed during the process of depositing and in no case after depositing shall any portion be displaced in the forms more than 6 feet in horizontal direction. Concrete in forms shall be deposited in uniform horizontal layers not deeper than 2 feet; and care shall be taken to avoid inclined layers or inclined construction joints except where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in forms shall not exceed 5 feet of vertical rise per hour. Sufficient illumination shall be provided in the interior of all forms so that the concrete at the places of deposit is visible from the deck or runway.

E. Conveyor Belts and Chutes: All ends of chutes, hopper gates, and all other points of concrete discharge throughout the Contractor's conveying, hoisting and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the Owner's Representative. Chutes longer than 50 feet will not be permitted. Minimum slopes

of chutes shall be such that concrete of the specified consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered.

F. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slap to the top, for the full width of the placement. As the Work progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.

G. Temperature of Concrete: The temperature of concrete when it is being placed shall be not more than 90°*F* nor less than 55°*F* for sections less than 12 inches thick nor less than 50°*F* for all other sections. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. When the temperature of the concrete is 85°*F* or above, the time between the introduction of the cement to the aggregates and discharge at the Siteshall not exceed 45 minutes. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90°*F*, the Contractor shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90°*F*. The Contractor shall be entitled to no additional compensation on account of the foregoing requirements.

H. Cold Weather Placement:

1. Placement of concrete shall conform to ACI 306.1 - Standard Specification for Cold Weather Concreting, and the following.

2. Remove all snow, ice and frost from the surfaces, including reinforcement, against which concrete is to be placed. Before beginning concrete placement, thaw the subgrade to a minimum depth of 6 inches. All reinforcement and embedded items shall be warmed to above 32°*F* before concrete placement.

3. Maintain the concrete temperature above 50°*F* for at least 3 days after placement.

I. Hot Weather Placement:

1. Placement of concrete shall conform to ACI 305R - Hot Weather Concreting, and the following.

2. Only set retarding admixture shall be used in concrete when air temperature is expected to be consistently over 80°*F*.

3. The maximum temperature of concrete shall not exceed 90°*F* immediately before placement.

4. From the initial placement to the curing state, concrete shall be protected from the adverse effect of high temperature, low humidity, and wind.

3.04 PUMPING OF CONCRETE

A. General: If the pumped concrete does not produce satisfactory end results, discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

B. Pumping Equipment: The pumping equipment must have two (2) cylinders and be designed to operate with one (1) cylinder only in case the other one is not functioning. In lieu of this requirement, the Contractor shall maintain a standby pump on the site during pumping.

C. The minimum diameter of the hose (conduits) shall be in accordance with ACI 304.2R.

D. Pumping equipment and hoses (conduits) that are not functioning properly, shall be replaced.

E. Aluminum conduits for conveying the concrete shall not be permitted.

F. Field Control: Concrete samples for slump, air content, and test cylinders will be taken at the placement (discharge) end of the line.

3.05 ORDER OF PLACING CONCRETE

A. The order of placing concrete in all parts of the Work shall be acceptable to the Owner's Representative. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints. The placing of units shall be accomplished by placing alternate units in a manner such that each unit placed shall have cured at least 7 days for hydraulic structures

and 3 days for all other structures before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the two (2) adjacent wall panels have cured at least 14 days for hydraulic structures and 7 days for all other structures.

B. The surface of the concrete shall be level whenever a run of concrete is stopped. To ensure a level, straight joint on the exposed surface of walls, a wood strip at least ¾ inch thick shall be tacked to the forms on these surfaces. The concrete shall be carried about ½ inch above the underside of the strip. About one (1) hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel and all laitance shall be removed.

## 3.06 TAMPING AND VIBRATING

A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be Group 3 (per ACI 309) high speed power vibrators (8,000 to 12,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required. Group 2 vibrators may be used only at specific locations when accepted by the Owner's Representative.

B. Care shall be exercised in placing concrete around waterstops. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that all air and rock pockets have been eliminated. Concrete surrounding the waterstops shall be given additional vibration, over and above that used for adjacent concrete placement to assure complete embedment of the waterstops in the concrete.

C. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to

accomplish the results herein specified within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.07 FINISHING CONCRETE SURFACES

A. General: Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions shown are defined as tolerances and are specified in Part 1, herein. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.

B. Formed Surfaces: No treatment is required after form removal except for curing, repair or defective concrete, and treatment of surface defects. Where architectural finish is required, it shall be as specified or as shown.

1. Surface holes larger than ½ inch in diameter or deeper than ¼ inch are defined as surface defects in basins and exposed walls.

C. Unformed Surfaces: After proper and adequate vibration and tamping, all unformed top surfaces of slabs, floors, walls, and curbs shall be brought to a uniform surface with suitable tools. Immediately after the concrete has been screeded, it shall be treated with a liquid evaporation retardant. The retardant shall be used again after each Work operation as necessary to prevent drying shrinkage cracks. The classes of finish specified for unformed concrete surfaces are designated and defined as follows:

1. FINISH U1 - Sufficient leveling and screeding to produce an even, uniform surface with surface irregularities not to exceed 3/8-inch. No further special finish is required.

2. FINISH U2 - After sufficient stiffening of the screeded concrete, surfaces shall be float finished with wood or metal floats or with a finishing machine using float blades. Excessive floating of surfaces while the concrete is plastic and dusting of dry cement and sand on the concrete surface to absorb excess moisture will not be permitted. Floating shall be the minimum necessary to produce a surface that is

free from screed marks and is uniform in texture. Surface irregularities shall not exceed 1/4-inch. Joints and edges shall be tooled where shown or as determined by the Owner's Representative.

3. FINISH U3 - After the floated surface (as specified for Finish U2) has hardened sufficiently to prevent excess of fine material from being drawn to the surface, steel troweling shall be performed with firm pressure such as will flatten the sandy texture of the floated surface and produce a dense, uniform surface free from blemishes, ripples, and trowel marks. The finish shall be smooth and free of all irregularities.

4. FINISH U4 - Steel trowel finish (as specified for Finish U3) without local depressions or high points. In addition, the surface shall be given a light hairbroom finish with brooming perpendicular to drainage unless otherwise shown. The resulting surface shall be rough enough to provide a nonskid finish.

D. Unformed surfaces shall be finished according to the following schedule:

UNFORMED SURFACE FINISH SCHEDULE

| Area | Finish |
|---|---|
| Grade slabs and foundations to be covered with concrete or fill material | U1 |
| Floors to be covered with grouted tile or topping grout | U2 |
| Slabs which are water bearing with slopes 10 percent and less | U4 |
| Sloping slabs which are water bearing with slopes greater than 10 percent | U4 |
| Slabs not water bearing | U4 |
| Slabs to be covered with built-up roofing | U2 |
| Interior slabs and floors to receive architectural finish | U3 |

Top surface of walls U4

E. Floor Hardener (Surface Applied) - Required

1. Provide concrete with the following additional requirements:

   a) Maximum slump of 4 inches when peak ambient temperatures are expected to be more than 65°*F*, and no more than 3 inches when ambient temperatures are below 65°*F*.

   b) Maximum air content of 3 percent.

   c) Do not use calcium chloride or set-accelerating admixtures containing calcium chloride.

   d) Do not use admixtures that increase bleeding.

   e) Do not use fly ash.

2. After the concrete has been leveled and as soon as the concrete will support an operator and machine without disturbing the level or working up excessive fines, float the surface of the slab with a mechanical float fitted with float shoes. Following floating, apply 1/2 to 2/3 of the total amount of dry shake surface hardener so that a uniform distribution of surface hardener is obtained. The use of a mechanical spreader is recommended. Once the shake has absorbed sufficient moisture (indicated by the darkening of the shake), float the surface. Immediately apply the remaining 1/3 to 1/2 of the shake and allow to absorb moisture. Do not place dry shake on concrete surface when bleed water is present.

3. Use finishing machines with detachable float shoes. Compact surface by a third mechanical floating if time and setting characteristics of the concrete will allow. Do not add water to the surface.

4. As surface further stiffens, indicated by loss of sheen, hand or mechanically trowel with blades set relatively flat. Remove all marks and pinholes in the final raised trowel operation.

5. Follow all application instructions of the floor surface hardener manufacturer.

6. Cure finished floors using fill-forming curing compound recommended by surface hardener manufacturer. Uniformly apply curing compound over the entire surface at a coverage that will provide moisture retention in excess of the requirements of ASTM C 309. Maintain ambient temperature of 50°*F* or above during the curing period.

7. Keep floors covered and free of traffic and loads for a minimum of 14 days after completion.

3.08 ARCHITECTURAL FINISH

A. General: Architectural finishes shall be required only where specifically called out on the Plans. In all other cases, the paragraph above, entitled "Finishing Concrete Surfaces", shall apply.

1. Immediately after the forms have been stripped, the concrete surface shall be inspected and any poor joints, voids, rock pockets, or other defective areas shall be repaired and all form-tie holes filled as indicated herein.

2. Architectural finishes shall not be applied until the concrete surface has been repaired as required and the concrete has cured at least 14 days.

3. All architecturally treated concrete surfaces shall conform to the accepted sample required herein in texture, color, and quality. It shall be the Contractor's responsibility to maintain and protect the concrete finish.

B. Smooth Concrete Finish:

1. The concrete surface shall be wetted, and a grout shall be applied with a brush. The grout shall be prepared by mixing one (1) part Portland Cement and one (1) part of fine sand that will pass a No. 16 sieve with sufficient water to give it the consistency of thick paint. The cement used in said grout shall be 1/2 gray and 1/2 white Portland Cement, as determined by the Owner's Representative. White Portland Cement shall be Atlas White or equal. Calcium chloride in the amount of 5 percent by volume of the cement shall be used in the brush coat. The freshly applied grout shall be

vigorously rubbed into the concrete surface with a wood float filling all small air holes. After all surface grout had been removed with a steel trowel, the surface shall be allowed to dry and, when dry, shall be vigorously rubbed with burlap to remove completely all surface grout so that there is no visible paint-like film of grout on the concrete. The entire cleaning operation for any area shall be completed the day it is started, and no grout shall be left on the surface overnight.

2. Cleaning operations for any given day shall be terminated at panel joints. It is essential that the various operations be carefully timed to secure the desired effect which is a light-colored concrete surface of uniform color and texture without any appearance of a point or grout film.

3. In the event that improper manipulation results in an inferior finish, rub such inferior areas with carborundum bricks.

4. Before beginning any of the final treatment on exposed surfaces, treat in a satisfactory manner a trial area of at least 200 square feet in some inconspicuous place selected by the Owner's Representative or Resident Project Representative and preserve said trial area undisturbed until the completion of the job.

C. Sandblasted Concrete Finish:

1. Sandblasting shall be done in a safe manner acceptable to local authorities and per OSHA requirements. The sandblasting shall be a light sandblast to remove laitance and to produce a uniform fine aggregate surface texture with approximately 1/32 to 1/16 inch of surface sandblasted off. Corners, patches, form panel joints, and soft spots shall be sandblasted with care.

2. A 3 square foot sample panel of the sandblasted finish shall be provided by the Contractor for acceptance by the Owner's Representative or Resident Project Representative before staring the sandblasting Work. The sample panel shall include a corner, plugs, and joints and shall be marked after approval. All other sandblasting shall be equal in finish to the sample panel.

3. Protection against sandblasting shall be provided on all surfaces and materials not requiring sandblasting but within or adjacent to areas being sandblasted. After sandblasting,

the concrete surfaces shall be washed with clean water and excess sand removed.

## 3.09 CURING AND DAMP-PROOFING

A. General: All concrete shall be cured for not less than 14 days after placing, in accordance with the methods specified herein for the different parts of the Work, and described in detail in the following paragraphs:

| Surface To Be Cured or Damp-proofed | Method |
|---|---|
| Unstripped forms | 1 |
| Wall sections with forms removed | 6 |
| Construction joints between footings and walls, and between floor slab and columns | 2 |
| Encasement concrete and thrust blocks | 3 |
| All concrete surfaces not specifically provided for elsewhere in this Paragraph | 6 |
| Floor slabs on grade | 6 |
| Slabs not on grade | 6 |

B. Method 1: Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removed. If steel forms are used the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within 14 days of placing the concrete, curing shall be continued in accordance with Method 6, herein.

C. Method 2: The surface shall be covered with burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been placed. No curing compound shall be applied to surfaces cured under Method 2.

D. Method 3: The surface shall be covered with moist earth not less than 4 hours, nor more than 24 hours, after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least 7 days after placement of concrete.

E. Method 4: The surface shall be sprayed with a liquid curing compound.

1. It shall be applied in accordance with the manufacturer's printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film which will seal thoroughly.

2. Where the curing compound method is used, care shall be exercised to avoid damage to the seal during the curing period. Should the seal be damaged or broken before the expiration of the curing period, the break shall be repaired immediately by the new application of additional curing compound over the damaged portion.

3. Wherever curing compound may have been applied by mistake to surfaces against which concrete subsequently is to be placed and to which it is to adhere, said compound shall be entirely removed by wet sandblasting just before the placing of new concrete.

4. Where curing compound is specified, it shall be applied as soon as the concrete has hardened enough to prevent marring on unformed surfaces, and within 2 hours after removal of forms from contact with formed surfaces. Repairs required to be made to formed surfaces shall be made within the said 2 hour period; provided, however, that any such repairs which cannot be made within the said 2 hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound, following which repairs shall be made as specified herein.

5. At all locations where concrete is placed adjacent to a panel which has been coated with curing compound, the previously coated panel shall have curing compound reapplied to an area within 6 feet of the joint and to any other location where the curing membrane has been disturbed.

6. Before final acceptance of the Work, all visible traces of curing compound shall be removed from all surfaces in such a manner that does not damage surface finish.

F. Method 5:

1. Until the concrete surface is covered with curing compound, the entire surface shall be kept damp by applying water using nozzles that atomize the flow so that the surface is not marred or washed. The concrete shall be given a coat of curing compound in accordance with Method 4, herein. Not less than 1 hour nor more than 4 hours after the coat of curing compound has been applied, the surface shall be wetted with water delivered through a fog nozzle, and concrete-curing blankets shall be placed on the slabs. The curing blankets shall be polyethylene sheet, polyethylene-coated waterproof paper sheeting or polyethylene-coated burlap. The blankets shall be laid with the edges butted together and with the joints between strips sealed with 2 inch wide strips of sealing tape or with edges lapped not less than 3 inches and fastened together with a waterproof cement to form a continuous watertight joint.

2. The curing blankets shall be left in place during the 14 day curing period and shall not be removed until after concrete for adjacent Work has been placed. Should the curing blankets become torn or otherwise ineffective, replace damaged sections. During the first 3 days of the curing period, no traffic of any nature and no depositing, temporary or otherwise, of any materials shall be permitted on the curing blankets. During the remainder of the curing period, foot traffic and temporary depositing of materials that impose light pressure will be permitted only on top of plywood sheets 5/8 inch minimum thickness, laid over the curing blanket. Add water under the curing blanket as often as necessary to maintain damp concrete surfaces at all times.

G. Method 6: This method applies to both walls and slabs.

1. The concrete shall be kept continuously wet by the application of water for a minimum period of at least 14 consecutive days, beginning immediately after the concrete has reached final set or forms have been removed or until the concrete surface is covered with the curing medium. The entire surface shall be kept damp by applying water using nozzles that atomize the flow so that the surface is not marred or washed.

2. Heavy curing mats shall be used as a curing medium to retain the moisture during the curing period. The curing

medium shall be weighted or otherwise held in place to prevent being dislodged by wind or any other causes and to be substantially in contact with the concrete surface. All edges shall be continuously held in place.

3. The curing blankets and concrete shall be kept continuously wet by the use of sprinklers or other means both during and after normal working hours. The concrete shall be maintained in a cool condition from the heat of hydration and the solar heat of the sun.

4. Immediately after the application of water has terminated at the end of the curing period, the curing medium shall be removed, any dry spots shall be rewetted, and curing compound shall be immediately applied in accordance with Method 4, herein.

5. Dispose of excess water from the curing operation to avoid damage to the Work.

H. Damp-proofing: The exterior surface of all buried roof slabs shall be damp-proofed as follows:

1. Immediately after completion of curing the surface shall be sprayed with a damp-proofing agent consisting of an asphalt emulsion. Application shall be in two (2) coats. The first coat shall be diluted to 1/2 strength by the addition of water and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon of dilute solution. The second coat shall consist of an application of the specified material, undiluted, and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon. Damp-proofing material shall be as specified herein.

2. As soon as the asphalt emulsion, applied as specified herein, has taken an initial set, the entire area thus coated shall be coated with whitewash. Any formula for mixing the whitewash may be used which produces a uniformly coated white surface and which so remains until placing of the backfill. Should the whitewash fail to remain on the surface until the backfill is placed, apply additional whitewash.

## 3.10 PROTECTION

A. Protect all concrete against injury until final acceptance by the Owner.

B. Fresh concrete shall be protected from damage due to rain, hail, sleet, or snow. Provide such protection while the concrete is still plastic and whenever such precipitation is imminent or occurring.

## 3.11 CURING IN COLD WEATHER

A. Water curing of concrete may be reduced to 6 days during periods when the mean daily temperature in the vicinity of the worksite is less than 40°*F*; provided that, during the prescribed period of water curing, when temperatures are such that concrete surfaces may freeze, water curing shall be temporarily discontinued.

B. Concrete cured by an application of curing compound will require no additional protection from freezing if the protection at 50°*F* for 72 hours is obtained by means of approved insulation in contact with the forms or concrete surfaces; otherwise the concrete shall be protected against freezing temperatures for 72 hours immediately following 72 hours protection at 50°*F*. Concrete cured by water curing shall be protected against freezing temperatures for 3 days immediately following the 72 hours of protection at 50°*F.*

C. Discontinuance of protection against freezing temperatures shall be such that the drop in temperature of any portion of the concrete will be gradual and will not exceed 40°*F* in 24 hours. In the spring, when the mean daily temperature rises above 40°*F* for more than 3 successive days, the specified 72 hour protection at a temperature not lower than 50°*F* may be discontinued for as long as the mean daily temperature remains above 40°*F;* provided, that the concrete shall be protected against freezing temperatures for not less than 48 hours after placement.

D. Where artificial heat is employed, special care shall be taken to prevent the concrete from drying. Use of unvented heaters will be permitted only when unformed surfaces of concrete adjacent to the heaters are protected for the first 24 hours from an excessive carbon dioxide atmosphere by application of curing compound; provided, that the use of curing compound for such surfaces is otherwise permitted by these Specifications.

## 3.12 TREATMENT OF SURFACE DEFECTS

A. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of

surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the Owner's Representative. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. All repairs and replacements herein specified shall be promptly executed by the Contractor at its own expense.

B. Defective surfaces to be repaired shall be cut back from trueline in a minimum depth of ½ inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32 inch depth of the surface film from all hard portions, by means of an efficient sandblast. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar so that while the repair material is being applied, the surfaces under repair will remain moist, but not so wet as to overcome the suction upon which a good bond depends. The material used for repair proposed shall consist of a mixture of 1 sack of cement to 3 cubic feet of sand. For exposed walls, the cement shall contain such a proportion of Atlas White Portland Cement as is required to make the color of the patch match the color of the surrounding concrete.

C. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with dry-packed cement grout. Holes left by form-tying devices having a rectangular cross-section, and other imperfections having a depth greater than their least surface dimension, shall not be reamed but shall be repaired in an approved manner with dry-packed cement grout.

D. All repairs shall be built up and shaped in such a manner that the completed Work will conform to the requirements of this Section, as applicable, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

E. Before filling any structure with water, all cracks that may have developed shall be "vee'd" and filled with construction joint sealant for water-bearing structures conforming to the materials and

methods specified in Section 03290 - Joints in Concrete Structures. This repair method shall be accomplished on the water bearing face of members. Before backfilling, faces of members in contact with fill, which are not covered with a waterproofing membrane, shall also have cracks repaired as specified herein.

3.13 PATCHING HOLES IN CONCRETE

A. Patching Small Holes:

1. Holes which are less than 12 inches in their least dimension and extend completely through concrete members, shall be filled as specified herein.

2. Small holes in members which are water-bearing or in contact with soil or other fill materials, shall be filled with nonshrink grout. Where a face of the member is exposed to view, the nonshrink grout shall be held back 2 inches from the finished surface. The remaining 2 inches shall then be patched according to the paragraph in Part 3 entitled - Treatment of Surface Defects.

3. Small holes through all other concrete members shall be filled with nonshrink grout, with exposed faces treated as above.

B. Patching Large Holes:

1. Holes which are larger than 12 inches in their least dimension, shall have a keyway chipped into the edge of the opening all around, unless a formed keyway exists. The holes shall then be filled with concrete as specified.

2. Holes which are larger than 24 inches in their least dimension and which do not have reinforcing steel extending from the existing concrete, shall have reinforcing steel set in grout in drilled holes. The reinforcing added shall match the reinforcing in the existing wall unless required otherwise by the Improvement Plans or approved shop drawings.

3. Large holes in members which are water bearing or in contact with soil or other fill, shall have a bentonite type waterstop material placed around the perimeter of the hole as specified in the Section 03290 - Joints in Concrete Structures, unless there is an existing waterstop in place.

## 3.14 CARE AND REPAIR OF CONCRETE

A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time before the final acceptance of the completed Work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the Contractor's expense.

**END OF SECTION 03300**

# SECTION 03315 - GROUT

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. The Contractor shall provide grout in accordance with the Contract Documents.

B. The following types of grout shall be covered in this Section:

1. Cement Grout

2. Packaged Grout

A. Nonshrink Grout: This type of grout is to be used wherever grout is illustrated in the Contract Documents unless another type is specifically referenced.

B. Epoxy Grout

C. Pump and Motor Grout

3. Topping Grout and Concrete Fill

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. The Work of the following Sections apply to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.

1. Section 03300 - Cast-in-Place Concrete.

### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

1. CRD-C 621 Corps of Engineers Specification for Non-Shrink Grout

B. National Sanitation Foundation

1. NSF / ANSI 61: Drinking Water System Components – Health Effects

C. ASTM Standard in Building Codes:

1. ASTM C 109: Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in or 50-mm Cube Specimens)

2. ASTM C 531: Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts, and Monolithic Surfacings

3. ASTM C 579: Test Methods for Compressive Strength of Chemical Resistant Mortars, Grouts, and Monolithic Surfacings

4. ASTM C 827: Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixture

5. ASTM C 881: Specification for Epoxy-Resin-Base Bonding System for Concrete

6. ASTM C 882: Standard Test for Bond Strength of Epoxy-Resin Systems Used with Concrete

7. ASTM C 884: Standard Test Method for Thermal Compatibility between Concrete and an Epoxy-Resin Overlay

8. ASTM D 638: Standard Test Methods for Tensile Properties of Plastics

9. ASTM D 696: Test Method for Coefficient of Linear Thermal Expansion of Plastics

10. ASTM D 2471: Standard Test Methods for Gel Time and Peak Exothermic Temperature of Reacting Thermosetting Resins

1.04 CONTRACTOR SUBMITTALS

A. The Contractor shall submit certified test results verifying the compressive strength, shrinkage, and expansion requirements indicated herein; and manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of nonshrink and

epoxy grout used in the Work in accordance with the requirements of the Specification Section 01330 – Submittals/Shop Drawings.

1.05 QUALITY ASSURANCE

A. Field Tests:

1. Compression test specimens will be taken during construction from the first placement of each type of grout, and at intervals thereafter as selected by the Owner's Representative to ensure continued compliance with these Specifications. The specimens will be prepared by a Geotechnical Consultant/Laboratory to be compensated by the Contractor. The Owner's Representative shall approve the Geotechnical Consultant/Laboratory firm.

2. Compression tests and fabrication of specimens for cement grout and nonshrink grout shall be performed as specified in ASTM C 109 at intervals during construction as determined by the Owner's Representative. A set of three (3) specimens will be prepared for testing at 7 days, 28 days, and each additional time period as appropriate. The Contractor shall bear the expenses related to this item.

3. Compression tests and fabrication of specimens for epoxy grout shall be performed as specified in ASTM C 579, Method B, at intervals during construction as determined by the Owner's Representative. A set of three (3) specimens will be prepared for testing at 7 days, and each earlier time period as appropriate. The Contractor shall bear the expenses relative to this item.

4. Placed grout, which fails to meet the requirements of these Specifications, is subject to removal and replacement at no additional cost to the Owner.

5. The cost of all laboratory tests on grout will be borne by the Contractor. The Contractor shall assist the approved Geotechnical Consultant/Laboratory Firm in obtaining specimens for testing. The Contractor shall also be responsible, without additional cost to the Owner, for additional tests and investigation on work performed which is non-compliant with the Specifications. The Geotechnical Consultant/Laboratory Firm shall supply all materials necessary for fabricating the test specimens.

B. Construction Tolerances: Construction tolerances shall be as specified in the Section 03300 - Cast-in-Place Concrete, except as modified herein or elsewhere in the Contract Documents.

## PART 2 - PRODUCTS

### 2.01 CEMENT GROUT

A. Cement Grout: Cement grout shall be composed of one part cement, three parts sand, and the minimum amount of water necessary to obtain the desired consistency. Where needed to match the color of adjacent concrete, white Portland Cement shall be blended with regular cement as needed. The minimum compressive strength at 28 days shall be 5,000 PSI.

B. Cement grout materials shall be as specified in Section 03300 - Cast-in-Place Concrete.

### 2.02 PREPACKAGED GROUTS

A. Nonshrink Grout:

1. Nonshrink grout shall be a prepackaged, inorganic, nongas-liberating, nonmetallic, cement-based grout requiring only the addition of water. The manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of nonshrink grout indicated herein shall be that recommended by the manufacturer for the particular application.

2. Class A nonshrink grouts shall have a minimum 28 day compressive strength of 6,000 PSI; shall have no shrinkage (0.0 percent) and a maximum 4.0 percent expansion in the plastic state when tested in accordance with ASTM C 827; and shall have no shrinkage (0.0 percent) and a maximum of 0.2 percent expansion in the hardened state when tested in accordance with CRD-C 621.

3. Class B nonshrink grouts shall have a minimum 28-day compressive strength of 5,000 PSI and shall meet the requirements of CRD-C 621.

4. Application:

a) Class A nonshrink grout shall be used for the repair of all holes and defects in concrete members which are water bearing or in contact with soil or other fill material, grouting under all equipment base plates, and at all locations where grout is indicated; except, for the applications of Class B nonshrink grout and epoxy grout indicated herein. Class A nonshrink grout may be used in place of Class B nonshrink grout for all applications.

b) Class B nonshrink grout shall be used for the repair of all holes and defects in concrete members which are not water bearing and not in contact with soil or other fill material, grouting under all base plates for structural steel members, and grouting railing posts in place.

B. Epoxy Grout:

1. Epoxy grout shall be a pourable, nonshrink, 100 percent solids system. The epoxy grout system shall have three components: resin, hardener, and specially blended aggregate, all premeasured and prepackaged. The resin component shall not contain any nonreactive diluents. Resins containing butyl glycidyl either (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. Manufacturer's instructions shall be printed on each container in which the materials are packaged. Epoxy grout shall be BurkEpoxy Anchoring Grout by The Burke Company, Sika or an approved equal.

2. The chemical formulation of the epoxy grout shall be that recommended by the manufacturer for the particular application.

3. The mixed epoxy grout system shall have a minimum working life of 45 minutes at 75°*F*.

4. The epoxy grout shall develop a compressive strength of 5,000 PSI in 24 hours and 10,000 PSI in 7 days when tested in accordance with ASTM C 579, Method B. There shall be

no shrinkage (0.0 percent) and a maximum 4.0 percent expansion when tested in accordance with ASTM C 827.

5. The epoxy grout shall exhibit a minimum effective bearing area of 95 percent. This shall be determined by a test consisting of filling a 2 inch diameter by 4 inch high metal cylinder mold covered with a glass plate coated with a release agent. A weight shall be placed on the glass plate. At 24 hours after casting, the weight and plate shall be removed and the void area in the plate measured. The surface of the grout shall be probed with a sharp instrument to locate all voids.

6. The peak exotherm of a 2-inch diameter by 4 inch high cylinder shall not exceed 95°*F* when tested with 75°*F* material at laboratory temperature. The epoxy grout shall exhibit a maximum thermal coefficient of $30 \times 10^{-6}$ inches/inch/degree *F* when tested according to ASTM C 531 or ASTM D 696.

7. Application: Epoxy grout shall be used to embed all anchor bolts and reinforcing steel required to be set in grout, and for all other applications in the Contract Documents where grout type is not specifically indicated.

8. For crack repair, the Contractor shall use pressure injection epoxy grout as recommended by the manufacturer and approved by the Owner's Representative.

C. Grout for Pumps and Motors

1. Grout for pumps and motors shall be epoxy grouts meeting the following minimum requirements:

   a) Creep shall be less than 0.005 in/in when tested by ASTM C 881 method. The test shall be at 70°*F* and 140°*F* with a load of 400 PSI.

   b) Linear shrinkage shall be less than 0.080 percent and thermal expansion less than $17 \times 10^{-6}$ in/in/degree *F* when tested by ASTM C 531.

   c) The compressive strength shall be a minimum of 12,000 PSI in 7 days when tested by ASTM C 579 Method 8, modified.

d) Bond strength of grout to Portland Cement concrete shall be greater than 2,000 PSI when using ASTM C 882 test method.

e) Grout shall pass the thermal compatibility test when overlayed on Portland Cement concrete using test method ASTM C 884.

f) Tensile strength and modulus of elasticity shall be determined by ASTM D 638. The tensile strength shall not be less than 1,700 PSI and the modulus of elasticity shall not be less than $1.8 \times 10^6$ PSI.

g) Gel time and peak exothermic temperature shall be determined by ASTM D 2471. Peak exothermic temperature shall not exceed 110° *F* when a specimen 6 inches in diameter by 12 inches high is used. Gel time shall be at least 150 minutes.

h) The grout shall be suitable for supporting precision machinery subject to high impact and shock loading in industrial environments while exposed to elevated temperatures as high as 150°*F*, with a load of 2,000 PSI.

2. Primer, if required, shall conform to the written recommendations of the grout manufacturer.

3. Surface preparations shall conform to the written recommendations of the grout manufacturer.

4. <u>Placement and Curing</u>:

a) Placement and curing procedures shall be in accordance with the written recommendations of the grout manufacturer.

b) A grouting performance demonstration/training session shall be conduced by the grout manufacturer's representative prior to foundation and base plate preparation and the first grouting on site. This training session shall demonstrate proper preparation and installation methods and that the grouting material meets the strength requirements.

5. Grout shall be Escoweld, Chockfast Red Epoxy Grout as manufactured by Philadelphia Resin Corp.; Five Star DP Epoxy Grout as manufactured by Five Star Products, Inc.; or equal.

2.03 TOPPING GROUT AND CONCRETE FILL

A. Grout for topping of slabs and concrete fill for built-up surfaces of tank, channel, and basin bottoms shall be composed of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and mixed as specified herein. All materials and procedures specified for normal concrete in Section 03300 - Cast-in-Place Concrete, shall apply except as noted otherwise herein.

B. Topping grout and concrete fill shall contain a minimum of 564 pounds of cement per cubic yard with a maximum water cement ratio of 0.45. Where concrete fill is thicker than 3 inches, sitework concrete, as specified in Section 03300 - Cast-in-Place Concrete, may be used when accepted by the Owner's Representative.

C. Coarse aggregate shall be graded as follows:

| U.S. Standard Sieve Size | Percent by Weight Passing |
|---|---|
| 1/2" | 100 |
| 3/8" | 90 - 100 |
| No. 4 | 20 - 55 |
| No. 8 | 5 - 30 |
| No. 16 | 0 - 10 |
| No. 30 | 0 |

D. Final mix design shall be as determined by trial mix design under supervision of the approved testing laboratory.

E. Strength: Minimum compressive strength of topping grout and concrete fill at the end of 28 days shall be 4,000 PSI.

2.04 CURING MATERIALS

A. Curing materials shall be as specified in Section 03300 - Cast-in-Place Concrete for cement grout and as recommended by the manufacturer of prepackaged grouts.

## 2.05 MEASUREMENT OF INGREDIENTS

A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurement shall not be allowed.

B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

## 2.06 NSF / ANSI STANDARD 61

A. All cementitious material, admixtures, curing compounds, and other industrial produced materials used in concrete, or for curing or repairing of concrete, that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.

# PART 3 - EXECUTION

## 3.01 GENERAL

A. All surface preparation, curing, and protection of cement grout shall be as indicated in Section 03300 - Cast-in-Place Concrete. The finish of the grout surface shall match that of the adjacent concrete.

B. The manufacturer of Class A nonshrink grout and epoxy grout shall provide on-site technical assistance to Contractor upon request.

C. Base concrete or masonry must have attained its design strength before grout is placed, unless authorized by the Owner's Representative.

D. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as indicated herein for the particular application.

E. The slump for topping grout and concrete fill shall be adjusted to match placement and finishing conditions but shall not exceed 4 inches.

## 3.02 GROUTING PROCEDURES

A. Prepackage Grouts: All mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be accomplished according to the instructions and recommendations of the manufacturer.

B. Base Plate Grouting:

1. For base plates, the original concrete shall be blocked out or finished off a sufficient distance below the plate to provide for a minimum 1 inch thickness of grout or a thickness as indicated on the Plans.

2. After the base plate has been set in position at the proper elevation by steel wedges or double nuts on the anchor bolts, the space between the bottom of the plate and the original pour of concrete shall be filled with non-shrink-type grout. The mixture shall be of a trowelable consistency and tamped or rodded solidly into the space between the plate and the base concrete. A backing board or stop shall be provided at the back side of the space to be filled with grout. Where this method of placement is not practical or where required by the Owner's Representative, alternate grouting methods shall be submitted for acceptance by the Owner's Representative.

C. Topping Grout and Concrete Fill:

1. All mechanical, electrical, and finish Work shall be completed prior to placement of topping or concrete fill. The base slab shall be given a roughened textured surface by sandblasting or hydroblasting exposing the aggregates to ensure bonding to the base slab.

2. The minimum thickness of grout topping and concrete fill shall be one inch (1") unless otherwise specified by the Plans. Where the finished surface of concrete fill is to form an intersecting angle of less than 45° with the concrete surface it is to be placed against, a key shall be formed in the concrete surface at the intersection point. The key shall be a minimum of 3-1/2 inches wide by 1-1/2 inches deep.

3. The base slab shall be thoroughly cleaned and wetted prior to placing topping or concrete fill. No topping or concrete fill shall be placed until the slab is free from standing pools, ponds of water. A thin coat of neat Type II cement grout

shall be broomed onto the surface of the slab just before topping or concrete fill placement. The topping or concrete fill shall be compacted by rolling or tamping, brought to established grade, and floated. Grouted concrete fill for tank and basin bottoms where scraping mechanism are to be installed shall be screeded by blades attached to the revolving mechanism of the equipment in accordance with the procedures outlined by the equipment manufacturer after the grout is brought to the established grade.

4. Topping grout placed on sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement.

5. The surface shall be tested with a straight edge to detect high and low spots which shall be immediately eliminated. When the topping or concrete fill have hardened sufficiently, it shall be steel troweled to a smooth surface free from pinholes and other imperfections. An approved type of mechanical trowel may be used to assist in this operation, but the last pass over the surface shall be by hand-troweling. During finishing, no water, dry cement or mixture of dry cement and sand shall be applied to the surface.

3.03 CONSOLIDATION

A. Grout shall be placed in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

**END OF SECTION 03315**

# SECTION 05120- STRUCTURAL STEEL

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. The Contractor shall provide structural steel beams, columns, bracings, galvanizing, and appurtenances, complete, in accordance with the Contract Documents.

### 1.02 RELATED SECTIONS

A. The Work of the following Sections apply to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of the Work.

B. Related Work Specified in Other Sections:

1. Section 03200 - Reinforcement Steel.

2. Steel supports, hangars, brackets and other miscellaneous items accessory to the mechanical and electrical installations.

### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. The current edition of the Uniform Building Code (UBC) of International Conference of Building Officials (ICBO).

B. Commercial Standards (Current Edition):

| | | |
|---|---|---|
| 1. | AISC M 011 | Manual of Steel Construction for Shop and Field Welding. |
| 2. | AISC S 326 | Design, Fabrication and Erection of Structural Steel for Buildings. |
| 3. | AWS B 3.0 | Welding Procedures and Performance Qualifications. |
| 4. | AWS D 1.1 | Structural Welding Code - Steel. |
| 5. | AWS W 1 | Welding Metallurgy |

C. ASTM Standards in Building Code (Current Edition):

| | | |
|---|---|---|
| 1. | ASTM A 6 | General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use |
| 2. | ASTM A 36 | Structural Steel (Except "W" rolled shapes) |
| 3. | ASTM A 283 | Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars |
| 4. | ASTM A 325 | High Strength Bolts for Structural Steel Joints |
| 5. | ASTM A 490 | Heat-Treated Structural Steel Bolts |
| 6. | ASTM A 992 | High Strength Structural Steel ("W" rolled shapes) |
| 7. | ASTM A 500 | Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes |

1.04 CONTRACTOR SUBMITTALS

A. The Contractor shall furnish submittals to the Owner's Representative for review in accordance with the Specification Section 01330 – Submittals/Shop Drawings.

B. Shop Drawings and Erection Drawings: The shop drawings shall provide a materials and specification list, construction and fabrication details, layout and erect diagrams, and the method of anchorage to adjacent construction. The shop drawings shall give the location, type, size and extent of welding and bolted connections, and clearly distinguish between shop and field connections. Before submittal of the shop drawings, the Contractor shall coordinate the shop drawings and related trades to ensure proper mating of assemblies. All work shall conform to the approved shop drawings.

C. Test Reports: The Contractor shall furnish certified physical and chemical mill test reports for material used for structural members. All tests shall be performed in accordance with applicable ASTM Standards.

1.05 DELIVERY

A. The Fabricator shall deliver the fabricated material to the job site in the sequence as approved by the Owner's Representative.

B. All shipped material to be piece-marked for erection with metal tags or other appropriate method approved by the Owner's Representative.

C. All material shipments shall include sufficient bolts for erection, plus at least the following extra bolts:

1. Add a minimum of 5% for unfinished bolts.

D. The Owner's Representative reserves the right to inspect fabricated material at Fabricator's shop. The Owner's Representative's expenses for shop inspections shall be borne by the Contractor. In the event the Owner's Representative identifies faulty materials or workmanship in fabricated material at the Fabricator's shop, the materials shall be re-fabricated at no cost to the Owner. The Owner's Representative shall be notified at least 7 days before the shipment of material. Shipments of material shall not be delayed if the Owner's Representative does not require inspection.

E. Material damaged in shipment shall be replaced or repaired at the Contractor's expense at no additional cost to the Owner.

1.06 QUALITY ASSURANCE

A. The Contractor shall fabricate and erect structural steel work in accordance with the latest edition of AISC "Specification for the Design, Fabrication and Erection of Steel for Buildings", and "Code of Standard Practice for Steel Buildings and Bridges", except whenever there is a discrepancy between the Plans and this Section, the Plans will govern.

B. Continuous Inspections:

1. The Contractor shall perform all welding and high strength bolting of structural steel assemblies under continuous inspection of the Owner's Representative. Should such fabrication be performed in the shop of a licensed Fabricator approved by the Owner's Representative, only the field welding and high strength bolting of structural steel assemblies will be required to be performed under continuous inspection of the Owner's Representative.

2. The Contractor shall notify the Owner's Representative at least 48 hours in advance of the needed inspection.

3. The Contractor shall provide copies of inspection reports to the Owner's Representative and Building Department, if applicable.

1.07 WARRANTY

A. The Fabricator shall furnish a warranty to the Owner to replace or repair all defective material and workmanship within 18 months of shipment, or 12 months of plant startup, whichever occurs first, excluding defects due to normal usage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: All materials shall be new, sound and conform to the requirements herein. Unless otherwise indicated, structural steel shall be coated per Technical Specification - Division 9 requirements.

B. Structural Steel: Rolled shapes, plates and bars shall conform to the latest edition of the AISC "Manual of Steel Construction", and shall also conform to current ASTM Designation A 36. All "W" rolled shapes shall conform to A 992.

C. Pipe: Pipe shall conform to ASTM A 53, Grade B seamless galvanized as required, Schedule 40, except as otherwise shown on the Plans.

D. Tubes: Tubes shall conform to ASTM A 500 Grade B.

E. Welding Electrodes: The Contractor shall use steel electrodes conforming with AWS D 1.1, except that E7024 rods or electrodes shall not be used.

2.02 FABRICATION

A. Fabrication shall be in accordance with AISC S 326 and indicated requirements. All structural steel welding in off-site fabrication shops shall be continuously inspected by the Owner's Representative with the inspection cost of the Owner's

Representative to be borne by the Contractor. The continuous inspection will be waived if the work is done in a shop certified by the Council of American Building Officials (CABO), or listed by the International Conference of Building Officials (ICBO) Evaluation Services, Inc.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

A. General:

1. Structural assemblies and shop and field welding shall meet the requirements of AISC M 011 and AISC S 326.

2. Measurements and dimensions shall be verified by the Contractor at the site.

3. Bolt holes shall be 1/16 inch larger than the nominal size of bolts. Where thick metals are indicated, holes shall be sub-punched and drilled, or reamed.

4. Dissimilar metals shall be protected from galvanic corrosion by means of pressure tapes, coatings or isolators.

5. Bolts shall not be permitted to drift, and holes shall not be enlarged to correct misalignment. In the event of mismatching of holes, new materials shall be provided.

6. Structural steel completely encased in concrete shall not be galvanized or painted, and shall have a clean surface for bonding to concrete.

7. Damaged structural steel shall be replaced. Use of salvaged, reprocessed, or scrap materials shall not be permitted.

B. Welding: Welding shall be performed by operators who have been qualified by tests as prescribed by AWS-W1 Section 7, to perform the type of welding indicated. Welding shall comply with AWS Code for Arc Welding in Building Construction, Section 4, Workmanship. Electrodes shall be matching per AWS.

C. Coating: The Contractor shall coat structural steel in accordance with Technical Specification - Division 9 requirements.

## 3.02 INSPECTION

A. The Owner's Representative reserves the right to inspect all materials and workmanship covered in this Specification. However, such inspection shall not relieve the Contractor of his responsibility to furnish materials and workmanship in accordance with the Contract requirements. If inspection indicates a weld or part of the material is defective, the Contractor shall remove and replace it at the Contractor's expense.

B. Shop inspection may include, but not be limited to, the following:

1. Verification of conformance of materials with this Specification and the Plans. The limits of acceptability and repair of surface imperfections for structural steel shall be in accordance with ASTM A 6.

2. Visual and dimensional inspection of shop-fabricated structural steel members and assemblies shall be in conformance with this Specification and the Plans.

3. Verification of welding procedures, welding operations and welder and tacker certificates of qualification shall be in accordance with this Specification and AWS D 1.1.

**END OF SECTION 05120**

# SECTION 05220 - CONCRETE BOLTS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. The Contractor shall provide concrete anchor bolts, inserts, complete, in accordance with the Contract Documents. Principal items are anchor bolts placed in concrete, adhesive anchors, expansion bolts, and drilled anchors.

### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this Section of the Specifications, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.

B. The current edition of the Uniform Building Code (UBC) of International Conference of Building Officials (ICBO).

C. Federal Specifications:

1. MIL-A-907E — Antiseize Thread Compound, High Temperature

D. Commercial Standards (Current Edition):

1. American Welding Society AWS A 5 Series.
2. ANSI/AWS B 3.0 — Welding Procedure and Performance Qualifications
3. ANSI/AWS D 1.1 — Specification for Welding Code - Steel
4. ANSI/AWS D 1.3 — Specification for Welding Sheet Steel in Structure
5. AISC — American Institute of Steel Construction - Manual of Steel Construction

E. ASTM Standards in Building Codes (Current Edition):

1. ASTM A 36 — Specification for Structural Steel

| | | |
|---|---|---|
| 2. | ASTM A 123 | Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products |
| 3. | ASTM A 153 | Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware |
| 4. | ASTM A 193 | Specifications for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service |
| 5. | ASTM A 194 | Specifications for Carbon and Alloy Steel Nuts for Bolts and High Pressure and High Temperature Service |
| 6. | ASTM A 307 | Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile |
| 7. | ASTM A 320 | Specification for Alloy Steel Bolting Materials for Low-Temperature Service |
| 8. | ASTM A 563 | Specification for Carbon and Alloy Steel Nuts |

1.04 CONTRACTOR SUBMITTALS

A. Shop Drawings: Shop drawings of all concrete bolts shall be submitted to the Owner's Representative for review in accordance with the Specification Section 01330 – Submittals/Shop Drawings.

B. An International Conference of Building Officials (ICBO) report listing the ultimate load capacity in tension and shear for each size and type of adhesive and expansion concrete anchor used shall be submitted for review. The Contractor shall submit manufacturer's recommended installation instructions and procedures for all adhesive and expansion anchors for review and approval. The Contractor shall follow approved procedures during installation of concrete anchors.

C. No substitution for the indicated adhesive anchors will be considered unless accompanied with ICBO report verifying strength and material equivalency, including temperature at which load capacity is reduced to 90 percent of that determined at 75°*F*.

PART 2 - PRODUCTS

## 2.01 GENERAL REQUIREMENTS

A. Anchor Bolts: Anchor bolts shall be fabricated of materials complying with SSPWC Subsections 206-1.4.1 and 209-2.2, and as follows:

1. Steel bolts: ASTM A 307 Grade A.

2. Fabricated steel bolts: ASTM A 36.

3. Stainless steel bolts, nuts, washers: ASTM A 320, Type 316.

B. Standard Service Bolts (not Buried or Submerged): Except where otherwise indicated, all bolts, anchor bolts, and nuts shall be steel, galvanized after fabrication as indicated herein unless the bolts are for pipe fittings, transition couplings, mechanical restrained joint fittings, flanged coupling adapters or other piping or piping fittings. The bolts and hardware for these items are specified in Section 02650. Threads on galvanized bolts and nuts shall be formed with suitable taps and dies such that they retain their normal clearance after hot-dip galvanizing. Except as otherwise indicated, steel for bolts, anchor bolts and cap screws shall be in accordance with the requirements of ASTM A 307, Grade A or B, or threaded parts of ASTM A 36.

C. Buried or Submerged Bolts: Unless other corrosion-resistant bolts are indicated, all bolts, anchor bolts, nuts and washers which are buried, submerged, or below the top of the wall inside any hydraulic structure shall be Type 316 stainless steel conforming to ASTM A 193 for bolts, and to ASTM A 194 for nuts, unless the bolts are for pipe fittings, transition couplings, mechanical restrained joint fittings, flanged coupling adapters or other piping or piping fittings. The bolts and hardware for these items are specified in Section 02650. All threads on stainless steel bolts shall be protected with an antiseize lubricant suitable for submerged stainless steel bolts, to meet government specification MIL-A-907E.

1, Antiseize lubricant shall be classified as acceptable for potable water use.

2. Antiseize lubricant shall be “PURE WHITE” by Anti-Seize Technology, Franklin Park, IL, 60131; AS-470 by Dixon Ticonderoga Company, Lakehurst, NJ, 08733, or equal.

D. Bolt Requirements:

1, The bolt and nut material shall be free-cutting steel.

2. The nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads. All bolts and cap screws shall have hexagon heads, and nuts shall be Heavy Hexagon Series.

3. The length of all bolts shall be such that after joints are made up, each bolt shall extend through the entire nut, but in no case, more than ½ inch beyond the nut.

E. Adhesive Anchors: Unless otherwise indicated, all drilled, concrete or masonry anchors shall be adhesive anchors. No substitutions will be considered unless accompanied with ICBO report verifying strength and material equivalency.

1, Epoxy adhesive anchors are required for drilled anchors where exposed to weather, in submerged, wet, splash, overhead, and corrosive conditions, and for anchoring handrails, pumps, mechanical equipment, and reinforcing bars. Epoxy anchor grout shall comply with Section 03315 - Grout. Threaded rod shall be stainless steel Type 316.

2. Unless otherwise indicated, glass capsule, polyester resin adhesive anchors will be permitted in locations not indicated above, and shall be Hilti HVA, or equal. Threaded rod shall be galvanized steel.

F. Expanding-Type Anchors: Expanding-type anchors, if indicated or permitted, shall be steel expansion-type ITW Ramset/Redhead “Trubolt” anchors; McCullock Industries “Kwick-Bolt”; or equal. Lead caulking anchors will not be permitted. Size shall be as indicated. Expansion-type anchors, which are to be embedded in grout, may be steel. Nonembedded buried, or submerged anchors shall be stainless steel.

G. Powder-Driven Pins: Powder-driven pins for installation in concrete shall be heat-treated steel alloy. If the pins are not inherently sufficiently corrosion-resistant for the conditions to which they are to be exposed, they shall be protected in an acceptable manner. Pins shall have capped or threaded-heads capable of transmitting the loads the shanks are required to support.

H. Impact Anchor: Impact anchors shall be an expansion-type anchor in which a nail-type pin is driven to produce the expansive force. It shall have a zinc sleeve with a mushroom-style head and stainless steel nail pin. Anchors shall be Metal Hit Anchors, manufactured by Hilti, Inc.; Rawl Zamac Nailin, manufactured by the Rawlplug Company, or equal.

## 2.02 GALVANIZING

A. Iron and Steel: ASTM A 123, with average weight per square foot of 2.0 ounces, and not less than 1.8 ounces per square foot.

B. Ferrous Metal Hardware Items: ASTM A 153 with average coating weight of 1.3 ounces per square foot.

C. Touch-Up Material For Galvanized Coatings: Repair galvanized coatings marred or damaged during erection or fabrication by use of DRYGALV, as manufactured by the American Solder and Flux Company, Galvalloy, Galvion, Rust-Oleum 7085 Cold Galvanizing Compound, or equal, applied in accordance with the manufacturer's instructions.

## 2.03 WELDING ELECTRODES

A. Steel Electrodes: Use welding electrodes conforming with AWS D 1.1, except E7024 rods or electrodes shall not be used.

B. Aluminum Electrodes: Contingent upon alloys being welded, use only inert gas-shielded arc or resistant-welding process with filler alloys conforming to UBC Standard No. 28, Table 28-1-C. Use no process requiring a welding flux.

C. Stainless Steel Electrodes: Perform welding of stainless steel with electrodes and techniques as contained in pertinent AWS A5 series specification, and as recommended in Welded Austenitic Chromium-Nickel Stainless Steel Techniques and Properties as published by the International Nickel Company, Inc., New York, New York.

# PART 3 - EXECUTION

## 3.01 FABRICATION AND INSTALLATION REQUIREMENTS

A. Fabrication and Installation: Except as otherwise indicated, the fabrication and installation of anchor bolts shall conform to the

requirements of the American Institute of Steel Construction "Manual of Steel Construction".

B. Install adhesive expansion and drilled anchor bolts in accordance with method specified in ICBO for manufacturer product.

C. Powder-Driven Pins: Powder-driven pins shall be installed by a craftsman who is certified by the manufacturer as being qualified to install the manufacturer's pins. Pins shall be driven in one initial movement by an instantaneous force that has been carefully selected to attain the required penetration. Driven pins shall conform to the following requirements where "D" = Pin's shank diameter:

| Material Penetrated by Pin | Material's Minimum Thickness | Pin's Shank Penetration in Supporting Material | Minimum Space From Pin's CL to Edge of Penetrated Material | Minimum Pin Spacing |
|---|---|---|---|---|
| Concrete | 16D | 6D minimum | 14D | 20D |

3.02 WELDING

A. Perform all welding in accordance with the "Structural Welding Code-Steel", AWS D 1.1, and current revisions. Use only welders qualified by tests in accordance with AWS B 3.0.

3.03 GALVANIZING

A. Bolts, anchor bolts, nuts and similar threaded fasteners, after being properly cleaned, shall be galvanized in accordance with the requirements of ASTM A 153. Field repairs to galvanizing shall be made using "Galvinox", "Galvo-Weld", or equal.

3.04 INSPECTION

A. The Owner's Representative reserves the right to inspect all materials and workmanship covered in this Section. Such inspections will not relieve the Contractor's responsibility to furnish materials and workmanship in accordance with the Specifications. If inspections indicate that materials or workmanship are defective, the Contractor shall remove and replace the defective work at no additional cost to the Owner.

**END OF SECTION 05220**

# SECTION 05400 – LIGHT METAL FRAMING

## PART 1 - GENERAL

### 1.01 THE REQUIREMENT:

A. The Contractor shall furnish and construct all light metal framing and appurtenant work, complete and in accordance with the requirements of the Contract Documents.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Miscellaneous Metals – Section 05500

### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS:

A. Codes:

The Building Code, as referenced herein, shall be the Uniform Building Code (UBC), as specified in Section 01090 entitled, "Reference Standards".

B. Commercial Standards:

| | |
|---|---|
| ANSI/ASTM A 446/5/446M-83 | Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality. |
| ASTM A 570-84a | Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality. |
| ASTM C 645 | Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track) and Rigid Furring Channels for Screw Application of Gypsum Board. |
| Metal Lath Association | Specifications for Metal Lathing and Furring. |
| Gypsum Association | Specifications for Installation of Screw-Type Steel Framing Member to Receive Gypsum Board, GA-203. |

PART 2 - PRODUCTS

2.01 METAL STUDS:

A. Non-Load Bearing: Metal studs shall be of the non-load-bearing channel type, roll-formed from 18-gage and 20-gage electro-galvanized steel. Tracks and erection accessories shall be standard products of an established metal stud manufacturer unless otherwise specified or shown. Metal studs depth shall be 3-5/8 inch deep unless otherwise shown on the Drawings.

B. Height Limits and Schedule: Maximum height limits for non-load-bearing studs shall be as follows, unless otherwise shown:

Stud Schedule

| Gage | Spacing Ctr. to Ctr. (Inches) | 2-1/2 Inch |
|---|---|---|
| 20 | 12 | 24-ft. 10-in. |
| 20 | 16 | 23-ft. 7-in. |
| 20 | 24 | 20-ft. 8-in. |

C. 18-gage studs shall be used at non-load bearing walls having a lath and plaster condition.

2.02 MISCELLANEOUS MATERIALS:

A. Hanger Wire: Hanger wire for suspended gypsum board ceilings shall be of soft-temper, annealed and galvanized steel wire. Hanger wire size shall be not less than that required by governing code.

B. Runner Channels: Runner channels shall be 1-1/2 inch cold-rolled channels and 3/4-inch stiffener channels, galvanized or factory-coated with rust-inhibitive paint. Channels shall have minimum weight of 475 and 300 lbs./1000 L.F., respectively.

C. Furring Channels: Furring channels shall be designed for screw attachment of 5/8-inch gypsum wallboard. They shall be roll-formed, galvanized Grade “A” steel conforming to ANSI/ASTM A 446, with a metal thickness of 0.035-inch minimum, 7/8-inch depth and 1-3/8 inch web.

D. Tie Wire: Tie wire shall be galvanized, 16-gage, annealed steel wire.

E. Fasteners: Fasteners shall be as required and as recommended within the Reference Standards.

F. Welding Materials: Welding materials shall be as recommended in the published standards of the structural stud manufacturer.

G. Power-Driven Pins: Power-driven pins to be installed in concrete or steel shall be of heat-treated steel alloy. If the pins are not sufficiently corrosion-resistant for the conditions to which they are to be exposed, they shall be protected in an acceptable manner. Pins shall have capped or threaded heads capable of transmitting the loads the shanks are required to support. Pins that are connected to steel shall have longitudinal serrations around the circumference of the shank. Complete information describing pin capacity, connections and proposed area of use shall be submitted to the Owner's Representative.

## PART 3 - EXECUTION

### 3.01 INSTALLATION REQUIREMENTS:

A. All work shall be installed in conformance with the manufacturer's recommendations and per the applicable requirements of UBC, ANSI and other referenced standards as specified or shown.

### 3.02 CEILING SUSPENSION SYSTEM:

A. Components: All necessary items for a complete installation shall be provided, including devices for attachment to overhead construction, hanger wires, main runners, splines, splicers, connecting clips, wall connectors, hold-down clips, edge moldings and other appurtenances.

B. Hanger Wires: Hanger wires shall be spaced along the main runner so that each hanger supports a minimum area of 16 square feet.

C. Runner Channels: Main runners shall be ½-inch channels spaced at 4-feet on centers. Hanger wires shall be saddle-tied along runners. Cross furring channels shall be spaced at 16-inches on centers, maximum, and shall be saddle-tied to main runner channel.

D. Interruptions: At any openings that interrupt the continuity of furring channels, additional cross reinforcing shall be provided to restore lateral stability or grillage.

3.03 METAL STUDS, FURRING AND FRAMING (For Non-Bearing Walls):

A. Runner Track Attachment: Floor and ceiling runner tracks shall be securely fastened to floor (or floor plate if required) and overhead construction as shown and as required.

B. Stud Attachment: Studs shall be securely fastened to tracks and spaced in accordance with the stud schedule. Each stud shall be crimped into runner tracks at the top, bottom and both sides for friction fit ¼-inch deflection clearance on top.

C. Wall Stiffening: Walls shall be stiffened with ¾-inch channels placed horizontally at not more than 4-1/2 foot vertical spacing.

D. Stud Requirements: Metal stud installation shall conform to the following requirements:

1. Studs shall be located at all door jambs, at abutting construction, intersecting walls and corners. Each corner and intersection of walls and partitions shall be formed with not less than three (3) studs.

2. Double 20-gage studs shall be installed at all door jamb and header locations as shown on the Drawings and shall be secured to the jamb anchors of each door frame by bolt or screw attachment.

3. Studs extending from door frame header to ceiling runner over door frames shall be positioned at wall board joints. Stud walls which do not extend to the structures above the ceiling shall be braced to the structure at every 6-feet and at door jamb locations.

4. The Contractor shall install 20-gage studs at wall-mounted fixtures and at a maximum of 12-inches on centers at walls having a lath and plaster condition or receiving ceramic tile.

5. Stud walls shall be braced as necessary to provide rigid construction. Double row of studs for chase walls shall be braced with cross ties of 5/8-inch thick gypsum board, 12-inches wide, installed at quarter points of studs.

6. Parapet walls and hung exterior walls and soffits shall be framed as shown with not less than 18-gage studs.

7. Double 20-gage studs shall be installed at all window jamb, sills and headers as shown on the Drawings.

E. Openings: Openings shall conform to the following requirements:

1. Channels shall be provided around openings for attachment of metal frames, dampers, grilles and ductwork in connection with metal studs and shall be securely fastened to studs.

2. Headers, sills and jack studs shall be provided as required at openings. Headers shall overlap adjacent vertical studs and shall be securely screw-attached to adjacent studs.

3. A 1-1/2 inch channel stiffener shall be installed 6-inches above all door openings. Stiffeners shall extend past the second single stud on each side of the opening and shall be saddle-tied to the structure.

F. Lintels: Trussed or box-framed lintel members designed to resist applied loads without excessive deflection shall be provided and shall be secured together by screws or other approved means.

G. Support for Wall-Mounted Items: Solid blocking, 1-1/2 inch channels, horizontal studding or other members within walls shall be provided as required and/or shown to provide secure and adjacent support for wall-mounted or wall-braced items. Galvanized plates shall be provide as backing for handrail brackets, 16-gage by 8-inch by 16-inch.

H. Horizontal Stiffeners: Ends of horizontal stiffeners shall be securely fastened to abutting construction.

I. Furring Channels: Furring channels shall be spaced 16-inches on centers, maximum, unless shown otherwise. Spans shall not exceed manufacturer's published recommendations and governing code requirements.

3.04 WORKMANSHIP:

A. Alignment: All metal studs shall be installed rigid, in line, level and plumb and shall be suitable for the application of the intended succeeding contiguous materials. The maximum allowable deviation in any plane shall be 1/8-inch from an 8-foot straight line and ¼-inch maximum in a surface having a total length in excess of 8-feet.

B. Component Fit: All framing members and tracks shall meet the following requirements:

1. All framing components shall be cut squarely or on an angle, as in bracing, to fit squarely against abutting members.

2. Tracks shall be securely anchored to the floor and overhead structure or other members.

3. Studs shall be seated squarely in the track with the stud web and flanges abutting the track web, shall be plumbed, aligned and shall be adequately attached to the flanges or web of both the upper and lower tracks.

**END OF SECTION 05400**

# SECTION 05500 - MISCELLANEOUS METALS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. The Contractor shall provide miscellaneous metals and appurtenances, complete, in accordance with the Contract Documents.

B. Work Included in This Section: Principal items are:

1. Shop/erect drawings and samples.

2. Metal grating with incidental supports and attachments.

3. Steel channels and/or angle frames and thresholds with anchors.

4. Welding electrodes.

5. Pipe supports with saddles, hangers, bracing and attachments as detailed and required, except as provided by other trades.

6. Miscellaneous iron and steel items indicated, specified, or required for completion of the Contract, unless included under other Sections.

7. Coating, including field touch-up.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. The Work of the following Sections apply to the Work of this Section. Other, not referenced below, shall also apply to the extent required for proper performance of this Work.

1. Section 03200 - Reinforcement Steel

2. Section 03300 - Cast-in-Place Concrete

3. Section 03315 - Grout

4. Section 05120 - Structural Steel

5. Section 05220 - Concrete Bolts

6. Steel supports, hangers, brackets and other miscellaneous items accessory to the THM Removal System and electrical installations indicated on the Plans, or covered in Divisions 11 and 16.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this Section of the Specifications, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.

B. The current edition of the Uniform Building Code (UBC) of International Conference of Building Officials (ICBO).

C. Except as otherwise indicated, the current editions of the following Federal Specifications apply to the Work of this Section:

| | | |
|---|---|---|
| 1. | QQ-F-461 | Floor Plate, Steel, Rolled. |
| 2. | MIL-G-18015 A | (Ships) Aluminum Planks, (6063-T6). |
| 3. | MIL-A-907E | Antiseize Thread Compound, High Temperature. |

D. Except as otherwise indicated, the current editions of the following commercial standards apply to the Work of this Section:

1. Commercial Standards:

| | |
|---|---|
| AA-M32C22A41 | Aluminum Association |
| AASHTO | HS-20 Truck Loading |
| AISC | Specification for Design, Fabrication and Erection of Structural Steel for Buildings with Commentary and Code of Standard Practice for Steel Buildings and Bridges. |
| AISC | Manual of Steel Construction |
| AISI | Design of Light Gauge, Cold-Formed Steel Structural Members |

| | |
|---|---|
| ANSI/AWS D 1.1 | Structural Welding Code - Steel |
| ANSI/AWS D 1.2 | Structural Welding Code - Aluminum |
| ANSI/AWS QC1 | Specification for Qualification and Certification of Welding Inspectors |
| NFPA 101 | Life Safety Code |
| NAOMM | Metal Stairs Manual |
| AWS-AS | Welding of Stainless Steel with Electrodes and Techniques |

2. <u>ASTM Standards in Building Codes</u>:

| | |
|---|---|
| ASTM A 36 | Specification for Structural Steel |
| ASTM A 48 | Specification for Gray Iron Castings |
| ASTM A 167 | Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip |
| ASTM A 193 | Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service |
| ASTM A 194 | Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure and High-Temperature Service |
| ASTM A 276 | Specification for Stainless Steel Bars and Shapes |
| ASTM A 283 | Specification for Low and Intermediate Tensile Strength Carbon Steel Plates |
| ASTM A 307 | Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile |
| ASTM A 320 | Specification for Alloy-Steel Bolting Material for Low-Temperature Service |
| ASTM A 424 | Specification for Steel, Sheet, for Procelain Enameling |

| | |
|---|---|
| ASTM A 500 | Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes |
| ASTM A 536 | Specification for Ductile Iron Casting |
| ASTM A 563 | Specification for Carbon and Alloy Steel Nuts |
| ASTM A 569 | Specification for Steel, Carbon (0.15 Maximum Percent), Hot Rolled Sheet and Strip Commercial Quality |
| ASTM A 575 | Specification for Steel Bars, Carbon, Merchant Quality, M-Grades |
| ASTM A 786 | Specification for Rolled Steel Floor Plates |
| ASTM B 98 | Specification for Copper-Silicon Alloy Rod, Bar, and Shapes |
| ASTM B 210 | Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes |
| ASTM B 221 | Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes |
| ASTM B 438 | Specification for Sintered Bronze Bearings (Oil-Impregnated) |

3. Trade Standards:

Welded Austenitic Chromium-Nickel Stainless Steel Technique and Properties, as published by the International Nickel Company, Inc., New York, New York.

Procelain Enamel Institute, Inc.

## 1.04 CONTRACTOR SUBMITTALS

A. Shop Drawings: Shop drawings shall be submitted in accordance with Section 01330 – Submittals/Shop Drawings.

B. Layout Drawings: Layout drawings for grating shall be submitted showing the direction of span, type and depth of grating, size and shape of grating panels, seat angle details, and details of grating hold down fasteners. Load and deflection tables shall be submitted for each style and depth of grating used.

## 1.05 QUALITY ASSURANCE

A. Miscellaneous metals shall be fabricated and erected in accordance with the latest edition of the AISC "Specification for the Design, Fabrication and Erection of Steel for Buildings", and "Code of Standard Practice for Steel Buildings and Bridges", except whenever there is a discrepancy between the Plans and this Specification, the Plans shall govern.

B. Aluminum work shall be fabricated and erected in conformance with applicable requirements of the UBC and referenced standards of the Aluminum Association.

C. Continuous Inspections: All welding and high strength bolting of structural steel assemblies shall be conducted under the continuous inspection of an International Conference of Building Officials (ICBO) certified "Special Inspector" selected by the Owner with costs borne by the Contractor. Should such fabrication be performed in the shop of a licensed fabricator approved by the governing building official and certified by the ICBO Evaluation Services, Inc., only the field welding and high strength bolting of structural steel assemblies will be required to be performed under continuous inspection of the ICBO-certified "Special Inspector". The Owner's Representative shall be notified at least 48 hours in advance of inspections. Copies of inspection reports shall be provided to the Owner, Contractor and Owner's Representative and governing building official.

# PART 2 - PRODUCTS

## 2.01 MATERIALS

A. Structural Steel: Structural steel shall be coated per Technical Specification - Division 9 and conform to the following requirements:

1. Shapes, Plates, Bars ASTM A 36

| | | |
|---|---|---|
| 2. | Pipe, Pipe Columns, Bollards | ASTM A 53, Type E or S, Grade B Schedule 40, unless noted otherwise. |
| 3. | Tubes | ASTM A 500, Grade B |

B. Aluminum: Aluminum structural shapes shall be new and conform to applicable Federal Specification for 6061-T6 alloy, unless otherwise noted. Aluminum Pipe shall conform to Schedule 40, or greater, unless otherwise noted.

C. Stainless Steel: Unless otherwise designated or approved, stainless steel alloy types shall conform to ASTM A 167 and ASTM A 276 as follows:

1. Stainless steel plates, pipe and structural shapes: Type 316L.

2. Stainless steel bolts, nuts and washers: Type 316L where connecting or bearing on aluminum.

D. Cast Iron: Cast iron shall conform to ASTM A 48, except as otherwise noted.

E. Ductile Iron: Ductile iron shall conform to ASTM A 536, using Grade 60-40-18 or better, except as otherwise noted.

## 2.02 METAL GRATING

A. General: Metal grating shall be of the design sizes, and types indicated. All grating shall be completely banded at all edges and cutouts using material and cross section equivalent to the bearing bars. Such banding shall be welded to each cut bearing bar. Grating shall be supported on all sides of an opening by support members. Where grating is supported on concrete, embedded support angles matching grating material shall be used on all sides, unless indicated otherwise. Such angles shall be mitered and welded at corners. Grating shall conform to the following requirements:

1. All pieces of grating shall be fastened in two locations to each support.

2. Where grating depth is not given, grating shall be provided which will be within allowable stress levels, and which shall not exceed a deflection of 1/4 inch or the span divided by

180, whichever is less. The loading to be used for determining stresses and deflections shall be the uniform live load 125 PSF, or a concentrated load of 1,000 pounds.

B. Grating Materials: Grating materials shall conform to the following requirements:

1. Grating material shall be of welded steel, coated after fabrication or aluminum as indicated in the Plans. Cross bars shall be welded in position.

   a) Steel grating shall be coated per Technical Specification - Division 9.

2. No single piece of grating shall weigh more than 50 pounds, unless indicated otherwise. Grating shall be serrated bar grating.

3. Cross bars shall be welded or mechanically locked tightly into position so that there is no movement allowed between bearing and cross bars.

C. Grating Fastening Devices: For metal gratings, either welded or mechanical attachments shall be used.

2.03 WELDING ELECTRODES

A. Steel Electrodes: Welding electrodes shall conform with AWS D 1.1, except E7024 rods or electrodes shall not be used.

B. Aluminum Electrodes: Contingent upon alloys being welded, only inert gas-shielded arc or resistant-welding process with filler alloys conforming to UBC Standard No. 28, Table 28-1-C shall be used. No process requiring a welding flux shall be used.

C. Stainless Steel Electrodes: Welding of stainless steel with electrodes and techniques shall conform to the pertinent AWS A 5 series specification, and as recommended in Welded Austenitic Chromium-Nickel Stainless Steel Techniques and Properties as published by the International Nickel Company, Inc., New York, New York.

2.05 BOLTS

A. Bolt Requirements: Bolts shall comply with the following:

1. Nuts shall be capable of developing the full strength of bolts. Threads shall be Coarse Thread Series conforming to the requirements of the requirements of the American Standard for Screw Threads. Bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series.

2. The length of all bolts shall be such that after joints are made up, each bolt shall extend through the entire nut, but in no case more than ½ inch beyond the nut.

B. Standard Service Bolts: Except where otherwise indicated, bolts and nuts shall be stainless steel.

2.06 MANUFACTURERS

A. Products of the type or model (if any) indicated shall be manufactured by one of the following (or equal):

1. Grating:

a) McNichols.

b) Owner approved equal.

PART 3 - EXECUTION

3.01 FABRICATION AND INSTALLATION REQUIREMENTS

A. Fabrication and Erection: Except as otherwise indicated, the fabrication and erection of structural steel shall conform to the requirements of the American Institute of Steel Construction "Manual of Steel Construction".

1. The Work of this Section shall be coordinated with related trades. Particular attention is required for items to be embedded in concrete work. All punchings and drillings, indicated or required, shall be provided for attachment of other work to that of this Section.

2. Compliance with Safety Requirements. Dimensions required for the fabrication and installation of handrails, ladders, grating, plate, pipe hangars and etc., which are not shown on the Plans, shall conform to the Division of Occupational Health and Safety, General Industrial Safety Orders, State of California.

B. Protection: The Contractor shall provide and be responsible for protection and repair of adjacent surfaces and areas which may become damaged as a result of work in this Section. Work performed hereunder shall be protected until completion and final acceptance of project by the Owner's Representative. The Contractor shall repair or replace all damaged or defective work to original specified condition at no additional cost to the Owner.

1. Finished floor surfaces and adjacent work shall be protected from damage. Concrete floors shall not be overloaded. Mobile equipment used in placing steel shall have pneumatic tires. Steel members shall not be placed directly on floors; pads of timber or other material shall be used for cushioning.

2. Where welding is completed in proximity to glass or finished surfaces, such surfaces shall be protected from damage due to weld sparks, spatter or tramp metal.

C. Pipe and Conduit Supports and Bracing: Supports and bracing for pipe and conduit shall be fabricated and installed as detailed on the Drawings and in a fully coordinated manner with the Work of other trades. Where shown or indicated, hot-dip galvanized shall be provided after fabrication, with touch-up of abraded or burned galvanizing using materials specified in this Section.

D. Embedded Steel Channel and Angle Frames: Embedded steel channel and angle frames shall have continuously welded joints. Exposed welds shall be ground flush.

## 3.02 WELDING

A. Welding Steel: Welding shall be performed in accordance with the "Structural Welding Code - Steel", AWS D 1.1, and current revisions, except where the Gas Metal Arc Welding (GMAW) process is used, the short-circuited mode shall only be used for light gauge material (12 gauge and lighter). Welders shall be qualified by tests in accordance with AWS B3.0.

## 3.03 COATING

A. All structural steel plates, shapes, bars and fabricated assemblies shall be coated per Technical Specification - Division 9.

**END OF SECTION 05500**

# SECTION 05650 - PRE-ENGINEERED SHADE STRUCTURE

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. Install Pre-Engineered Shade Structure per dimensions and type illustrated in the Plans.

B. PRODUCT DESIGN LOADS: To meet governing Building Department requirements. Soil loading and seismic design criteria to be obtained from project specific Geotechnical Report. Minimal Building Department requirements shall be used when no specific Geotechnical Report is provided.

C. DESIGN METHOD: Per applicable building code. Note: Manufacturer to use three-dimensional structural analysis to determine member load and forces.

D. The pre-engineered package shall be a pre-cut and pre-fabricated package that shall include powder coated structural frame members, roof material, fasteners, and trim as well as the installation instructions. The structure shall be shipped knocked down for minimum shipping charges. Field labor will be kept to a minimum by pre-manufactured parts. No onsite welding will be permitted. Connection bolts shall be concealed within the tubing where possible.

E. Where possible, tube column to concrete base will be surface mounted with all anchor bolts hidden within the column.

F. Where possible, the structure will have a moment connection at the top of the column and a pinned connection at the base of the column to ensure a clean connection at the base, reduce the size of the concrete base, and provide for one-step concrete installation process.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03300 – Cast-In-Place Concrete

B. Section 05400 – Light Metal Framing

1.03 REFERENCES

A. American Institute of Steel Construction (AISC)

B. American Iron and Steel Institute (AISI) Specifications for Cold Formed Members.

C. American Society of Testing and Materials (ASTM)

D. American Society for Quality (ASQ)

E. American Welding Society (AWS)

F. California Building Code (CBC)

G. International Building Code (IBC)

H. Leadership in Energy and Environmental Design (LEED)

I. Lightning Protection Institute (LPI)

J. National Fire Protection Association (NFPA)

K. OSHA Steel Erection Standard 29 CFR 1926 Subpart R-Steel Erection

L. Steel Structures Painting Council (SSPC) SSPC-SP10 Near White Blast Cleaning

1.04 SUBMITTALS

A. Submit 3 set shop drawings and 2 sets structural calculations wet signed and sealed by a Professional Engineer licensed in the State of California.

1.05 QUALITY ASSURANCE :

Provide evidence of commitment of quality craftsmanship as demonstrated by the following:

A. SUPPLIER QUALIFICATIONS:

1. The product shall be designed, produced, and finished at a facility owned and directly supervised by the supplier who has at a minimum of ten years under same ownership making steel

frame pre-manufactured structures. Cumulative experience in fabrication will not be an acceptable alternative.

2. The product shall be shipped from a single source.

3. Membership in American Institute of Steel Construction.

4. Membership for American Society of Quality.

5. Membership in American Welding Society.

6. Membership in Chemical Coaters Association International.

7. Membership in Construction Specifications Institute.

8. Full time on-staff Licensed Engineer.

9. Full time on-staff Quality Assurance Manager.

10. Published Quality Management System.

11. Full time on-staff AWS Certified Welding Inspector.

12. Continued certification by an independent inspection agency.

13. Control of finishing quality by in-house shot blast, pretreatment, primer and powder coating.

1.06 PRODUCT STORAGE AND HANDLING

A. Comply with the requirements of Section 01600 – Materials and Equipment.

1.07 LIMITED WARRANTY

A. Supply manufacturer's standard 10 year limited warranty on frame and 10 years limited warranty on paint system.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. MWC Group, Inc.
Ph: 760-563-2016
www.metwestconstruction.com

B. Shelterscapes
Ph: 800-458-5872
www.shelterscapes.com

C. Pre-Fab Builders
1364 East Valencia Drive
714-575-9265
www.prefabinc.org

D. Substitutions must be approved a minimum of ten (10) days before bid. All approved manufacturers shall be notified in writing before the bid date and shall not be allowed to bid without written notification.

E. Alternate suppliers must meet the qualifications and provide proof of certifications listed.

F. Alternate suppliers must provide equivalency to paint system.

G. Alternate suppliers must provide proof that their designs do not infringe on patents or copyrights.

2.02 MATERIALS

A. STRUCTURAL FRAMING: structural steel tube minimum ASTM A500 grade B, “I” beams; tapered columns, open channels, or wood products shall not be accepted for primary beams.

B. COMPRESSION RING: structural channel or welded plate minimum ASTM A36 or COMPRESSION TUBE: structural steel tube minimum ASTM A500 grade B.

C. STRUCTURAL FASTENERS: ASTM A325 high strength bolts and A563 high strength nuts, ASTM A307 anchor bolts.

H. “R” PANEL/MULTI-RIB METAL ROOFING: Multi-rib roofing shall be 24 gauge ribbed galvalume steel sheets with ribs 1 3/16” high and 12” on center. Roof surface shall be painted with Kynar 500 to the manufacturer’s standard color. Ceiling surface shall be white. Roof panels are factory precut to size and angle to provide one-step installation.

1. Metal roofing trim shall match the color of the roof and shall be factory made of 26 gauge Kynar 500 painted steel. Trim shall includes panel ridge caps, eave trim, splice channels, roof peak cap, and corner trim as applicable for model selected.,

reference drawings for additional information. Painted screws and butyl tape are included.

2. Ridge Caps shall be performed with a single central bend to match the roof pitch and shall be hemmed on the sides.

2.03 ACCESSORIES / OPTIONAL

A. ELECTRICAL ACCESS AND BOX CUTOUTS: Electrical access to be provided per manufacturer's electrical access sheet. Electrical cut outs shall be marked as height above finish floor and size of cutout required.

B. Electrical access at compression shall be provided.

C. Electrical access up through columns to be provided.

2.04 FABRICATION

A. All steel fabrication of tubes and plates shall be factory controlled under a documented Quality Management System. All parts shall be permanently etched with identification numbers. Fabrication facility will be experienced for a minimum of ten years in precision tube and plate fabrication. Cumulative experience in fabrication will not be an acceptable alternative.

B. Certified AWS welders, shall make all welded connections in accordance with AWS Specifications and trained by an AWS Certified Welding Inspector.

2.05 FINISH STEEL

A. For quality control purposes, steel shall be cleaned, pretreated and finished at a facility owned and directly supervised by the manufacturer. Steel shall be shot blasted to SSPC-SP10 near-white blast cleaning. SSPC-SP2 hand tool cleaning will not be an acceptable alternative. Parts shall be pretreated in a 3 stage iron phosphate or equal washer. Epoxy primer powder coat to be applied to parts for superior corrosion protection. Top powder coat of Super Durable TGIC Powder Coat to color selected from manufacturer's standard color chart. For environmental purposes, finish shall allow no VOC emissions. Sample production parts shall have been tested and meet the following criteria:

1. Salt spray resistance per ASTM B 117/ ASTM D 1654 to 5000 hours with no creep from scribe line and rating of 10.

2. Humidity resistance per ASTM D2247-02 to 3000 hours with no loss adhesion or blistering.

3. Color/UV resistance per ASTM G154-04 to 2000 hours exposure, alternate cycles with results of (a) no chalking (b) 75% color retention (c) Color variation maximum 3.0 E variation CIE formula (before and after 2000 hours exposure).

PART 3 - ERECTION

A. FOOTINGS: The structure shall be set on prepared footings designed by the Shade Structure Manufacturer. Anchor bolts shall also be provided by Shade Structure Manufacturer. Concrete slab (if required) is to be provided by others.

B. The contractor must use appropriate construction practices for the specific site conditions.

C. Install all components according to manufacturer's installation instructions and these specifications.

**END OF SECTION 05650**

# SECTION 07900 - SEALANTS AND CAULKING

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. The Contractor shall provide caulking, sealing, moisture protection, and appurtenant Work for sealing joints in non-water-bearing surfaces, complete and in accordance with the Contract Documents.

### 1.02 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this Section of the Specifications, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.

B. The current edition of the Uniform Building Code (UBC) of International Conference of Building Officials (ICBO).

C. NSF / ANSI 61: Drinking Water System Components – Health Effects

D. Except as otherwise indicated, the current editions of the following apply to the Work of this Section:

1. Federal Specifications:

| | |
|---|---|
| TT-S-001543A | Sealing Compound, Silicone Rubber Base, (For Caulking, Sealing and Glazing in Buildings and Other Structures) |
| A-A-1556 | Sealing Compound, Elastomeric Type, Single Component (For Caulking, Sealing, and Glazing in Buildings and Other Structures) |
| TT-S-00227E (3) | Sealing Compound, Elastomeric Type, Multi-Component (For Caulking, Sealing and Glazing in Buildings and Other Structures) |

| | |
|---|---|
| SS-S-200E (2) | Sealant, Joint, Two Component, Cold Applied, for Portland Cement Pavement |

E. Manufacturer's Standards: In addition to the standards listed above, the sealants and caulking products and their application shall be in accordance with the manufacturer's published recommendations and specifications.

## 1.03 CONTRACTOR SUBMITTALS

A. The Contractor shall provide submittals in accordance with the Specification Section 01330 – Submittals/Shop Drawings.

B. Samples: The Contractor shall submit samples (including color samples) of all the caulking and sealant materials and other moisture protection materials proposed for use on the Work. The samples shall be clearly marked with the manufacturer's name and product identification.

C. Technical Data: The Contractor shall submit a complete materials list along with the manufacturer's technical data and literature, specifications, joint width and depth tables, and installation instructions.

D. Certificates: The Contractor shall submit, if requested by the Owner's Representative, certificates from an independent testing laboratory approved by the Owner's Representative, certifying that the submitted materials meet all the requirements of the ASTM and Federal Specifications cited.

E. Warranty: The Contractor shall provide a 5 year written warranty of the entire sealant installation against faulty and/or incompatible materials and workmanship, together with a statement that it agrees to repair or replace, to the satisfaction of the Owner Representative, at no additional cost to the Owner, any such defective areas which become evident within said 5 year warranty period.

## 1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken packages or containers bearing the manufacturer's label. Packages or containers shall be delivered to the site with seals unbroken.

B. Shelf Life: Materials whose shelf life dates have expired shall not be used in the Work. Such materials shall be promptly removed from the project site.

C. Storage: All materials shall be carefully stored in accordance with the manufacturer's instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the product.

## PART 2 - PRODUCTS

### 2.01 SEALANTS AND CAULKING MATERIALS

A. Caulking and sealing materials shall conform to the following requirements:

1. Significant Movement Sealants (+25% Movement Capability):

a) Expansion wall joints; control joints; interior and nontraffic horizontal joints:

1) Two-component, nonsag, polyurethane or polysulfide sealant conforming to Federal Specification TT-S-00227E (3), Class A, Type II, and ASTM C 920; Type M; Class 25; Grade NS.

(a) Products Research & Chemical Corp. ARC-2.

(b) Progress Unlimited "Iso-Flex 2000"; or approved equal.

2) One component, nonsag, low modulus, polyurethane or polysulfide sealant conforming to Federal Specification A-A-1556, Class A, Type II, and ASTM C 920; Type S; Class 25; Grade NS.

(a) Products Research & Chemical Corp., "RC-1".

(b) Tremco "Dymonic"; or approved equal.

3) One component, nonsag, medium modulus, neutral cure, silicone sealant conforming to Federal Specification TT-S-001543A, Class A, and ASTM C 920; Type S; Class 25; Grade NS.

(a) Products Research & Chemical Corp. “PRC-4000”.

(b) Dow Corning “795”; or approved equal.

b) Horizontal Joints:

1) Two component, self-leveling, polyurethane or polysulfide sealant conforming to Federal Specification TT-S-00227E(3), Class A, Type I, and ASTM C 920; Type M; Class 25; Grade P.

(a) Products Research & Chemical Corp. “RC-2SL”.

(b) Bostic “Chem-Calk 550”; or approved equal.

2) One component, self-leveling, polyurethane or polysulfide sealant conforming to Federal Specification A-A-1556, Class A, Type I, and ASTM C 920; Type S; Class 25; Grade P.

(a) Products Research & Chemical Corp. “6006”.

(b) Mameco “Vulkem 45”; or approved equal.

2.02 NSF / ANSI STANDARD 61

A. All materials and other industrial produced materials that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. Manufacturer's Recommendations: All work under this Section and all testing, where applicable, shall be performed in accordance with manufacturer's printed recommendations, specifications, and installation instructions except where more stringent requirements are indicated herein; and, except where project conditions require extra precautions or provisions to assure performance of the waterproofing system.

B. Authorized Installers: Caulking, sealants, and moisture protection shall be complete systems, and installed only by installers authorized and approved by the respective material manufacturers.

3.02 SEALANT FILLED JOINTS

A. Manufacturer's Representative: The Contractor shall furnish the on-site services of the sealant manufacturer's representative (before starting sealant work) for inspection of the joints to be sealed and for instructing the installer in the proper use of the materials.

B. Surface Preparation: Joints and spaces to be sealed shall be clean, dry, and free of dust, loose mortar, and other foreign materials. Ferrous metal surfaces shall be cleaned of all rust, mill scale, and other coatings by wire brush, grinding, or sandblasting. Oil and grease shall be removed by cleaning in accordance with sealant manufacturer's printed recommendations. Protective coatings shall be removed from all aluminum surfaces against which caulking or sealing compound is to be placed. Bituminous or resinous materials shall be removed from surfaces to receive caulking or sealants.

C. Sealant Depth: Sealant depth in joints shall be 1/2 the width of joint, but not less than 1/8 inch deep and ¼ inch wide nor more than ½ inch deep and 1 inch wide. All joints shall have a rigid filler material installed to proper depth prior to application of sealant.

D. Joints in Porous Materials: Where required by the manufacturer, sides of joints of porous materials shall be primed immediately prior to caulking or sealing.

E. Applications: A full bead of sealant shall be applied into the joint under sufficient pressure, with the nozzle drawn across sealant, to completely fill the void space and to ensure complete wetting of contact area to obtain uniform adhesion. During application the tip of the nozzle shall be kept at the bottom of the joint thereby forcing the sealant to fill from the bottom to the top. Sealants shall be

tooled immediately after exposure with caulking tool or soft bristled brush moistened with solvent. The finished sealant filled joint shall be slightly concave unless otherwise indicated.

F. Cleaning: After application of sealant and caulking materials, adjacent materials which have been soiled shall be cleaned and left in a neat, clean, undamaged or unstained condition. On porous surfaces, excess sealant shall be removed per sealant or caulking manufacturer's printed instructions.

**END OF SECTION 07900**

# SECTION 09800 - PROTECTIVE COATINGS

## 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 protective coating of all specified surfaces, including all surface preparation, pretreatment, coating application, touch-up of factory-coated surfaces, protection of surfaces not to be coated, cleanup, and appurtenant work, all in accordance with the requirements of the Contract Documents.

B. The following surfaces shall not be protective coated hereunder unless shown or specified herein, or elsewhere in the Contract Documents.

1. Concrete
2. Machined surfaces
3. Grease fittings
4. Glass
5. Equipment nameplates
6. Maintenance hole frames and covers
7. Platform gratings, stair treads, door thresholds, and other walk surfaces

C. The coating system schedules summarize the surfaces to be coated, the required surface preparation, and the coating systems to be applied. Coating notes, if any, on the Plans are used to show exceptions to the schedules, to show or extend the limits of coating systems, or to clarify or show details for application of the coating systems. Items to be coated for this Project include the following, at a minimum.

1. The vertical pumps, pump motors, and all other ferrous metal above grade items of the Finish Water Pumps shall be surface prepared and coated. The above grade rubber expansion joint fittings shall also be surface prepared and coated.

2. The interior surfaces of the existing 2.4 MG water tank, tank appurtenances, and all remaining steel surfaces of the tank shall be coated. The exterior wall tank surface shall be coated, as required, should the THM Removal System require mounting to the exterior of the 2.4 MG water tank.

## 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 13290 – Rehabilitation of Existing Steel Tank

## 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. References herein to "SSPC Specifications" or "SSPC" shall mean the published standards of the Steel Structures Painting Council, 4400 Fifth Avenue, Pittsburgh, PA 15213.

B. References herein to "NACE" shall mean the published standards of the National Association of Corrosion Engineers, P.O. Box 986, Katy, TX 77450.

C. Comply with the reference specifications of the General Requirements - Division 1.

D. Comply with the current provisions of the following Codes and Standards.

1. Commercial Standards:

| | |
|---|---|
| ANSI A 13.1 | Scheme for Identification of Piping Systems |
| ANSI/AWWA C 105 | Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids |
| ANSI/AWWA C 203 | Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape-Hot-Applied |
| ANSI/AWWA D 102 | Painting Steel Water-Storage Tanks |
| NSF / ANSI 61: | Drinking Water System Components – Health Effects |

2. Federal Specifications:

| | |
|---|---|
| TT-P-28F | Paint, Aluminum, Heat Resisting (1200F) |

1.04 CONTRACTOR SUBMITTALS

A. Submittals shall be made in accordance with Section 1330 – Submittals/Shop Drawings and the General Requirements herein.

B. Samples: The Contractor shall submit samples of all paint, finishes, and other coating materials specified herein, in accordance with the General Requirements. Paint or coating samples shall be submitted on 8-1/2 inch by 11 inch sheet metal. Each sample shall be completely coated over its entire surface with one protective coating material, type, and color.

C. Coating Materials List: The Contractor shall provide 8 copies of a coating materials list which indicates the manufacturer and the coating number, keyed to the coating systems herein, prior to or at the time of submittal of samples.

D. Paint Manufacturer's Information: For each paint system to be used the Contractor shall submit the following listed data at least 30 days prior to painting.

1. Paint manufacturer's data sheet for each product used, including statements on the suitability of the material for the intended use.

2. Paint manufacturer's instructions and recommendations on surface preparation and application.

3. Colors available for each product (where applicable).

4. Compatibility of shop and field applied coatings (where applicable).

5. Material safety data sheet for each product used.

6. Two sets of color samples to match each color selected by the Owner’s Representative from the manufacturer's standard color sheets. If custom mixed colors are required by this Section, the color samples shall be made using color

formulations prepared to match the color samples furnished by the Owner's Representative. The color formula shall be shown on the back of each color sample.

E. Manufacturer's Certification: For submerged and severe service coating systems, the Contractor shall require the paint manufacturer to certify to the following:

1. The manufacturer's representative has provided at least 6 hours of on-site instruction in the proper surface preparation, use, mixing, application, and curing of the coating systems.

2. The manufacturer's representative has personally observed the start of surface preparation, mixing, and application of the coating materials.

F. The Contractor shall submit all such certificates to the Owner's Representative within 7 days of completion of each paint system.

G. Applicator's Certificate and Report: For submerged and severe service coating systems, the Contractor shall require the applicator of the protective paint coatings to certify to the following:

1. Immediately before painting, surfaces conformed to the specified preparation; they were in the specified condition; and were clean, dry, and free of dust, rust, and mill scale.

2. Surface preparation and coating use, mixing, application, and curing were accomplished in accordance with the current printed instructions and recommendations of the protective coating manufacturer, and these Specifications.

3. The products specified were used and a listing of the names of the products and their manufacturer.

4. The products were used within the shelf-life dates, stating the shelf-life dates of each container of each product used.

5. The specified dry film thickness of coatings are on the items.

6. The quantities of each product used with copies of paint manufacturer's invoice.

7. Compatible paints were used where shop or field applied coatings are applied over previously-applied coatings.

8. The applicator's certificate shall list the dates and locations that the coating work was completed for the various surfaces coated, and shall also list the dry film thickness obtained for each coat. The Contractor shall submit said paint applicator's certificates to the Owner's Representative within 7 days after completion of each paint system.

## 1.05 QUALITY ASSURANCE

A. General: The Contractor shall give the Owner's Representative a minimum of three (3) days advance notice of the start of any field surface preparation work of coating application work, and a minimum of seven (7) days advance notice of the start of any shop surface preparation work.

B. All such work shall be performed only in the presence of the Owner's Representative, unless the Owner's Representative has granted prior approval to perform such work in its absence.

C. Inspection by the Owner's Representative, or the waiver of inspection of any particular portion of the work, shall not relieve the Contractor of its responsibility to perform the work in accordance with these Specifications.

D. Where protective coatings are to be performed by a subcontractor, said subcontractor must possess a valid state license as required for performance of the painting and coating work called for in this specification and must provide 5 references which show that the painting subcontractor has previous successful experience with the specified or comparable coating systems. Include the name, address, and the telephone number for the owner of each installation for which the painting subcontractor provided the protective coating.

E. Scaffolding shall be erected and moved to locations where requested by the Owner's Representative to facilitate inspection. Additional illumination shall be provided to cover all areas to be inspected.

F. Inspection Devices: The Contractor shall furnish, until final acceptance of such coatings, inspection devices in good working condition for the detection of holidays and measurement of dry-film thicknesses of protective coatings. Dry-film thickness gauges shall be made available for the Owner's Representative's use at all times while coating is being accomplished, until final acceptance of such coatings. The Contractor shall provide the services of a trained operator of the

holiday detection devices until the final acceptance of such coatings. Holiday detection devices shall be operated only in the presence of the Owner's Representative.

G. Holiday Testing: The Contractor shall holiday test all coated ferrous surfaces inside a steel reservoir, or other surfaces which will be submerged in water or other liquids, or surfaces which are enclosed in a vapor space in such structures and surfaces coated with any of the submerged and severe service coating systems. Areas which contain holidays shall be marked and repaired or recoated in accordance with the coating manufacturer's printed instructions and then retested.

1. Coatings With Thickness Exceeding 20 Mils: For surfaces having a total dry film coating thickness exceeding 20 mils: pulse-type holiday detector such as Tinker & Rasor Model AP-W, D.E. Stearns Co. Model 14/20, or equal shall be used. The unit shall be adjusted to operate at the voltage required to cause a spark jump across an air gap equal to twice the specified coating thickness.

2. Coatings With Thickness of 20 Mils or Less: For surfaces having a total dry film coating thickness of 20 mils or less: Tinker & Rasor Model M1 non-destructive type holiday detector, K-D Bird Dog, or equal shall be used. The unit shall operate at less than 75 volts. For thicknesses between 10 and 20 mils, a non-sudsing type wetting agent, such as Kodak Photo-Flo, or equal, shall be added to the water prior to wetting the detector sponge.

H. Film Thickness Testing: On ferrous metals, the dry film coating thickness shall be measured in accordance with the SSPC "Paint Application Specification No. 2" using a magnetic-type dry film thickness gauge such as Mikrotest model FM**,** Elcometer model 111/1EZ, or equal. Each coat shall be tested for the correct thickness. No measurements shall be made until at least 8 hours after application of the coating. On non-ferrous metals and other substrates, the coating thicknesses shall be measured at the time of application using a wet film gauge.

I. Surface Preparation: Evaluation of blast cleaned surface preparation work will be based upon comparison of the blasted surfaces with the standard samples available from the NACE, using NACE standard TM-01-70.

## 1.06 MANUFACTURER REPRESENTATIVE

A. The Contractor shall require the protective coating manufacturer to furnish a qualified technical representative to visit the Site for technical support as specified in the paragraph entitled "Manufacturer's Certification", herein, and as may be necessary to resolve field problems attributable or associated with the manufacturer's products furnished under this Contract or the application thereof.

1.07 MAINTENANCE

A. Warranty Inspection: A warranty inspection shall be conducted during the eleventh month following completion of all coating and painting work. The Contractor and a representative of the coating material manufacturer shall attend this inspection. All defective work shall be repaired in accordance with these Specifications and to the satisfaction of the Owner's Representative. The Owner's Representative may, by written notice to the Contractor, reschedule the warranty inspection, or may cancel the warranty inspection altogether. If a warranty inspection is not held the Contractor is not relieved of its responsibilities under the Contract Documents.

PART 2 - PRODUCTS

2.01. GENERAL

The Contractor shall furnish all labor, materials and equipment and perform all operations necessary for the cleaning, sandblasting and coating of all metallic surfaces, plastic surfaces and concrete surfaces as indicated on the drawings and specifications.

A. Definitions: The term "paint", "coatings", or "finishes" as used herein, shall include surface treatments, emulsions, enamels, paints, epoxy resins, and all other protective coatings, excepting galvanizing or anodizing, whether used as a pretreatment, primer, intermediate coat, or finish coat. The term "DFT" means minimum dry film thickness.

B. General: Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer, all of which shall be plainly legible at the time of use.

C. The Contractor shall use coating materials suitable for the intended use and recommended by their manufacturer for the intended service.

D. Compatibility: In any coating system only compatible materials from a single manufacturer shall be used in the Work. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, subject to the approval of the Owner's Representative, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.

E. Colors: All colors and shades of colors of all coats of paint shall be as selected or specified by the Owner's Representative. Each coat shall be of a slightly different shade, to facilitate inspection of surface coverage of each coat. Finish colors shall be as selected from the manufacturer's standard color samples by the Owner. Finish colors shall be custom mixed to match color samples furnished by the Owner.

F. Protective Coating Materials: Products shall be standard products produced by recognized manufacturers who are regularly engaged in production of such materials for essentially identical service conditions. Where requested, the Contractor shall provide the Owner's Representative with the names of not less than 10 successful applications of the proposed manufacturer's products demonstrating compliance with this specification requirement.

G. Substitute or "Or-Equal" Submittals: Unless otherwise specified, materials are from the catalogs of the companies listed herein. Materials by other manufacturers are acceptable provided that they are established as being compatible with and of equal quality to the coatings of the companies listed. The Contractor shall provide satisfactory documentation from the firm manufacturing the proposed substitute or "or-equal" material that said material meets the specified requirements and is equivalent or better than the listed materials in the following properties:

1. Quality

2. Durability

3. Resistance to abrasion and physical damage

4. Life expectancy

5. Ability to recoat in future

6. Solids content by volume

7. Dry film thickness per coat

8. Compatibility with other coatings

9. Suitability for the intended service

10. Resistance to chemical attack

11. Temperature limitations in service and during application

12. Type and quality of recommended undercoats and topcoats

13. Ease of application

14. Ease of repairing damaged areas

15. Stability of colors

H. The cost of all testing and analyzing of the proposed substitute materials that may be required by the Owner's Representative shall be paid by the Contractor. If the proposed substitution requires changes in the contract work, the Contractor shall bear all such costs involved and the costs of allied trades affected by the substitution.

## 2.02 INDUSTRIAL COATING SYSTEMS

A. Material Sources: Each of the following manufacturers is capable of supplying many of the industrial coating materials specified herein. Where manufacturers and paint numbers are listed, it is to show the type and quality of coatings that are required. Proposed substitute materials must be shown to satisfy the material descriptions and to equal or exceed the properties of the listed materials as required in the paragraph entitled "Substitute or Or-Equal Submittals" herein.

1. Ameron

2. Carboline Coatings Company

3. Cook Paint and Varnish Company

4. Engard Coatings Corporation

5. Glidden Coatings and Resins

6. Koppers Company, Inc.

7. Pittsburgh Paints

8. Tnemec Company

B. System 1 - Alkyd Enamel: High quality, gloss or semi-gloss, medium long oil alkyd finish shall have a minimum solids content of 49 percent by volume. Primer shall be as recommended by manufacturer.

1. Prime coat (DFT = 3 mils) Engard 126 HS**,** Tnemec P4-55, or approved equal.

2. Finish coats (two or more, DFT = 3 mils), Engard 222 HS, Tnemec 2H, or an approved equal.

3. Total system DFT = 6 mils.

C. System 2: Not Used

D. System 3 - Aluminum Silicone Resin: Aluminum silicone resin material shall be suitable for a service temperature of up to 1,000 degrees F, and shall comply with Federal Specification TT-P-28.

1. Prime coat and finish coat (2 or more, DFT = 3 mils), Rust-Oleum 4315, Engard 240, Koppers B-969-E-66, Tnemec Series 39, or equal.

2. Total system DFT = 3 mils.

E. System 4 - Epoxy/Aliphatic Polyurethane: Two component aliphatic acrylic or polyester polyurethane coating material shall provide superior color and gloss retention, resistance to splash from acid and alkaline chemicals, resistance to chemical fumes and severe weathering and with a minimum solids content of 58 percent by volume. Primer shall be a rust inhibitive two component epoxy coating with a minimum solids content of 70 percent by volume.

1. Prime coat (DFT = 4 mils), Amercoat 400, Carboline D890, Engard 480, Tnemec 104, or equal.

2. Finish coat (one or more, DFT = 3 mils), Amershield, Carboline 133 HB, Engard 428 HS, Tnemec 73, or equal.

3. Total system DFT = 7 mils.

4. More than one finish coat shall be applied as necessary to produce a finish with uniform color and texture.

F. System 5 - Inorganic Zinc/Epoxy/Polyurethane: The inorganic zinc primer shall be a water or solvent based, self-curing, zinc silicate 2-component inorganic coating which contains at least 85 percent of metallic zinc by weight in the dried film, and is recommended by the coating manufacturer as a primer for this system. The intermediate coat shall be a high-build two component epoxy with a solids content of at least 70 percent by volume. Finish coats shall be a 2-component aliphatic acrylic or polyester polyurethane coating material that provides superior color and gloss retention, resistance to chemical fumes and severe weathering, and a minimum solids content of 58 percent by volume.

1. Prime coat (DFT = 2 mil), Dimetcote 12, Carbo Zinc 11, Engard 511, Tnemec 90-92, or equal.

2. Intermediate coat (DFT = 4 mils), Ameron 400, Carboline D890, Engard 480, Tnemec 104, or equal.

3. Finish coats (one or more, DFT = 3 mils), Amershield, Carboline 133HB, Engard 428 HS, Tnemec 73, or equal.

4. Total system DFT = 9 mils.

5. Intermediate coat shall be applied in excess of 4 mils DFT or in more than one coat as necessary to completely cover the inorganic zinc primer and prevent application bubbling of the polyurethane finish coat.

6. More than one finish coat shall be applied as necessary to produce a finish with uniform color and texture.

G. System 6 - Inorganic Zinc, Water Based: Water based, self curing, ethyl silicate shall be a two component inorganic coating material that contains at least 85 percent of metallic zinc by weight in the dried film.

1. Prime coat and finish coat (one, DFT = 3 mils), Dimetcote 12, Engard 511, Koppers P-1500, Tnemec 90-92, or equal.

2. Total system DFT = 3 mils.

H. System 7 - Acrylic Latex: Single component, water based acrylic latex with a fungicide additive shall have a minimum solids content of 35 percent by volume. Prime coat shall be as recommended by manufacturer. The coating material shall be available in the ANSI

safety colors.

1. Prime coat (DFT = 2 mils), as recommended by manufacturer.

2. Finish coats (2 or more, DFT = 6 mils), Amercoat 2104, Carboline 3300, Engard 230, or equal.

3. Total system DFT = 8 mils.

I. System 8 - Not Used

J. System 9 - Not Used

K. System 10 - Acrylic, Concrete: High molecular weight acrylic coating material shall have a minimum solids content of 35 percent by volume. Prime coat shall be an acrylic filler and sealer for concrete surfaces.

1. Prime coat (Filler/sealer), Engard 132, Koppers Block Sealer, Tnemec 54-560, or equal.

2. Finish coats (2 or more, DFT = 3 mils), Engard 230, Koppers 600, Tnemec 6, or equal.

L. System 11 - Aliphatic Polyurethane, Concrete: Two component aliphatic polyester polyurethane coating material shall provide superior color and gloss retention, resistance to splash from acid and alkaline chemicals, and resistance to chemical fumes and severe weathering, and with a minimum solids content of 58 percent by volume. Filler-sealer compound shall be a two-component epoxy material used to provide a smooth surface for the epoxy intermediate coat. The filler-surfacer is applied to the entire concrete surface and worked into the concrete surface with a wide blade putty knife or squeegee. The intermediate coat shall be a high-build polyamide epoxy coating with a minimum solids content of 70 percent by volume.

1. Prime coat (Filler-sealer), NU-Klad 114, Engard 481, Tnemec 63-1500, or equal.

2. Intermediate coat (DFT = 4 mils), Amercoat 400, Engard 480, Tnemec 104, or equal.

3. Finish coats (2 or more, DFT = 3 mils), Amershield, Engard 428 HS, Tnemec P71, or equal.

M. System 12 - Aliphatic Polyurethane, Fiberglass: Two-component

aliphatic polyurethane coating material shall provide superior color and gloss retention, resistance to splash from acid and alkaline chemicals, and resistance to chemical fumes and severe weathering. A primer, tie coat, or mist coat shall be used as recommended by the manufacturer.

1. Prime coat (Tie coat), Amercoat 185, Engard 420, Tnemec P66, or equal.

2. Finish coats (2 or more, DFT = 3 mils), Amershield, Engard 428 HS, Tnemec 73, or equal.

2.03 SUBMERGED AND SEVERE SERVICE COATING SYSTEMS

A. Materials Sources: The manufacturers' products listed in this paragraph are materials which satisfy the material descriptions of this paragraph and have a documented successful record for long term submerged or severe service conditions. If proposed materials are not listed below, the requirements of the paragraph entitled "Substitute or Or-Equal Submittals" apply. In addition, the Contractor shall submit for consideration a list of at least 10 installations with similar service conditions for which the proposed substitute or "or-equal" products have shown satisfactory performance for at least several years including the name, address, and phone number of the owner of each installation.

B. System 100 - Amine Cured Epoxy: High build, amine cured, straight epoxy resin shall have a solids content of at least 80 percent by volume, and shall be suitable for long-term immersion service in potable water. The material shall conform to Food and Drug Administration regulations for food additives.

1. Prime coat and finish coats (3 or more, DFT = 16 mils), Amercoat 395, Engard 480, Tnemec 104, or equal.

C. System 101 - Not Used

D. System 102 - Not Used

E. System 103 - Coal Tar Epoxy: High build, 2-component amine cured coal tar epoxy shall have a solids content of at least 68 percent by volume, suitable for long term immersion in wastewater and for coating of buried surfaces, and conforming to DOD-P-23236, Class 2, or to SSPC Paint 16. Prime coats are for use as a shop primer only. Prime coat shall be omitted when both surface preparation and coating are to be performed in the field.

1. Prime coat (DFT = 1.5 mils), Amercoat 71, Engard 422, Koppers 654, Tnemec P66, or equal.

2. Finish coats (2 or more, DFT = 16 mils), Amercoat 78 HB, Engard 464, Koppers 300-M, Tnemec 46 H-413, or equal.

3. Total system DFT = 17.5 mils.

F. System 104 - Coal Tar Epoxy, Concrete: High build, 2-component amine cured coal tar epoxy, shall have a solids content of at least 74 percent by volume, suitable for long term immersion in wastewater and for coating of buried surfaces and conforming to DOD-P-23236, Class 2, or to SSPC Paint 16. Filler-surfacer compound shall be a 2 component epoxy material used to fill voids and rough areas. The seal coat provides a smooth surface for the application of the coal tar epoxy. The seal coat is a two-component epoxy material with 100 percent solids and is applied to the entire concrete surface and worked into the concrete surface with a wide blade putty knife or a squeegee.

1. Seal coat, Nu-Klad 114, Engard 491, or equal.

2. Intermediate coat (DFT = 4 mils), Amercoat 78 HB, Engard 464, or equal.

3. Finish coats (2 or more, DFT = 16 mils), Amercoat 78 HB, Engard 464, or equal.

G. System 105 - Inorganic Zinc/Epoxy:

1. Inorganic Zinc Primer: Water or solvent based, self-curing 2 component inorganic coating shall contain a minimum of 85 percent metallic zinc by weight in the dried film and is recommended by the coating manufacturer as a primer for the epoxy material.

2. Polyamide Cured Epoxy: High build polyamide cured epoxy coating shall have a solids content of at least 70 percent by volume and a finish coat color of white. The material shall be capable of achieving at least 4 mils dry film thickness per coat.

3. Amine Cured Epoxy: High build amine cured epoxy coating shall have a solids content of at least 80 percent by volume and with a finish coat color of white or ivory. The material shall be capable of achieving at least 5 mils dry film thickness per

coat.

4. The epoxy coating material shall be a straight epoxy resin and shall be either a polyamide-cured epoxy or an amine-cured epoxy suitable for long-term immersion service in potable water. The material shall conform to Food and Drug Administration regulations for food additives and state and local health regulations and policies for service in potable water reservoirs. The Contractor shall submit a written certification that the proposed materials meet the above regulatory agency standards and policies. The material shall be applied with a primer if recommended by the coating manufacturer.

5. Part A: Products shall be as listed, or equal:

   a. Pre-coating, prior to erection. (DFT = 3 mils) Dimetcote 12, Carbo Zinc D11-HS, Engard 511, Tnemec 90-92. See Note (1) under Paragraph f.

   b. Touch up, following erection. (DFT = 3 mils) See Note (2) under Paragraph f.

   c. Difficult-to-coat areas, following erection. Amercoat 395, Carbo-line 191, Engard 480, Tnemec 139. See Note (3) under Paragraph f.

   d. Finish Coats (2 or more) (DFT = 8 mils) Amercoat 395, Carbo-line 191, Engard 480, Tnemec 139.

   e. Total system DFT = 11 mils

   f. Notes:

      (1) All lap roof plate edges are to be pre-coated. If necessary, zinc primer exposed on exterior of roof may be removed prior to welding.

      (2) Touch-up coating shall be accomplished for areas damaged during erection, or areas not pre-coated. The Contractor shall spot sandblast to SSPC-SP-5 before application of coating. Material used for touch-up shall be a compatible solvent based inorganic or organic zinc primer recommended by the manufacturer.

(3) All edges, nuts, bolts, lap joints, weld seams and the roof rim angle shall receive one brush-applied coat prior to the application of the complete spray coat.

6. Part B: Products shall be as listed, or equal:

a. Difficult-to-coat areas. Amercoat 395, Carbo-line 191, Engard 480, Tnemec 139. See Note (1) under Paragraph d.

b. Finish coats (2 or more). (DFT = 12 mils) Amercoat 395, Carbo-line 191, Engard 480; Tnemec 139. See Note (1) under Paragraph d.

c. Total system DFT = 12 mils.

d. Notes:

1) All edges, nuts, bolts, lap joints, and weld seams shall receive one brush-applied coat prior to the application of the first complete spray coat.

7. Curing Period: Prior to immersion, the completed system shall be subjected to at least 240 hours of curing time with the metal temperature at a minimum of 70 degrees F, or 480 hours at a minimum of 60 degrees F, both conditions at a maximum relative humidity of 50 percent and under the forced ventilation conditions required by the paragraph entitled "Curing of Coatings, herein. More curing time or a higher temperature shall be provided if recommended by the epoxy coating manufacturer. If the environmental conditions do not provide the necessary minimum temperature, use heated air to provide the necessary heat for curing. Other combinations of curing time and temperature may be used if the coating manufacturer presents satisfactory documentation and test results to substantiate that the degree of curing is equal or greater than curing for 240 hours at 70 degrees F.

8. Volatile Organic Compound Testing: *The completed interior reservoir coating system shall be tested for volatile organic compounds as specified herein this specification section.*

H. System 106 - Fusion Bonded Epoxy: The coating material shall be a 100 percent powder epoxy applied in accordance with the ANSI/AWWA C 213 "AWWA Standard for Fusion-Bonded Epoxy

Coating for the Interior and Exterior of Steel Water Pipelines", except that the surface preparation shall be as specified in the coating system schedule of this Section. The coating shall be applied using the fluidized bed process.

1. Liquid Epoxy: For field repairs or where, as confirmed by the Owner's Representative, it would be impossible to use the powder epoxy method without causing damage to the item, the use of a liquid epoxy will be permitted, applied in not less than 3 coats to provide a DFT of 15 mils. The liquid epoxy shall be a 100 percent solids epoxy recommended by the powder epoxy manufacturer.

2. Coating (DFT = 16 mils), Scotchkote 206N, Miccron 650, Miccron 651, or equal.

3. Total system DFT = 16 mils.

I. System 107 - Chemical Resistant Sheet Lining:

1. Materials: The Contractor shall use natural rubber, chlorobutyl, or neoprene sheet lining materials as specified herein. The shop drawing submittal shall contain technical information that confirms the suitability of the lining material system for long-term immersion in each chemical to be stored. The service temperatures are expected to be up to 150 degrees F.

2. Neoprene sheet lining material shall be synthetic rubber formulated for steam curing at atmospheric pressure. The minimum lining thickness shall be 3/16 inch. The lining material shall be B.F. Goodrich compound 59688, or equal.

3. Chlorobutyl sheet lining material shall be synthetic rubber formulated for steam curing at atmospheric pressure. The minimum lining thickness shall be 3/16 inch. The lining material shall be B.F. Goodrich compound 60924, or equal.

4. Natural rubber (soft) sheet lining material shall be soft natural rubber formulated for steam curing at atmospheric pressure. The minimum lining thickness shall be 3/16 inch. The lining material shall be B.F. Goodrich compound 83160, or equal.

5. Natural rubber (hard) sheet lining material shall be a hard, natural rubber resistant to oxidizing agents and formulated for autoclave curing. The minimum lining thickness shall be 3/16

inch. The lining material shall be, or equal, B.F. Goodrich compound 8631, or equal.

6. Primers, adhesives, activators, accelerators and other necessary materials shall be as specified by the sheet material manufacturer.

7. Metal Surface Preparation: Prior to abrasive blast cleaning the base metal shall be prepared as specified by the sheet lining material manufacturer's installation instructions. If the instructions differ from these specifications the highest degree of cleaning and surface preparation shall be provided. Abrasive blast cleaning shall be done in accordance with this Section.

8. Installation of lining materials shall be in accordance with the material manufacturer's written installation instructions. All interior surfaces shall be lined, including all piping, vents, fittings, flange faces, maintenance hole covers and blind flanges.

9. The lining system shall be holiday tested in accordance with this Section before and after curing.

10. The lining system shall be cured by steam using the time and temperature as specified by the material manufacturer.

11. Extended Maintenance: The Contractor shall promptly repair any defects in the lining system for a period of two years after the lining has been placed into service. Such maintenance shall include repair of the chemical tank and any equipment or facilities damaged by the corrosive action of the chemicals.

J. System 108 - Not Used

K. System 109 - Epoxy - Phenolic: Epoxy-phenolic amine cured resin with a solids content of at least 55 percent by volume, and suitable for long-term immersion in wastewater and exposure to the effects of hydrogen sulfide gas where there is the probability of sulfuric acid formation on the surfaces.

1. Prime coat and finish coats (3 or more, DFT = 12 mils), Plasite 7122, Amercoat 346, or equal.

L. System 110 - Epoxy - Phenolic, Concrete: Epoxy-phenolic amine cured resin with a solids content of at least 55 percent by volume, and

suitable for long-term immersion in wastewater and exposure to the effects of hydrogen sulfide gas where there is the probability of sulfuric acid formation on the surfaces. The filler-sealer shall be a 100 percent solids amine cured epoxy material with silica and inert fillers. A 100 percent solids epoxy surfacer shall be used to fill holes and patch the concrete surfaces after abrasive blasting.

1. Prime coat (filler-sealer), applied in two coats to the entire surface using a squeegee to achieve a smooth, void-free surface, Plasite 9028M1, Nu-Klad 105 followed by Nu-Klad 114, or equal.

2. Finish coats (2 or more, DFT = 12 mils), Plasite 7122, Amercoat 346, or equal. On stairways and in walking and working areas use Plasite 7122 HAR, or use Amercoat 346 with Amercoat 886 non-skid additive in the final coat.

M. System 111 - Vinyl Ester: Vinyl ester resin coating material with an inert flake pigment suitable for immersion service in 30 percent hydrochloric acid and 30 percent sulfuric acid solutions.

1. Two or more coats (DFT = 40 mils), Plasite 4100, Engard 436, or equal. Use a prime coat as recommended by the material manufacturer.

N. System 112 - Vinyl Ester-Concrete: Vinyl ester resin coating material with an inert flake pigment suitable for immersion service in hydrochloric acid and sulfuric acid solutions. The filler-sealer shall be a 100 percent solids amine-cured epoxy or vinyl ester material with silica and inert fillers. The filler-sealer is applied to the entire concrete surface. A 100 percent solids epoxy or vinyl ester surfacer shall be used to fill holes and patch the concrete surface after abrasive blasting.

1. Prime coat (filler-sealer), applied in two coats using a squeegee to achieve a smooth void-free surface, Plasite 9028 MI, Engard 490, or equal.

2. Finish coats (two or more, DFT = 40 mils), Plasite 4100, Engard 436, or equal.

## 2.04 SPECIAL COATING SYSTEMS

A. System 200 - PVC Tape: Prior to wrapping the pipe with PVC tape, the pipe and fittings first shall be primed using a primer recommended by the PVC tape manufacturer. After being primed, the pipe shall be

wrapped with a 20 mil adhesive PVC tape, half-lapped, to a total thickness of 40 mils.

B. System 201 - Rich Portland Cement Mortar: Rich Portland Cement mortar coating shall have a minimum thickness of 1/8 inch, followed by enclosure in an 8 mil thick polyethylene sheet with all joints and edges lapped and sealed with tape.

C. System 203 - Epoxy Surfacing: Two-component epoxy floor surfacing shall be formulated to resist many acids, alkalies, and solvents. Material shall be resistant to liquid alum, sodium hydroxide, and 50 percent sulfuric acid. Products shall be as follows, or equal:

1. Ameron Alternative: Prime coat Nu-Klad 105; finish coat Nu-Klad 110 (1/4-inch thick).

2. Engard Alternative: Prime coat Engard 491; finish coat Engard 481 (1/4-inch thick).

D. System 204 - Waterproofing: Two coats of a clear, non-staining, silane-modified-siloxane masonry waterproofing material. The Waterproofing System 204 after application shall be provided with not less than a five-year warranty on the performance of the product.

1. Where EPA Allows Solvents: Chemstop, "Heavy Duty Masonry Waterproofing"; Rainguard, "XS"; or equal.

2. Where EPA Prohibits Solvents: Chemstop, "Barricade"; Rainguard's "Blok-Lok"; Rainproof's "Chem-Trete #45"; or equal.

Surfaces shall be cleaned with a chemical (approved by waterproofing manufacturer) cleaner and power wash. Surfaces shall be clean and dry before application of waterproofing. Method and rate of application shall be in accordance with manufacturer's published instructions. A manufacturer's representative shall be present during applications if necessary for warranty.

E. System 205 - Polyethylene Encasement: Application of polyethylene encasement shall be in accordance with ANSI/AWWA C 105 using Method C.

F. System 206 - Cement Mortar Coating: A 1-1/2 inch minimum thickness mortar coating reinforced with ¾ inch galvanized welded wire fabric shall be provided. The cement mortar shall contain no less than one part Type V cement to 3 parts sand. The cement mortar

shall be cured by a curing compound meeting the requirements of "Liquid Membrane-Forming Compounds for Curing Concrete" ASTM C 309-81, Type II, white pigmented, or by enclosure in an 8 mil thick polyethylene sheet with all joints and edges lapped by at least 6-inches.

G. System 207 - Non-Slip Surfacing: Coating shall have one coat of Epoxo as manufactured by American Abrasive Metals Co., Inc., or one coat of Ameron Nu-Klad 100 with Amercoat 886 additive, or equal. The coating shall be gray in color. Application shall be by means of a roller and not more than 60 sq ft per gallon of non-slip coating shall be applied. Primer shall be as recommended by the coating manufacturer.

H System 208 - Aluminum Metal Isolation: A wash primer (0.5 mils) shall be applied, followed by one coat of heavy bodied bituminous paint, such as Koppers Super Service Black, Tnemec 46-465, or equal (8 mils). Total thickness of system (8.5 mils).

2.05 NSF / ANSI STANDARD 61

A. All coating materials and coating systems that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.

PART 3 - EXECUTION

3.01 STORAGE, MIXING, AND THINNING OF MATERIALS

A. Manufacturer's Recommendations: Unless otherwise specified herein, the coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting its coating materials, for preparation of surfaces for coating, and for all other procedures relative to coating shall be strictly observed. The Contractor shall supply the Owner’s Representative with copies of each manufacturer's instructions in accordance with the General Requirements.

B. All protective coating materials shall be used within the manufacturer's recommended shelf life.

C. Storage and Mixing: Coating materials shall be protected from exposure to cold weather, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings of different manufacturers shall not be mixed together.

## 3.02 PREPARATION FOR COATING

A. General: All surfaces to receive protective coatings shall be cleaned as specified herein prior to application of said coatings. The Contractor shall examine all surfaces to be coated, and shall correct all surface defects before application of any coating material. All marred or abraded spots on shop-primed and on factory-finished surfaces shall receive touch-up restoration prior to any coating application.

B. Protection of Surfaces Not to be Coated: Surfaces which are not to receive protective coatings shall be protected during surface preparation, cleaning, and coating operations.

C. All hardware, lighting fixtures, switch plates, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not to be painted shall be removed, masked or otherwise protected. Drop cloths shall be provided to prevent coating materials from falling on or marring adjacent surfaces. The working parts of all mechanical and electrical equipment shall be protected from damage during surface preparation and coating operations. Openings in motors shall be masked to prevent entry of coating or other materials.

D. Care shall be exercised not to damage adjacent work during blast cleaning operations. Spray painting shall be conducted under carefully controlled conditions. The Contractor shall be fully responsible for and shall promptly repair any and all damage to adjacent work or adjoining property occurring from blast cleaning or coating operations.

E. Protection of Painted Surfaces: Cleaning and coating shall be so programmed that dust and other contaminants from the cleaning process will not fall on wet, newly-coated surfaces.

## 3.03 SURFACE PREPARATION STANDARDS

A. The following referenced surface preparation specifications of the Steel Structures Painting Council shall form a part of this specification:

1. Solvent Cleaning (SSPC-SP1): Removal of oil, grease, dirt, soil, salts, and contaminants by cleaning with solvent, vapor, alkali, emulsion, or steam.

2. Hand Tool Cleaning (SSPC-SP2): Removal of loose rust, loose mill scale, and loose paint to degree specified, by hand chipping, scraping, sanding, and wire brushing.

3. Power Tool Cleaning (SSPC-SP3): Removal of loose rust, loose mill scale, and loose paint to degree specified by power tool chipping, descaling, sanding, wire brushing, and grinding.

4. White Metal Blast Cleaning (SSPC-SP5/NACE1): Removal of all visible rust, mill scale, paint, and foreign matter by blast cleaning by wheel or nozzle (dry or wet) using sand, grit, or shot.

5. Commercial Blast Cleaning (SSPC-SP6/NACE3): Blast cleaning until at least two-thirds of each element of surface area is free of all visible residues.

6. Brush-Off Blast Cleaning (SSPC-SP7/NACE4): Blast cleaning of all except tightly adhering residues of mill scale, rust, and coatings, exposing numerous evenly distributed flecks of underlying metal.

7. Near-White Blast Cleaning (SSPC-SP10/NACE2): Blast cleaning nearly to White Metal Cleanliness, until at least 95 percent of each element of surface area is free of all visible residues.

B. The Contractor shall note that the definition of Near White Metal Blast Cleaning, SSPC-SP10, is from the 1995 version of the SSPC standard, and requires that 95 percent of "each element" of surface area be free of all visible residues. The other surface preparation standards shall be the most recent versions published by the SSPC.

3.04 METAL SURFACE PREPARATION (UNGALVANIZED)

A. The minimum abrasive blasting surface preparation shall be as specified in the coating system schedules included at the end of this Section. Where there is a conflict between these specifications and the coating manufacturer's printed recommendations for the intended service, the higher degree of cleaning shall apply.

B. Workmanship for metal surface preparation shall be in conformance with the current SSPC Standards and this Section. Blast cleaned surfaces shall match the standard samples available from the National Association of Corrosion Engineers, NACE Standard TM-01-70.

C. All oil, grease, welding fluxes and other surface contaminants shall be removed by solvent cleaning per SSPC-SP1 prior to blast cleaning.

D. All sharp edges shall be rounded or chamfered and all burrs, and surface defects and weld splatter shall be ground smooth prior to blast cleaning.

E. The type and size of abrasive shall be selected to produce a surface profile that meets the coating manufacturer's recommendation for the particular coating and service conditions.

F. The abrasive shall not be reused unless otherwise approved by the Owner's Representative. For automated shop blasting systems, clean oil-free abrasives shall be maintained.

G. The Contractor shall comply with the applicable federal, state, and local air pollution control regulations for blast cleaning.

H. Compressed air for air blast cleaning shall be supplied at adequate pressure from well maintained compressors equipped with oil/moisture separators which remove at least 95 percent of the contaminants.

I. Surfaces shall be cleaned of all dust and residual particles of the cleaning operation by dry air blast cleaning, vacuuming or another approved method prior to painting.

J. Enclosed areas and other areas where dust settling is a problem shall be vacuum cleaned and wiped with a tack cloth.

K. Damaged or defective coating shall be removed by the specified blast cleaning to meet the clean surface requirements before recoating.

L. If the specified abrasive blast cleaning will damage adjacent work, the area to be cleaned is less than 100 square feet, and the coated surface will not be submerged in service, then SSPC-SP2, hand tool cleaning or SSPC-SP3, power tool cleaning, may be used.

M. Shop applied coatings of unknown composition shall be completely removed before the specified coatings are applied. Valves, castings, ductile or cast iron pipe, and fabricated pipe or equipment shall be examined for the presence of shop-applied temporary coatings. Temporary coatings shall be completely removed by solvent cleaning per SSPC-SP1 before the abrasive blast cleaning work has been started.

N. Shop primed equipment shall be solvent cleaned in the field before finish coats are applied.

3.05 SURFACE PREPARATION FOR GALVANIZED FERROUS METAL

A. Galvanized ferrous metal shall be alkaline cleaned per SSPC-SP1 to remove oil, grease, and other contaminants detrimental to adhesion of the protective coating system to be used.

B. Pretreatment coatings of surfaces shall be in accordance with the printed recommendations of the coating manufacturer.

3.06 SURFACE PREPARATION OF FERROUS SURFACES WITH EXISTING COATINGS

A. General: All grease, oil, heavy chalk, dirt, or other contaminants shall be removed by solvent or detergent cleaning prior to abrasive blast cleaning. The generic type of the existing coatings shall be determined by laboratory testing.

B. Abrasive Blast Cleaning: The Contractor shall provide the degree of cleaning specified in the coating system schedule for the entire surface to be coated. If the degree of cleaning is not specified in the schedule, deteriorated coatings shall be removed by abrasive blast cleaning to SSPC-SP10 - Near-White Blast Cleaning. Areas of tightly adhering coatings shall be cleaned to SSPC-SP7, Brush-off Blast Cleaning, as approved by the Owner's Representative, with the remaining thickness of existing coating not to exceed 3 mils. The resultant sand from the sandblasting operations shall be removed and disposed of by the Contractor. The Contractor shall pay for all cost associated with the disposal of the residue.

C. Incompatible Coatings: If coatings to be applied are not compatible with existing coatings the Contractor shall apply intermediate coatings per the paint manufacturer's recommendation for the specified coating system or shall completely remove the existing coating prior to abrasive blast cleaning. A small trial application shall be conducted for compatibility prior to painting large areas.

D. Unknown Coatings: Coatings of unknown composition shall be completely removed prior to application of new coatings.

E. Water Abrasive or Wet Abrasive Blast Cleaning: Where specified or where job site conditions do not permit dry abrasive blasting for industrial coating systems due to dust or air pollution considerations,

water abrasive blasting or wet abrasive blasting may be used. In both methods, paint-compatible corrosion inhibitors shall be used, and coating application shall begin as soon as the surfaces are dry. Water abrasive blasting shall be accomplished using high-pressure water with sand injection. In both methods, the equipment used shall be commercially produced equipment with a successful service record. Wet blasting methods shall not be used for submerged and severe service coating systems unless specified.

3.07 CONCRETE AND CONCRETE BLOCK MASONRY SURFACE PREPARATION

A. Surface preparation shall not begin until at least 30 days after the concrete or masonry has been placed.

B. All oil, grease, and form release and curing compounds shall be removed by detergent cleaning per SSPC-SP1 before abrasive blast cleaning.

C. Concrete, concrete block masonry surfaces and deteriorated concrete surfaces to be coated shall be abrasive blast cleaned to remove existing coatings, laitance, deteriorated concrete, and to roughen the surface equivalent to the surface of the No. 80 grit flint sandpaper.

D. If acid etching is required by the coating application instructions the treatment shall be made after abrasive blasting. After etching, rinse surfaces with water and test the pH. The pH shall be between neutral and 8.

E. Surfaces shall be clean and as recommended by the coating manufacturer before coating is started.

F. Unless required for proper adhesion, surfaces shall be dry prior to coating. The presence of moisture shall be determined with a moisture detection device such as Delmhorst Model DB, or equal.

3.08 PLASTIC, FIBERGLASS AND NON-FERROUS METALS SURFACE PREPARATION

A. Plastic and fiberglass surfaces shall be sanded or brush off blast cleaned prior to solvent cleaning with a chemical compatible with the coating system primer.

B. Non-ferrous metal surfaces shall be solvent-cleaned SSPC-SP1 followed by sanding or brush-off blast cleaning SSPC-SP7/NACE4.

C. All surfaces shall be clean and dry prior to coating application.

3.09 ARCHITECTURAL CONCRETE BLOCK MASONRY SURFACE PREPARATION

A. The mortar surfaces shall be cured at least 14 days before surface preparation work is started.

B. Dust, dirt, grease, and other foreign matter shall be removed prior to abrasive blasting.

C. The masonry surfaces shall be prepared in accordance with the material manufacturer's printed instructions.

3.10 WORKMANSHIP

A. Skilled craftsmen and experienced supervision shall be used on all work.

B. Clean drop cloths shall be used. All damage to surfaces resulting from the work hereunder shall be cleaned, repaired, and refinished to their original condition.

C. All coatings shall be applied under dry and dust-free conditions. Coating shall be accomplished in a workmanlike manner so as to produce an even film of uniform thickness. Edges, corners, crevices, and joints shall receive special attention to insure that they have been thoroughly cleaned and that they receive an adequate thickness of coating material. The finished surfaces shall be free from runs, drops, ridges, waves, laps, brush marks, and variations in color, texture, and finish. The hiding shall be so complete that the addition of another coat would not increase the hiding. Special attention shall be given to insure that edges, corners, crevices, welds, and similar areas receive a film thickness equivalent to adjacent areas, and installations shall be protected by the use of drop cloths or other approved precautionary measures.

3.11 SHOP COATING REQUIREMENTS

A. All items of equipment, or parts of equipment which are not submerged in service, shall be shop primed and then finish coated in the field after installation with the specified or approved color. The methods, materials, application equipment and all other details of shop painting shall comply with this section. If the shop primer requires topcoating within a specified period of time, the equipment

shall be finish coated in the shop and then touch-up painted after installation.

B. All items of equipment, or parts and surfaces of equipment which are submerged or inside an enclosed hydraulic structure when in service, with the exception of pumps and valves, shall have all surface preparation and coating work performed in the field.

C. The interior surfaces of steel reservoirs shall have all surface preparation and coating work performed in the field.

D. For certain pieces of equipment it may be undesirable or impractical to apply finish coatings in the field. Such equipment may include engine generator sets, equipment such as electrical control panels, switchgear or main control boards, submerged parts of pumps, ferrous metal passages in valves, or other items where it is not possible to obtain the specified quality in the field. Such equipment shall be shop primed and finish coated and touched up in the field with the identical material after installation. The Contractor shall require the manufacturer of each such piece of equipment to certify as part of its shop drawings that the surface preparation is in accordance with these specifications. The coating material data sheet shall be submitted with the shop drawings for the equipment.

E. For certain small pieces of equipment the manufacturer may have a standard coating system which is suitable for the intended service conditions. In such cases, the final determination of suitability will be made during review of the shop drawing submittals. Equipment of this type generally includes only indoor equipment such as instruments, small compressors, and chemical metering pumps.

F. Shop painted surfaces shall be protected during shipment and handling by suitable provisions including padding, blocking, and the use of canvas or nylon slings. Primed surfaces shall not be exposed to the weather for more than 6 months before topcoated, or less time if recommended by the coating manufacturer.

G. Damage to shop-applied coatings shall be repaired in accordance with this Section and the coating manufacturers printed instructions.

H. The Contractor shall make certain that the shop primers and field topcoats are compatible and meet the requirements of this Section. Copies of applicable coating manufacturer's data sheets shall be submitted with equipment shop drawings.

## 3.12 APPLICATION OF COATINGS

A. The application of protective coatings to steel substrates shall be in accordance with "Paint Specification No. 1, (SSPC-A-1)", Steel Structures Painting Council.

B. Cleaned surfaces and all coats shall be inspected prior to each succeeding coat. The Contractor shall schedule such inspection with the Owner's Representative in advance.

C. Blast cleaned ferrous metal surfaces shall be painted before any rusting or other deterioration of the surface occurs. Blast cleaning shall be limited to only those surfaces that can be coated in the same working day.

D. Coatings shall be applied in accordance with the manufacturer's instructions and recommendations, and this Section, whichever has the most stringent requirements.

E. Special attention shall be given to edges, angles, weld seams, flanges, nuts and bolts, and other places where insufficient film thicknesses are likely to be present. Use stripe painting for these areas.

F. Special attention shall be given to materials which will be joined so closely that proper surface preparation and application are not possible. Such contact surfaces shall be coated prior to assembly or installation.

G. Finish coats, including touch-up and damage repair coats shall be applied in a manner which will present a uniform texture and color matched appearance.

H. Coatings shall not be applied under the following conditions:

1. Temperature exceeding the manufacturer's recommended maximum and minimum allowable.

2. Dust or smoke laden atmosphere.

3. Damp or humid weather.

4. When the substrate or air temperature is less than 5 degrees F above dewpoint.

5. When air temperature is expected to drop below 40 degrees F

or less than 5 degrees F above the dewpoint within 8 hours after application of coating.

I. Dewpoint shall be determined by use of a sling psychrometer in conjunction with U.S. Dept. of Commerce, Weather Bureau psychrometric tables.

J. Steel piping shall be abrasive blast cleaned and primed before installation.

K. The finish coat on all work shall be applied after all concrete, masonry, and equipment installation is complete and the work areas are clean and dust free.

3.13 CURING OF COATINGS

A. The Contractor shall provide curing conditions in accordance with the conditions recommended by the coating material manufacturer or by this Section, whichever is the highest requirement, prior to placing the completed coating system into service.

B. In the case of enclosed areas, forced air ventilation, using heated air if necessary, may be required until the coatings have fully cured.

C. Forced Air Ventilation of Steel Reservoirs and Enclosed Hydraulic Structures: Forced air ventilation is required for the application and curing of coatings on the interior surfaces of steel reservoirs and enclosed hydraulic structures. During curing periods continuously exhaust air from a maintenance hole in the lowest shell ring, or in the case of an enclosed hydraulic structure, from the lowest level of the structure using portable ducting. After all interior coating operations have been completed provide a final curing period for a minimum of 10 days, during which the forced ventilation system shall operate continuously. For additional requirements, refer to the specific coating system being used in the paragraph entitled "Submerged and Severe Service Coating Systems" herein.

3.14 TESTING FOR VOLATILE ORGANIC COMPOUNDS IN POTABLE WATER RESERVOIRS

A. General: The Contractor shall provide the following services to ensure that the interior reservoir coatings or linings do not convey volatile organic compounds to the potable water.

B. Selection of Coating or Lining Material: The Contractor shall provide a coating or lining system that has a successful record in meeting the

national, regional, and local regulations and policies pertaining to leaching of volatile organic compounds into potable water.

C. Before the coating or lining materials are used, the Contractor shall by letter notify the regulatory agency having jurisdiction. The letter shall describe the proposed materials, including brand names, catalog numbers, catalog technical data, application and curing instructions, and material safety data sheets.

D. The Contractor shall provide curing time, temperature and ventilations as specified by the manufacturer or this Section, whichever is the highest requirement. In some cases, the Contractor may find it necessary to extend the curing time or ventilation time beyond the requirements in order to comply with the regulatory agency requirements or to reduce the leached organic compounds to the required levels. All costs in connection with any extended curing times shall be borne by the Contractor.

E. Following the curing or ventilation period, the Contractor shall clean, disinfect and fill the reservoir as specified.

F. *A 7 day soaking period shall follow initial filling to determine the presence of any leached organics.* Before the tank is placed into service, samples of the water in the tank will be taken by the Owner's Representative and analyzed by a laboratory approved by the State or the EPA. Analyses will be for volatile organic compounds by EPA Method 624 or equivalent (this test includes TCE, PCE, xylenes, toluene, ketones, carbon tetrachloride, and similar compounds). The costs of testing shall be borne by the Contractor.

G. If the tests results are above either (1) 0.005 mg/l for TCE, 0.004 mg/l for PCE, 0.62 mg/l for xylenes, 0.10 mg/l for toluene, 0.75 mg/l for methyl-ethyl ketone (to be used as representative for all ketone compounds), 0.005 mg/l for carbon tetrachloride, or (2) the regulatory agency's recommended Action Level Limits, whichever is less, the Contractor shall drain the water from the tank and flush, refill, and retest at no additional cost to the Owner. The Contractor shall provide as many curing, soaking, and flushing cycles as necessary to reduce the leached volatile organic compounds to levels below the requirements.

## 3.15 IDENTIFICATION OF PIPING

A. Identification of piping shall be in accordance with Section 15780 – Treatment Plant Piping Identification Systems.

B. Every valve or connection, where it may be possible for a worker to be exposed to a hazardous substance, shall be labeled per General Industry Safety Orders, Article 112 OSHA Occupational Safety and Health Standards 29 CFR 1910.

C. All unburied pipe in structures and in chemical pipe trenches shall be color-code painted. Colors shall be as specified in Section 15780 – Treatment Plant Piping Identification Systems, as selected by the Owner's Representative, or as shown.

D. All unburied chemical pipes, including chemical pipes in structures and chemical pipe trenches shall be color-code painted. Colors shall be as specified in Section 15780 – Treatment Plant Piping Identification Systems, as selected by the Owner's Representative, or as shown.

## 3.16 PROJECT SPECIFIC COATING SYSTEM SCHEDULES

The following items shall be coated as specified. Any item not specified shall be coated in accordance with applicable Coating System Schedule as follows:

| Item Designation | System No. | Surface |
|---|---|---|
| FM-1 | 5. | Steel, Cast Iron and Ductile Iron. This includes the Finish Water Piping as previously described in this section. |
| NFM-4 | 7. | Above grade PVC piping and fittings, and rubber expansion joint fittings. This includes the Finish Water Piping. |
| FM-3 | 100. | Surfaces of equipment and ferrous surfaces submerged or intermittently submerged in potable water or utility water, including all surfaces lower than 2 feet above high water level and all surfaces inside enclosed hydraulic structures and vents (excluding shop-coated valves, couplings, pumps, mixers). |

A. Coating System Schedule, Ferrous Metal - Not Galvanized:

| ITEM DESIGNATION | ITEM | SURFACE PREPARATION | SYSTEM NO. |
|---|---|---|---|
| FM-1 | All exposed surfaces indoors and outdoors. | Commercial Blast Cleaning SSPC-SP6/NACE3 | (1) alkyd enamel |
| FM-1 | All exposed surfaces indoors and outdoors. | Commercial Blast Cleaning SSPC-SP6/NACE3 | (4) aliphatic polyurethane |
| FM-1 | All exposed surfaces indoors and outdoors, and exterior surfaces of Steel Reservoirs. | Near-White Metal Blast cleaning SSPC-SP10/NACE2 | (5) inorganic zinc/epoxy/ polyurethane |
| FM-2 | Surfaces in chlorination room, chlorine storage room. | Commercial Blast Cleaning SSPC-SP6/NACE3 | (100) amine-cured epoxy |
| FM-3 | Surfaces of equipment and ferrous surfaces submerged or intermittently submerged in potable water or utility water, including all surfaces lower than 2-feet above high water level and all surfaces inside enclosed hydraulic structures and vents (excluding shop-coated valves, couplings, pumps). | White Metal Blast Cleaning SSPC-SP5/NACE1 | (100) amine-cured epoxy |
| FM-4 | Surfaces of equipment and ferrous surfaces submerged or intermittently submerged in wastewater, including all | White Metal Blast Cleaning SSPC-SP5/NACE1 | (103) coal tar epoxy |

| | | | |
|---|---|---|---|
| | surfaces lower than 2-feet above high water level and all surfaces inside enclosed hydraulic structures (excluding shop-coated valves, couplings, pumps). | | |
| FM-5 | Surfaces exposed to high temperature (between 150 and 600 degrees F). | Near-White Metal Blast Cleaning SSPC-SP10/NACE2 | (6) inorganic zinc,water-based |
| FM-6 | Surfaces exposed to high temperature (between 600 and 1000 degrees F). | Near-White Metal Blast Cleaning SSPC-SP10/NACE2 | (3) aluminum silicone resin |
| FM-7 | Buried small steel pipe. | Removal of dirt, grease, oil | (200) PVC tape |
| FM-8 | Buried pipe couplings, valves, and flanged joints (where piping is plastic). | Removal of dirt, grease, oil | (201) rich portland cement mortar |
| FM-9 | Buried pipe couplings, valves, and flanged joints (where piping is not plastic, or tape-coated, or mortar-coated steel), including epoxy-coated surfaces. | As specified by reference specification | (205) polyethylene encasement |
| FM-10 | Buried pipe couplings, valves, and flanged joints (where piping is mortar-coated steel or reinforced concrete), including epoxy-coated surfaces. | Removal of dirt, grease, oil | (206) cement-mortar coating |
| FM-11 | Ferrous surfaces in water passages of all valves 4-inch size and | White Metal Blast Cleaning SSPC-SP5/NACE1 | (100) amine-cured epoxy |

| | | | |
|---|---|---|---|
| | larger, exterior surfaces of submerged valves. | | |
| FM-12 | Where shown or specified, ferrous surfaces in water passages and submerged surfaces of all pumps which have a discharge size of 4-inches or larger. | White Metal Blast Cleaning SSPC-SP5/NACE1 | (106) fusion-bonded epoxy |
| FM-13 | Ferrous surfaces of sleeve-couplings. | White Metal Blast Cleaning SSPC-SP5/NACE1 | (106) fusion-bonded expoxy |
| FM-14 | All ferrous surfaces of sluice gates, flap gates, and shear gates, including wall thimbles. | White Metal Blast Cleaning SSPC-SP5/NACE1 | (106) fusion-bonded epoxy |
| FM-15 | Buried surfaces that are not specified to be coated | Near-White Metal Blast Cleaning SSPC-SP10/NACE2 | (103) coal tar epoxy |
| FM-16 | Indoor sheet metal, flashings, exposed ducts. | Commercial Blast Cleaning SSPC-SP6/NACE3 | (1) alkyd enamel |
| FM-17 | Interior surfaces of all chemical tanks, except caustic soda tanks, including tank nozzles, manholes, nozzle necks, flange faces. | White Metal Blast Cleaning SSPC-SP5/NACE1 | (107) chemical-resistant sheet lining |
| FM-18 | Surfaces of indoor equipment. | Commercial Blast Cleaning SSPC-SP6/NACE3 | (1) alkyd enamel |
| FM-19 | Existing ferrous equipment or surfaces of exterior steel reservoirs which are required to be re-coated | Near-White Metal Blast Cleaning - SSPC - SP10/NACE2 | (5) inorganic zinc/epoxy/ polyurethane |

as part of this Work.

B. Coating System Schedule, Ferrous Metal - Galvanized: Pretreatment coatings, barrier coatings, or washes shall be applied as recommended by the coating manufacturer. All galvanized surfaces shall be coated. All galvanized surfaces except for the following items shall be coated unless coating is required by other Sections: (1) Floor gratings and frames, (2) Handrails, (3) Stair treads, (4) Chain link fencing and appurtenances, (5) Owner's Representatives selected items.

| ITEM DESIGNATION | ITEM | SURFACE PREPARATION | SYSTEM NO. |
|---|---|---|---|
| FMG-1 | All exposed surfaces indoors and outdoors, except those included below. | Alkaline Cleaning SSPC-SP1 | (1) alkyd enamel |
| FMG-1 | All exposed surfaces indoors and outdoors, except those below. | Alkaline Cleaning SSPC-SP1 | (4) epoxy/aliphatic polyurethane |
| FMG-2 | Surfaces in chlorinator room, chlorine storage room. | Alkaline Cleaning SSPC-SP1 | (100) amine-cured epoxy |
| FMG-3 | Buried small steel pipe. | Removal of dirt, grease, oil | (200) PVC tape |
| FMG-4 | Surfaces buried or submerged in wastewater. | Alkaline Cleaning SSPC-SP1 followed by Brush-Off Grade Blast Cleaning SSPC-SP7/NACE4 | (103) coal tar epoxy |
| FMG-5 | Buried miscellaneous surfaces, couplings, valves, and flanged joints. | Removal of dirt, grease, oil | (201) rich portland cement mortar |
| FMG-6 | Indoor sheet metal flashings, exposed ducts. | Alkaline Cleaning SSPC-SP1 | (1) alkyd enamel |

C. Coating System Schedule, Steel Reservoir Interior: For steel reservoir exterior coating system, see "Coating System Schedule, Ferrous Metal-Not Galvanized". The interior surfaces of steel reservoirs shall have all surface preparation and coating work performed in the field.

| ITEM DESIGNATION | ITEM | SURFACE PREPARATION | SYSTEM NO. |
|---|---|---|---|
| SR-1 | All interior surfaces beginning one foot above high water level, including all plates, roof structural members, fittings, and vents. | White Metal Blast Cleaning SSPC-SP5/NACE1 | (105) Part A, inorganic zinc/epoxy |
| SR-2 | Underside of column bases, floor under column bases before columns set in place, submerged contact surfaces that are not accessible after erection. | White Metal Blast Cleaning SSPC-SP5/NACE1 | (105) Part B, inorganic zinc/epoxy |
| SR-3 | Interior surfaces exclusive of surfaces in SR-1 and SR-2 above, including overflow, drain and other piping out to the first valve or coupling. | White Metal Blast Cleaning SSPC-SP5/NACE1 | (105) Part B, inorganic zinc/epoxy |

D. Coating System Schedule, Steel Digester Floating Covers and Digester Gasholders:

| ITEM DESIGNATION | ITEM | SURFACE PREPARATION | SYSTEM NO. |
|---|---|---|---|
| SD-1 | All ferrous surfaces submerged in water or sludge, including rim plate. | White Metal Blast Cleaning SSPC-SP5/NACE1 | (103) coal tar epoxy |
| SD-2 | All ferrous surfaces exposed to digester | White Metal Blast Cleaning SSPC- | (103) coal tar epoxy |

| | | | |
|---|---|---|---|
| | gas. | SP5/NACE1 | |
| SD-3 | All interior ferrous surfaces of gasholder shell, including top angle. | White Metal Blast Cleaning SSPC-SP5/NACE1 | (103) coal tar epoxy |
| SD-4 | All ungalvanized interior surfaces inside digester roof, between and including the ceiling plate and the roof deck. | Near-White Metal Blast Cleaning SSPC-SP10/NACE2 | (6) inorganic zinc, water-based |
| SD-5 | Exposed, outdoors. | Commercial Blast Cleaning SSPC-SP6/NACE3 | (4) epoxy/aliphatic polyurethane |

## 3.17 COATING SYSTEM SCHEDULE, NON-FERROUS METAL, PLASTIC, FIBERGLASS

A. Where isolated non-ferrous parts are associated with equipment or piping, the Contractor shall use the coating system for the adjacent connected surfaces. Do not coat handrails, gratings, frames or hatches. Only primers recommended by the coating manufacturer shall be used.

| ITEM DESIGNATION | ITEM | SURFACE PREPARATION | SYSTEM NO. |
|---|---|---|---|
| NFM-1 | All exposed surfaces, indoors and outdoors, except those included below. | Solvent Cleaned SSPC-SP1 | (1) alkyd enamel |
| NFM-1 | All exposed surfaces, indoors and outdoors, except those included below. | Solvent Cleaned SSPC-SP1 | (4) epoxy/aliphatic polyurethane |
| NFM-2 | Chlorination room, chlorine storage room. | Solvent Cleaned SSPC-SP1 | (100) amine-cured epoxy |
| NFM-3 | Aluminum surfaces in contact with concrete, or with any other metal except galvanized ferrous metal. | Solvent Cleaned SSPC-SP1 | (208) aluminum metal isolation |
| NFM-4 | Polyvinyl chloride plastic piping, indoors and outdoors, or in structures, not submerged. | Solvent Cleaned SSPC-SP1 | (7) acrylic latex |
| NFM-5 | Fiberglass surfaces. | Per Section 3.08 | (12) aliphatic polyurethane fiberglass |
| NFM-6 | Buried non-ferrous metal pipe. | Removal of dirt, grease, oil | (200) PVC tape |

## 3.18 COATING SYSTEM SCHEDULE-CONCRETE

| ITEM DESIGNATION | ITEM | SURFACE PREPARATION | SYSTEM NO. |
|---|---|---|---|
| C-1 | Exposed indoors and outdoors, as shown. | Per Section 3.07 | (10) acrylic, concrete |
| C-2 | Submerged in wastewater including surfaces up to 2-feet above high water line and down to 2-feet below low water line and all surfaces in an enclosed structure, as shown. | Per Section 3.07 | (104) coal tar epoxy, concrete |
| C-2 | Submerged in wastewater including surfaces up to 2-feet above high water line and down to 2-feet below low water line and all surfaces in an enclosed structure, as shown. | Per Section 3.07 | (110) epoxy-phenolic, concrete |
| C-3 | Floor slab, exposure to chemicals, as shown. | Per Section 3.07 | (203) epoxy surfacing |
| C-4 | Floor slab, non-slip surface, as shown. | Per Section 3.07 | (207) non-slip surfacing |
| C-5 | Interior surfaces of sewer manholes, including sidewalls, bottom, and metal appurtenances, for manholes shown. | Per Section 3.07 | (104) coal tar epoxy, concrete |
| C-5 | Interior surfaces of sewer manholes, including sidewalls, bottom, and metal appurtenances, for | Per Section 3.07 | (110) epoxy-phenolic, concrete |

| | | | |
|---|---|---|---|
| | manholes shown. | | |
| C-6 | Walls, exposure to chemical splash, washdown, as shown. | Per Section 3.07 | (11) aliphatic polyurethane, concrete |

3.19 COATING SYSTEM SCHEDULE-CONCRETE BLOCK MASONRY

| ITEM DESIGNATION | ITEM | SURFACE PREPARATION | SYSTEM NO. |
|---|---|---|---|
| CBM-1 | Exposed, indoors and outdoors, as shown. | Per Section 3.09 | (10) acrylic, concrete |
| CBM-2 | Submerged in wastewater, including all vertical masonry surfaces above waterline as shown. | Per Section 3.09 | (104) coal tar epoxy, concrete |
| CBM-2 | Submerged in wastewater, including all vertical masonry surfaces above waterline as shown. | Per Section 3.09 | (110) epoxy-phenolic concrete |
| CBM-3 | Exterior surfaces, above grade. | Per Section 3.09 | (204) waterproofing |

3.20 COATING OVERSPRAY ON VEHICLES

Contractor shall issue that all vehicles in the vicinity of the project site are relocated away from any coating overspray areas prior to initiation of coating activities. Contractor shall be responsible for any damage of vehicles caused by coating overspray. Contractors or Contractor insurance company shall promptly evaluate and asses any complaints regarding coating overspray rectify and remedy any damages resultant from coating overspray in an expeditious fashion.

**END OF SECTION 09800**

# SECTION 11900 – IN-RESERVOIR THM REMOVAL SYSTEM

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. These specifications provide the requirements to furnish, install, and place into operation a Trihalomethane Removal System (TRS) using floating spray equipment in the 2.4 million gallons (MG) Steel Water Reservoir Tank at City of Holtville Water Treatment Plant in Holtville, CA.

B. The Existing 2.4 MG Steel Water Reservoir Tank was constructed in 2010, and is an A36 Steel Tank with aluminum Geodesic Dome Roof.

The Existing 2.4 MG Tank is 128 feet in diameter with a height of 28 feet - 8.5 inches. The operational water level is to fluctuate from 21 feet to 23.5 feet.

The Existing Ground Water Storage Tanks operate in series. Finish water is conveyed through the UV Disinfection Building and into the 1.5 MG Steel Water Reservoir Tank at the west side inlet.

Water currently travels from the 1.5 MG Storage Tank through the 12-inch dia. backwash PVC pipeline into the 2.4 MG Storage Tank. Water proceeds to exit out of the 2.4 MG Storage Tank from the west side outlet pipeline to the distribution booster pump station. *However, Improvements to the Finish Water Piping are shown on Plan Sheet 9 of the Drawings*.

TTHM testing is shown below, along with data reported to the State are from Site 9 and Site 10 (Section C – Historical TTHM Testing Data).

As-Built plans and submittals for the 2.4 MG Storage Tank are attached in the Special Conditions. Any recent TTHM testing data are available from the Owner upon request.

C. Historical TTHM testing data:

1. Water Storage Tank TTHM Data

| Sample Date | East 2.4 MG Tank TTHM's (ppb) |
|---|---|
| 08/13/14 | 120 |
| 11/19/14 | 96 |
| 02/11/15 | 52 |
| 05/13/15 | 99 |
| 08/12/15 | 120 |
| 11/18/15 | 66 |

| | |
|---|---|
| 02/10/16 | 60 |
| 05/11/16 | 84 |
| 08/09/16 | 87 |
| 11/08/16 | 65 |
| 02/15/17 | 44 |
| 05/10/17 | 47 |

2. TTHM Report for Disinfection Byproducts Compliance

| Sample Date | Distribution System Site 9 (Hydrant @ Melon Ave. & Underwood Rd. – 1 mile away from Plant) | Distribution System Site 10 (Hydrant @ 2009 Anderholt Rd. – 2 miles away from Plant) |
|---|---|---|
| 08/13/14 | 91 | 93 |
| 11/19/14 | 83 | 84 |
| 02/11/15 | 86 | 88 |
| 05/13/15 | 110 | 110 |
| 08/12/15 | 140 | 140 |
| 11/18/15 | 77 | 80 |
| 02/10/16 | 65 | 66 |
| 05/11/16 | 93 | 91 |
| 08/09/16 | 78 | 93 |
| 11/08/16 | 60 | 54 |
| 02/15/17 | 50 | 44 |
| 05/10/17 | 69 | 58 |

D. Flows

| | Average Total Flow Through: (GPM) | Peak Total Flow Through: (GPM) | May System Flow Rate: (GPM) | Max Fill Rate: (GPM) |
|---|---|---|---|---|
| Whole System | 806 | 1,514 | 1,514 | - |
| Through Tanks (Tanks in series) | 889 | 1,400 | - | 1,400 |

1.02 REFERENCES

A. Occupational Safety and Health Administration, OSHA

B. Department of Transportation, DOT

C. Underwriters Laboratories Inc., UL 508

D. NSF / ANSI Standard 61

## 1.03 QUALITY ASSURANCE

A. Continuous Operation Equipment. The floating spray equipment shall operate continuously, all day and all night, using three-phase 230 VAC or 460VAC as the power source.

B. No Visual Defects. The floating spray equipment shall have no visual defects, and shall have high quality welds, assembly, and corrosion resistant finish.

C. Qualified Manufacturer/Supplier. The manufacturer of the equipment shall have extensive experience in the production and installation of such equipment. Manufacturer shall submit evidence of at least five (5) years experience and five (5) previous installations with site contact information.

D. Factory Startup Services. Delivery, installation and startup services shall be included in the bid. For factory delivery and installation, services shall be performed by full time factory employees experienced in the operation of this equipment and who have completed OSHA safety trainings applicable to this type of installation.

E. Within 30 days following installation, the manufacturer shall provide an installation report detailing as described in Section 1.04 - Submittals.

F. Warranty. The THMR floating spray equipment shall be warranted to be free of defects in materials and workmanship for a period of 2 years. See Performance Warranty conditions in Part 3 following.

## 1.04 SUBMITTALS

A. Submittals shall be made in accordance with Section 1330 – Submittals/Shop Drawings and the General Requirements herein.

B. The awarded Bidder shall provide [3] copies of the following documents.

1. A qualification statement demonstrating compliance with Section 1.03.

2. Shop drawings for the installed equipment in accordance with Section 1330 – Submittals/Shop Drawings.

3. Manufacturer's literature, illustrations and specification sheets defining materials of construction, dimensions, and weights.

4. A copy of the warranty statement which conforms with Part 3 following.

C. Final submittals shall include:

1. A complete installation, operation and maintenance manual in conformance with Section 01730.

## 1.05 FIELD SERVICES

A. Startup and Training. Startup and training to be performed by full time factory employees trained in the operation of the TRS System in accordance with Sections 1660 and of the Specifications.

B. Training. Contractor shall provide at least eight (8) hours of training.

C. Safety Equipment. Installation personnel shall be equipped with job-specific safety equipment to complete the installation of a THMR floating spray equipment following all OSHA safety regulations. Safety equipment shall include confined space, fall protection, rescue, decontamination, and communication tools such as (air monitor, ventilation fan, tri-pod, winches, FBH's, retractables, ropes, lanyards, descenders, radios, hard hats, step pools, disinfectant sprayer, etc.)

# PART 2 PRODUCT SPECIFICATIONS

## 2.01 MANUFACTURER

A. Specified Equipment. The floating spray equipment shall be manufactured by Medora Corporation, Inc. of Dickinson, ND, or a pre-approved alternative.

B. Pre-approved Alternative(s). Alternatives to the specified equipment will be considered on the following basis only.

1. Fourteen (14) Days Before Bid. To offer equipment as a pre-approved alternative, written application from the alternative supplier shall be made to the Owner's Representative at least 14 days in advance of the bid opening.

2. No Material Difference in Quality of Equipment or in Vendor Support. The application should include:

a. A brief description of how the offered alternative does or does not meet each of the specifications in this document.

b. An analysis of how acceptance of the alternative equipment would likely affect the overall water quality goals of the project.

c. A statement of the science and support background of the supplier of the alternative equipment, so that the benefits and costs of the alternative equipment to the Owner can be estimated by the Owner's Representative.

3. Five (5) Day's Notice to Bidders. If the alternative equipment is accepted by the Owner's Representative, an informational addendum to these specifications shall be distributed by the Owner's Representative to plan holders at least 5 days in advance of the bid opening.

## 2.02 PERFORMANCE AND FEATURES

A. The THM removal system (TRS) is to provide THM readings below 80 ppb at Distribution Site 9 and 10, and a maximum TTHM reading of 64 ppb exiting the 2.4 MG Water Tank at all times.

B. Any exterior TRS equipment or appurtenances to be placed along the outside of the 2.4 MG tank shall only be allowed along the 25° to 174° perimeter exterior of the tank (eastern side of the tank, see Plan Sheet 4 for orientation).

C. Spray Units. To meet the project objectives, the following number of spray units should be considered.

| Quantity | Model | Tank or Reservoir |
|---|---|---|
| 4 | SN15 THMR Floating spray System or pre-approved equal | 2.4 MG Tank |

C.1 Three (3) Spray Units shall operate continuously (1 spare) with Three-Phase 230VAC/460VAC Power Supply. The THMR floating spray equipment shall operate continuously during day and night while connected to electric grid power. Power shall be provided from the existing Electrical Room in the Laboratory Building. Run-Stop-Fault statuses for each spray system shall be sent to the TRS control panel which then communicates with the new control panel in the Laboratory Building.

C.2 Stainless Steel Construction. The THMR floating spray equipment shall be constructed primarily of Type 316 stainless steel metal, pickled or passivated, for strength and superior corrosion resistance. Other non stainless steel materials shall be of NSF approved materials and rated for contact with potable water.

C.3 Motor. The THMR floating spray equipment shall be mechanically operated by a submersible motor that meets the following criteria.

1. Direct Drive, with no gearbox and no lubrication maintenance required.

2. Designed for submersible operation.

3. Designed for Continuous Operation without overheating or compromising motor life expectancy.

4. Requires three-phase 230 volts AC or 460 volts AC, 60Hz power requirement, and circuit breakers or fuses sized accordingly to 3HP, 5HP, 10HP, and 15HP models, following NEC requirements.

C.4 Submersible Motor Protection. A Submersible Motor Protection device, such as Franklin Sub-monitor or equivalent is highly recommended for 3-phase powered THMR floating spray equipment.

C.5 Horizontal, Low Velocity intake. The THMR floating spray equipment shall be supplied with an intake capable of being positioned at the lowest elevation of the tank or reservoir floor. The intake level setting shall bring water into the THMR floating spray at a horizontal layer within 1 inches (2.5 cm) of the tank or reservoir floor. The intake shall include a singular hose of adequate length to reach the required intake depth setting.

C.6 Nozzles. The THMR floating spray equipment shall be equipped with a nozzle assembly sized specifically for the pump capacity output. Constructed of 316 stainless steel for optimal corrosion resistance and long wear life.

C.7 Forced Air Injection: The TRS shall be supplied with a forced air ventilation (blower) system. Quantity 3 (Two (2) Operating, One (1) Spare). Power shall be provided from the existing Electrical Room in the Laboratory Building. A general Run-Stop-Fault status shall be sent to the TRS control panel which then communicates with the new control panel in the Laboratory Building. The blowers will contain the following:

BAF-3hp-3PH Ventilation System or approved equal. Turbine blower and air filter unit, for 3,000 CFM at 4 water column inches. Include baseplate, mounting, 3 hp dual voltage TEFC close- coupled motor, and 10 micron x 10,000 CFM intake air filter. Working dimensions are 72 inches long x 60 inches wide x 60 inches tall. Available in single or three phase. Shipping weight is approximately 1500 lbs., in a crate approximately 78 inches length x 66 inches width x 66 inches height.

a. Ground mount installation: Placement and mounting of blower skid next to the tank or reservoir shall be provided by the Contractor.

b. Tank penetration(s) required for air injection shall be provided by the Contractor. Ducting from the blower to the top of the tank to be provided by the Contractor. Contact Supplier for proper duct sizing.

c. If air duct is to traverse the side of the reservoir tank, air piping is to be steel piping and braced with steel angle irons welded to the exterior of the reservoir tank. Any welded flange adapters connections to the tank exterior shall include a gasket between tank and flange adapter. All material for shim plates, pipe bracket and angel supports to be 316

stainless steel. All steel material to be coated per the requirements of Specification 09800.

d. The blowers shall be installed in a sound attenuation enclosure. The sound level shall be no more than 50 decibels at the current property line. The enclosure shall allow easy access for maintenance and shall not interfere with the normal operation of the blowers. The ductwork shall be connected to both blowers and use a damper or other device to allow the operators to switch airflow from blower to blower. The system shall not allow both blowers to operate simultaneously.

C.8 The THMR floating spray equipment shall be constructed with NSF / ANSI Standard 61 approved materials for safe contact with potable water.

C.9 Maintenance Requirements. The THMR floating spray equipment shall operate normally with the following maintenance features.

1. No scheduled lubrication is required of any system components including motor.

2. No spare parts shall be required to be kept on hand.

D. Mixer Units Required. To meet the project objectives, the following number of mixers should be considered. Quantity 2 (One (1) Operating, One (1) Spare).

| Qty | Model | Tank or Reservoir |
|---|---|---|
| 2 | GridBee Model GS-12-120v potable tank mixer | 2.4 MG Tank |

D.1 Required Flow Rating: The manufacturer shall provide Computational Fluid Dynamics modeling supporting the flow rate of the mixer, with water of 1.0000 specific gravity, in each respective tank.

D.2 Complete mix: The manufacturer guarantees that the subject tank will be completely mixed by the mixer. In continuous operation of the mixer:

a. at least once per 24 hours all water temperatures within the tank shall converge to within 0.8 degrees C, and

b. at least once per 72 hours all chlorine concentrations within the tank shall converge to within 0.3 mg/l.

D.3 Continuous Operation with 120VAC Power Supply. The mixer shall operate continuously during day and night while connected to electric grid power.

D.4 Stainless Steel Construction. The mixer shall be constructed primarily of Type 316 stainless steel metal for strength and superior corrosion resistance.

D.5 Motor. The mixer shall be mechanically operated by a submersible motor that meets the following criteria.

1. Direct Drive, with no gearbox and no lubrication maintenance required.

2. Designed for submersible operation.

3. Designed for Continuous Operation without overheating or compromising motor life expectancy.

4. 120 VAC power source shall be supplied by others and not the mixer manufacturer.

D.6 Low Elevation Intake: The mixer shall be supplied with an intake capable of being positioned at the lowest elevation of the tank or reservoir floor. The intake level shall bring water into the mixer at horizontal layer within 6 inches (15 cm) of the tank or reservoir floor.

D.7 The complete mixing system shall be NSF / ANSI Standard 61 and NSF Annex G listed for safe contact with potable water.

D.8 Maintenance Requirements. The mixer shall operate normally with the following maintenance features.

1. No scheduled lubrication is required of any system components including motor.

2. No spare parts shall be required to be kept on hand.

E. SCADA and Controls. The sprayer(s), mixer(s), and blower(s) shall have an Electric Control Box including a motor current indicator in a 4-20mA analog output and remote on/off control via 24VDC relay. Power shall be provided from the existing Electrical Room in the Laboratory Building. Run-Stop-Fault statuses for each of the TRS equipment units. Statuses shall be sent to the new master PLC panel in the Laboratory Building.

Electrical Control Box. The mixer equipment shall be supplied with a Control Box capable of disconnecting 120 VAC outgoing power to the mixer equipment and meeting the following criteria:

2. NEMA 4X enclosure shall be provided with protection against condensation and moisture in a marine environment.

3. Control Box shall be UL 508 Listed for sound electrical design and safety.

4. Control Box shall include exterior mounted HOA switch, definite purpose contactor for mixer control, GFCI, exterior mounted run indicator light, grounding lug, 120 VAC standard three-prong male molded plug, and locking latch for security.

5. Control Box shall include a 4-20 mA current transducer providing analog output for motor current allowing for monitoring proper operation. Control Box shall include a 24 VDC relay to allow for remote on and off control of the mixer. Integration of 4-20 mA output and remote on/off relay into site PLC/RTU shall be provided by others and not by the mixer equipment manufacture.

6. Control Box requires a 120 VAC power source from the existing electrical room. Minimum 20 Amp rated service located near the final placement of the Control Box. SCADA and control functions of the Control Box require 24 VDC incoming power for automatic operation and 4-20 mA current transducer. The 120 VAC and 24 VDC power source shall be supplied by others and not the mixer equipment manufacture.

F. Provide and install I/O wiring between the THM Removal System starter/control panel and new master (main) plant plc cabinet, see associated P&ID in conceptual plans for quantity and type of I/O points to be accounted for.

G. Provide associated master (main) plant PLC and HMI programming as defined in Section 16907 – Programming & Control Description.

## PART 3 THM REMOVAL PERFORMANCE VERIFICATION TESTING

A. The Contractor shall be responsible to have the Trihalomethane Removal System (TRS) manufacturer verify that the TRS installed provides THM readings below 80 ppb at Distribution Site 9 and 10, and a maximum TTHM reading of 64 ppb exiting the 2.4 MG Water Tank at all times. Since the levels of total THMs in a potable water system and THM production in a tank vary with the temperature and the seasons of the year, the overall THM performance verification testing program shall extend over the following four (4) consecutive calendar quarters following final acceptance of the total contract work by the Owner.

B. As a project submittal, the Contractor shall have the TRS manufacturer prepare and submit to the Owner's Representative (through the Contractor) for review and approval a proposed performance verification testing plan. The Contractor shall also submit to Owner's Representative, for review and approval at the time of the Bid, a cost analysis breakdown of the TRS. The Contractor, with or without the THM removal manufacturer, shall submit a Bond, acceptable to the City Attorney, equal to the cost of the TRS, at the time the TRS submittal is accepted and before the initial payment for the TRS bid item to the Contractor. The Bond shall not be released until the conditions of the Performance Warrantee have been met. Conditions for Payment for this portion of the work are explained herein. The proposed testing plan shall include as a minimum quarterly field sampling and testing of the water exiting the tank and Distribution System Site 9 and 10. The sampling location on the 2.4 MG Tank shall be as reasonably close to the tank as possible with existing taps that may exist. The Owner (through its Chief Operator) will provide up to 8 hours per quarter of labor to assist with the sampling and testing program. The Contractor shall cover all costs associated with THM analysis either by providing to the Owner for use an acceptable field device capable of directly measuring THM levels in the water (Contractor shall also provide the Owner with proper training for use of the device); or by paying for all costs for analyses (including containers, shipping, etc.) associated with a certified laboratory, which is mutually agreeable between the Owner and the Contractor. Each quarter, both the Owner and Contractor shall fully and openly share all data collected as part of the program.

C. Contract Price Compensation: Upon completion of the performance verification testing program (4 quarters), the determination as to the successful performance of the THM removal equipment shall be made as follows with the following contract price compensation being applied to the bond:

1. If all four consecutive quarters provides THM readings below 80 ppb at Distribution Site 9 and 10, and a maximum TTHM reading of 64 ppb exiting the 2.4 MG Water Tank, then the bond is released.

2. If any one of the four consecutive quarter's provides THM readings 80 ppb or above at Distribution Site 9 and 10, and THM readings of 64 ppb or above exiting the 2.4 MG Water Tank, the Contractor (through the THM equipment manufacturer) shall have one (1) opportunity to modify the existing TRS or install additional THM removal equipment (without doing any structural modifications to the tank itself) to provide THM readings below 80 ppb at Distribution Site 9 and 10, and a maximum TTHM reading of 64 ppb exiting the 2.4 MG Water Tank. The Contractor shall have 60 days to modify or improve the installed TRS. The Contractor shall provide written notification to the Owner of its desired modification to the installed TRS and shall submit a proposed work plan and schedule for the equipment modification/addition work. Once the equipment modification work has been completed, an additional four consecutive calendar quarters of THM monitoring shall be performed. If all four consecutive additional quarters of THM minimum requirements are achieved, then the bond is released.

3. If the THM removal system does not meet the removal criteria more than once of the four consecutive quarters, throughout the first year following installation, the Owner will request:

   i. The THM removal manufacturer to add additional THM reduction equipment to meet THM removal criteria. The additional equipment, including materials and labor will be compensated by the Contractor. Any needed tank modification and/or electrical work needed shall be paid by the bonding company;

   ii. or that the THM removal manufacturer shall remove the THM reduction equipment at the cost of the THM removal manufacturer, and the Owner will be refunded 100% of the amount held by the bonding company.

4. The above price compensation is intended to apply to general tank operating conditions such that the normal monthly average daily flow to the tank was approximately 2,000,000 gallons or less. The Owner recognizes that greater tank turn-over flows may result in proportional lower THM removal percentages produced by the THM removal equipment.

**END OF SECTION 11900**

# SECTION 13290 - REHABILITATION OF EXISTING STEEL TANKS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. This section includes all labor, material, equipment, tools and services required for the surface preparation (abrasive blasting), coating, disinfection, and refilling of the existing 2.4 Million Gallon Storage Tank and 1.5 Million Gallon Storage Tank.

B. The Scope of Work associated with this Project requires the replacement of the 2.4 Million Gallon Storage Tank interior ladder; removal, disposal, and replacement of appurtenances, such as the Insect & Bird Screen on the Vent Screen Assembly, Roof Clip Shoe Supports & hardware, and Access Hatch gaskets; and the installation of a baffle curtain system in the 1.5 Million Gallon Storage Tank.

C. Contractor may cut and replace a section of the steel tank (door-sheet) to access conduct coating scope of work. Replacement of the steel tank section shall be conducted in accordance with specification section AWWA D100 and this specification, as applicable.

D. Scope of Work for the Existing 2.4 Million Gallon Steel Tank.

1. Surface preparation via abrasive blasting per technical specification section 09800.

2. Coating of the reservoir inlet pipe, overflow pipe, interior tank floor, and interior tank wall.

3. Tank Height: 28.71 feet

4. Tank Diameter: 128 feet

5. Support Column: None

6. Surface prepare and coat Area: 24,413 sq. ft., include an additional 87 sq. ft for tank appurtenances and pipes protruding in the tank – total 24,500 sq. ft.

7. Disinfection System Testing per AWWA C652 Standard

8. Installation of a Trihalomethane Removal System

9. Installation of a Cathodic Protection System.

E. Scope of Work for the Existing 1.5 Million Gallon Steel Tank.

1. Surface preparation via abrasive blasting per technical specification section 09800.

2. Coating of the reservoir interior tank floor, interior tank wall, interior tank ceiling and rafters.

3. Tank Height: 34.0 feet

4. Tank Diameter: 100 feet

5. Support Column: 8.5 feet O.D.

6. Surface prepare and coat Area: 26,500 sq. ft.

7. Disinfection System Testing per AWWA C652 Standard

8. Installation of a Baffle System.

F. The Contractor shall be required to obtain all necessary permits to conduct sandblasting and coating operations.

G. The Contractor shall be responsible to secure electrical power required for Rehabilitation of Existing Steel Tank(s).

1.02 RELATED SECTIONS

A. Section 05500 - Miscellaneous Metals

B. Section 09800 - Protective Coatings

C. Section 11900 – In-Reservoir THM Removal System

D. Section 13600 – Fabric Baffle Wall

1.03 REFERENCES

A. American Society for Testing and Materials Standard Specifications:

1. ASTM A 123 Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products

2. ASTM B 633 Electrodeposited Coatings of Zinc on Iron and Steel

B. American Welding Society:

1. AWS D 10.4 Recommended Practices for Welding Austenitic Chromium-Nickel Stainless Steel Piping and Tubing

C. The following references, latest editions, shall govern the work completed in this Section unless specified otherwise in these Specifications:

1. SSPC-Volume 1, Steel Structures Painting Manual, Good Painting Practice.

2. SSPC-Volume 2, Steel Structures Painting Manual, Systems and Specifications:

3. American Water Works Association Standards:

| | | |
|---|---|---|
| a. | AWWA D 100 | Welded Steel Tanks for Water Storage |
| b. | AWWA D 102 | Coating Steel Water Storage Tanks |
| c. | AWWA C 652 | Disinfection of Water Storage Facilities |
| d. | AWWA C 200 | Steel Water Pipe |
| e. | AWWA C 205 | Cement-Mortar Protective Lining and Coating for Steel Water Pipe |
| f. | AWWA C 207 | Steel Pipe Flanges for Waterworks Service |

4. California Code of Regulations, Title 8: Industrial Safety (CCR).

5. NSF / ANSI 61: Drinking Water System Components – Health Effects

1.04 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittals/Shop Drawings and the requirements herein.

B. Product Data:

1. All steel material items, if required.

2. High-strength bolts, if required.

3. Manufactured items required to be provided as part of the Project.

4. Interior Coating

C. Shop Drawings:

1. Demolition, fabrication and erection drawings for tank interior ladder and all accessories, including all welding details.

D. Manufacturer's Certifications:

1. Tank Interior Ladder shop drawings, including welding joint details and inspection personnel data.

2. Tank Interior Ladder fabrication, including mill tests and shop inspection report.

3. Tank Interior Ladder erection, including field inspection and testing report.

E. The Contractor shall provide a separate submittal for each material replacement item in the tank rehabilitation. The material and item supplied shall be of equal or superior quality to the material and item to be replaced. The items include, but are not limited to the following:

1. Interior Ladder

2. Insect & Bird Screen on the Tank vent screen Assembly.

3. Roof Clip Steel Shoe Supports

4. All Hatch Gaskets.

F. The Contractor shall include the following data in the laboratory test results and report submittal:

1. Actual weight of blast cleaning abrasive used for field abrasive blast cleaning, submitted within twenty-four (24) hours after blasting is completed.

2. Name of laboratories proposed to be used to test wastes and reservoir water prior to testing any materials.

3. Laboratory test results for representative waste samples prior to removing any waste materials from the job site. At a minimum, the samples shall be tested for total concentrations of the 17 metals (CAM 17) identified in Title 22, for comparison to Total Threshold Limit Concentrations (TTLC) values. The California Waste Extraction Test (WET) shall be performed for each analyte of each sample for which the total concentration exceeds 10 times the Soluble Threshold Limits Concentrations (STLC) value, if any, as specified in Title 22. ToxiDistrict Characteristic Leaching Procedure (TCLP) testing shall be performed for each analyte of each sample for which the total concentration exceeds 20 times the TCLP values, if any, specified in the Federal Resource Conservation and Recovery Act. Reactivity, Corrosivity, and Ignitability testing shall be performed as required by Title 22 and/or the Owner or representative of the disposal facility.

4. Receipts from disposal site for all wastes. Receipts shall identify disposed material and source, show quantity of disposed material in tons or cubic yards, and show method used for final disposition as buried, incinerated, and chemically treated and/or other means.

G. The Contractor shall include the following data in the disposal plan submittal:

1. Certification that the materials disposal plan complies with all applicable requirements of the Federal Resource Conservation and Recovery Act: Title 22 and Title 26 of the California Administrative Code; and other applicable regulations of local, State and Federal agencies having jurisdiction over the disposal of spent abrasive blast media, removed coating materials, and other waste, whether hazardous or non-hazardous.

2. The name and Environmental Laboratory Accreditation Program Certificate number of laboratory that will sample and test spent abrasive blast media and removed coating materials. Include statement of the laboratory's certified testing areas and analyses that the laboratory is qualified to perform.

3. Written permission to dispose of material from disposal site representative. Include name, address, and telephone number of disposal site and of representative.

4. The Owner shall provide written acceptance of the disposal plan prior to disposal of any wastes.

## 1.05 QUALITY ASSURANCE

A. General:

1. Demonstrate that the tank interior ladder manufacturer has been regularly designing, fabricating and erecting / rehabilitating similar steel tanks for at least ten (10) years.

2. Stamp and sign all shop drawings and calculations by a Registered Structural Engineer from the State of California, if required.

3. Supply all new materials and fabricated items.

4. Verify adequacy of tank foundation and anchorage.

B. The Owner may use any testing method deemed necessary by the Owner's Representative to verify quality of work. The Owner's Representative shall monitor the quality of work pursuant to this Section.

C. The Contractor shall perform the necessary quality assurance in accordance with an approved plan/shop drawing.

D. The Contractor shall comply with the following conditions in collection and analysis of wastes:

1. All testing of spent abrasive blast media and removed coating materials to classify these wastes as hazardous or non-hazardous shall be performed by a laboratory that complies with and is certified under the Environmental Laboratory Accreditation Program (ELAP) of the California Department of Health Services.

2. Any laboratory performing analysis shall provide for comparison to TTLC, STLC, TCLP limits, and RCA limits, and to all other applicable regulatory limits. Laboratory shall retain samples at least **ninety (90) calendar days** after all analyses are complete.

3. The Contractor shall ensure collection of as many representative samples as required by the representative of the disposal facility, but not less than four (4) total.

4. The Contractor shall ensure the following: each sample shall have an identifying sample number assigned when the sample is taken; each sample number shall be included on the sampling chain of custody and in all reports, correspondence, and other documentation related to the sample; each sample shall have a sampling chain of custody; and each chain of custody show the

name and organization of each person having custody of the sample, and also show the sample number, job name and location, time of day and date sample was taken, material sampled, and tests to be performed.

5. The Contractor shall notify the Owner's Representative at least twenty-four (24) hours prior to sampling collection for the purpose of Owner's Representative verification of samples collected.

## PART 2 - PRODUCTS

### 2.01 GENERAL

A. Materials shall be standard products of established manufacturers who have produced continuously the type of material specified. All material shall be new and of high quality insuring long life and reliable operation.

B. Safety: CCR and UBC.

### 2.02 DESIGN CRITERIA

A. Contractor shall remove, dispose and replace appurtenances to match existing material types, sizes and dimensions. Any scope of work not equal to existing shall be submitted to the Owner's Representative for review and approval.

### 2.03 TANK APPURTENANCES

A. Tank Interior Ladder:

1. Remove and dispose of all components of the existing interior ladder.

2. The interior ladder shall be of 316 stainless steel.

3. All step round bars to penetrate flat bar railing and welded on the outside of the flat bar railing.

4. Angle irons to hold interior ladder to tank wall shall be A36 Steel.

5. The interior ladder assembly with the angle irons will consist of a bushing, insulator pad and being held with a bolt with nut & flat washer.

6. The interior ladder assembly shall consist of a safety climb rail.

7. The interior ladder shall be coated per Section 09800 – Protective Coatings.

B. Manways:

1. Access Hatch's Gaskets: Remove, dispose of and replace the Access Hatch Neoprene Gaskets for the following:

   One (1) - 30-inch diameter manway gasket.

   One (1) - 36-inch diameter manway gasket.

   One (1) – 4'-0" x 4'-0" square access hatch gasket.

C. Roof Clip Steel Shoe Supports

1. Steel shoe support shall be of 316 stainless steel.

2. Steel shoe supports shall be secured with four (4) 316 stainless steel 1/2" diameter bolts. Vertical bolt spacing shall be 3". Horizontal bolt spacing shall be 6". Special Inspection for seismic resistance required per Section 1707 of the CBC.

3. Each Steel Shoe Support will consist of a stainless steel guild, 1/8" Teflon pad and stainless steel slip sheet.

D. Screens:

1. Remove, dispose of and replace the Vent Screen Assembly for the following:

   Four (4) – Screen Assemblies; Vents have a 20-1/2" dia. opening, with a 36-1/2" dia. x 7" tall aluminum shroud.

2.04 FABRICATION

A. Interior Ladder:

1. Fabricate and assemble in the shop to the greatest extent possible.

2. Shape all members correctly, with no kinks, twists, dents or other blemishes prior to erection. Evenly spring all curved work.

3. Make exposed edges free of burrs and sharp edges. Make corners rounded or chamfered.

4. No shop priming is allowed. All steel shall be coated in the field.

5. Stainless Steel Items:

   a. Use the proper type of stainless steel electrodes or welding rods complying with AWS D 10.4.

   b. Remove by grinding and polishing, all scratches, marks, pits and other blemishes on exposed surfaces.

   c. Use grinding wheels and other tools that have never been used on carbon steel.

## 2.05 SOURCE QUALITY CONTROL

A. Material: Verify that satisfactory mill test reports are available on all steel, including stainless steel.

B. Welding:

   1. Verify welders are qualified.

   2. Verify that weld procedures are followed.

C. Report: Provide a shop inspection report including mill tests, radiographs and inspection records, before tank erection is started.

## 2.06 INTERIOR STEEL TANK SURFACE PREPARATION AND COATING

The interior surfaces of the tank shall be coated in accordance with Item Designation SR-1 of Section 09800 - Protective Coatings.

## 2.07 EXTERIOR STEEL TANK SURFACE PREPARATION AND COATING

The exterior wall tank surfaces shall be coated in accordance with Item Designation FM-1 of Section 09800 - Protective Coatings requiring a near white metal blast cleaning SSPC-SP10/NACE2 with a System 5 Inorganic Zinc/Epoxy/Polyurethane Coating System, if required.

## 2.08 DRAINING TANK

The existing tank is to be drained by the Contractor. The Contractor shall provide a minimum fourteen (14) day written notice for a date to which the tank is to be drained.

## PART 3 - EXECUTION

### 3.01 PREPARATION

A. Develop a written demolition, erection plan and welding sequences for the Tank Interior Ladder.

B. Develop this plan and sequences to minimize welding distortions and kinks between plates.

C. Furnish this plan and sequences to the erection crew.

### 3.02 DEMOLITION AND ERECTION

A. AWWA D 100 and Also:

1. Comply with erection plan and welding sequences.

2. Follow qualified weld procedures.

3. Use qualified welders.

4. Provide complete penetration butt welds at all side shell joints.

5. Remove all evidence of any welding of temporary erection devices.

6. Stainless Steel Items:

   a. Use the proper type of stainless steel electrodes or welding rods complying with AWS D 10.4.

   b. Remove by grinding and polishing, all scratches, marks, pits and other blemishes on exposed surfaces.

   c. Use grinding wheels and other tools that have never been used on carbon steel.

### 3.03 FIELD QUALITY CONTROL

A. AWWA D 100, and Also:

1. Provide forty-eight (48) hours notice of all testing to Owner's Representative.

2. Provide all testing equipment and satisfactory access to the work being inspected.

3. Perform and evaluate all radiographs promptly, so any repairs can be made and re-evaluated without delay of the erection.

4. The Owner's Representative shall be the sole judge of compliance with the quality of work specified herein or in AWWA D 100.

5. Repair all leaks and retest by the same method that discovered the leak.

B. Tank Interior Ladder Welding:

1. The Owner reserves the right to retain a Certified Welding Inspector to be present during all inspections and testing and to specify the test locations.

2. Inspection by trepanning, air carbon arc gouging and removal of sectional segments will not be permitted.

C. Tank Bottom and Side Shell: Test by the water method, after erection and painting. The Owner shall provide the water. The Contractor shall be responsible to dispose of the water.

D. Report: Provide a field inspection report, including radiographs and inspection records before acceptance of the tank improvements by the Owner's Representative.

## 3.04 PAINTING

A. Perform interior and exterior cleaning, preparation, and painting in accordance with AWWA D 102 and Section 09800.

B. Provide a first anniversary inspection of the tank painting, including testing and any required repair work, at no additional cost to the Owner, one (1) year after the filing of the Notice to Completion.

## 3.05 DISINFECTION

A. After protective coatings have been applied and accepted, disinfection and bacteriological testing the interior tank surfaces shall be conducted per the latest AWWA C652 standard.

3.06 TESTING FOR VOLATILE ORGANICS

A. After successful completion of the Disinfection and Bacteriological Testing, the Contractor shall complete Volatile Organic Compound Testing per Technical Specification Section 09800 – Protective Coatings.

3.07 DISPOSAL OF TEST WATER

A. Water used for testing and disinfection procedures shall be disposed of as required by the Contractor. The Contractor shall identify the point at which the water is to be disposed and provide all pumps, suction hoses, discharge hoses, fuel and labor to dispose of the test water.

3.08 PLACING TANK IN SERVICE

A. The tank shall be placed in service after successful disinfection and volatile organic compound testing has been conducted and after the Owner's Representative determines that all rehabilitation and coating work has been satisfactorily completed.

3.09 SEQUENCE OF CONSTRUCTION

A. Unless specifically noted in the Special Conditions or the Improvement Plans, the tank may be placed out of service for construction. Description of placing the tank out of service and duration of out of service will be provided in the Contractors sequence of construction submittal as per Section 1330 – Submittals/Shop Drawings.

3.10 NOISE

A. Construction activities louder than 60 decibel level, within a radius of 30 feet from the exterior of the tank are to be conducted during the hours from 7 AM to 8 PM. Based on weather, night work may be granted upon the approval of the Owner.

**END OF SECTION 13290**

# SECTION 13500 - CATHODIC PROTECTION SYSTEMS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. The Contractor shall design an Impressed Current Cathodic Protection (ICCP) Systems and furnish all labor, materials, equipment, supervision and testing, and perform all operations required to install a complete ICCP system to protect the interior of the 2,400,000 gallon capacity, 128-feet diameter by 21-feet (low) and 23-feet (high) water depth steel water storage tank.

B. The Contractor shall also provide a sacrificial anode system:

1. The cathodic protection systems shall protect against corrosion of all internal surfaces of the water storage tanks normally in contact with water and of the exterior of the bottom plates of the water storage tank in contact with the concrete.

2. The systems shall be provided by a firm specializing in cathodic protection systems.

C. The corrosion control systems shall be coordinated and certified by a licensed Corrosion Engineer (State of California) who specializes in Cathodic Protection Systems. The impressed current system shall be in accordance with NACE International Standard Recommended Practice RPO388-95 “Impressed Current Cathodic Protection of Internal Submerged Surfaces of Steel Water Storage Tanks” and RPO193-93 “External Cathodic Protection of On-Grade Metallic Storage Tank Bottoms”, and shall be based on a tank-to-water potential, IR drop free, within a range of -0.850 volts to -1.050 volts relative to a copper-copper sulfate reference electrode. The facilities shall be based on results of field tests. The impressed current anodes shall be for a useful life of 20 years for the water storage tank.

D. Conditions: The storage tank will initially be rehabilitated, see Technical Specification Section 13290. The existing storage tank is a 128-foot diameter by 28.71-feet high welded steel tank. The overflow height is 25.27 feet from the bottom for the existing tank. The existing tank will be coated in the interior to meet AWWA specification requirements. The tank is used to treat and store water that has the following characteristics:

1. Water Quality:

| | | |
|---|---|---|
| a. | Temperature | 50 - 90°*F* |
| b. | pH | 7.5 – 8.0 |
| c. | Dissolved Oxygen | 5 - 10 mg/L |
| d. | Conductivity | 1,000 - 1,300 µmhos/cm |
| e. | Total Dissolved Solids | 700 - 900 mg/L |
| f. | Alkalinity | 160 mg/L $CaCO_3$ |
| g. | Hardness | 350 mg/L $CaCO_3$ |
| h. | Calcium | 90 mg/L $CaCO_3$ |
| i. | Chloride | 150 mg/L |
| j. | Sulfate | 300 - 350 mg/L |
| k. | Chlorine Residual | 0.3 – 2.0 mg/L |

E. Work included in this Section consists of all components of the cathodic protection system including rectifiers, anodes, cables, junction boxes, electrical conduit reference electrodes, and any other work. In addition:

1. Cathodic Protection Calculations.

2. Shop Drawings and Materials List.

3. In-place construction of water storage tank's cathodic protection systems.

4. Testing and adjusting of water storage tank's cathodic protection systems.

5. Correction of all deficiencies.

6. Cleanup and restoration of surfaces.

F. Code Requirements

1. All materials, workmanship and installation shall conform with all requirements of the legally constituted authority having jurisdiction. These authorities include, but are not limited to, the latest revision of the State of California, applicable regulations for Industrial Relations, Industrial Safety, and Electrical Orders; the National Electric Code, General Construction Safety Orders of the Industrial Accident Commission; and all other applicable State, County, or City codes and regulations. Nothing in the Plans or Specifications is to be construed to permit work not conforming to these regulations and codes. Where larger size or better grade materials than required by these regulations and codes are specified, the Specifications and Plans shall have precedence.

G. Reference Specifications:

1. American Society for Testing and Materials (ASTM).

2. National Electrical Manufacturers Association (NEMA).

3. NACE International (NACE).

4. NSF / ANSI 61: Drinking Water System Components – Health Effects

1.02 SUBMITTALS

A. Submit material or equipment data in accordance with the General Conditions.

B. The Contractor shall submit Calculations, Construction Drawings and Materials for the Cathodic Protection Systems to the Owner's Representative for his review.

C. The Contractor shall submit the following:

1. Electrical Design plans shall include a single-line drawing which incorporates the ICCP system. The electrical design plans shall be signed and stamped, by a registered engineer in the State of California, which is to be developed to reflect associated system electrical requirements such as breaker(s), wire(s) and conduit sizing; drawing is to include updated system load calculations. The single-line drawing is to be incorporated into the design package developed in association with plant controls system upgrade/replacement.

2. Calculations to support the basis for design of the water storage tank's interior and bottom plate cathodic protection systems.

3. A complete list of equipment and materials. Include name and manufacturer, catalog number, size, finish, and any other pertinent data necessary to determine conformance with Specifications.

4. Certification by the cable manufacturer covering conformance of cable insulation to designated Specifications.

5. A certified test report showing the chemical analysis of all anodes.

6. Wiring diagrams for the rectifiers, showing all details and components.

7. Manuals for the rectifiers. Each manual shall include as-built shop drawings, operation and maintenance instructions, parts ordering data and ratings for the equipment purchased for this project.

8. Spare Parts: For each piece of equipment, submit a list of recommended spare parts. Include part numbers and the name, address, and telephone number of the supplier.

9. Test Report of completed installation.

10. Contractor's Corrosion Engineer including experience summary. The projects previously inspected and number of years of experience shall be listed on the experience summary. The Corrosion Engineer shall possess at least 5 years of experience and inspected 10 previous projects. The Corrosion Engineer shall be licensed in the State of California.

## PART 2 - PRODUCTS

### 2.01 GENERAL

A. All materials must be new, free from defects, and shall be of the best commercial quality for the purpose specified. The system shall include but not be limited to the following.

2.02 RECTIFIERS

A. The cathodic protection rectifiers shall be a computer controlled type rectifier system which shall precisely maintain the water storage tank at a specific cathodic protection level. The units shall be of solid state design and equipped with a direct reading meter which displays the exact level of protection being provided. Circuitry shall be designed to eliminate any “IR” drop error in the structure potential. This “error-free” reading shall then be automatically compared to the pre-set protective potential and, if any deviation exists, the output of the system shall be automatically adjusted to compensate. This cycle shall occur 120 times per second. Rectifiers shall be Goodall Customair or equivalent universal model. The rectifiers shall include the following features:

1. D.C. Output Ratings:

   a. Existing Tank or Filter Interior: 8 volts, 4 amps.

   b. Existing Tank or Filter Exterior: 12 volts, 8 amps.

2. Total automatic control of current output from 0 to 100% of rated capacity. (Capacity as recommended by the Manufacturer.)

3. Lightening, surge, and overload protection (ac and dc).

4. 120 volt, 50 Hz, single-phase A.C. power input.

5. Silicon rectifying elements.

6. Transformer.

7. Circuit Breaker(s).

8. Provision for air-cooling operation.

9. Digital voltmeter(s), ammeter(s) and potential meter(s).

10. Weatherproof cabinet in accordance with NEMA 4 requirements.

11. Automatic controller shall adjust current output to compensate for changes in water level, temperature of water, water chemistry, and cathodic polarization, and shall include the following provisions:

    a. Utilize long-life reference electrode(s) installed within the tank.

    b. Monitor the tank-to-water potential, free of IR drop.

    c. Automatically adjust the tank-to-water potential, free of IR drop, to a preset value.

    d. Operate within 25MV of preset value.

    e. Limit current to a preset value.

    f. Utilize digital potential meter(s) to display tank-to-water potential, free of IR drop.

2.03 ANODES

A. Impressed Current Anodes shall conform to requirements of NACE International Publication 90A196, “Impressed Current Anodes for Underground Cathodic Protection Systems”, except as specifically modified herein.

B. Provide center-connected centrifugally-cast high-silicon chromium cast-iron anodes for impressed current, or approved equal. Composition of the anodes shall conform to the following requirements:

| Element | Minimum % | Maximum % |
|---|---|---|
| Silicon | 14.2 | 14.75 |
| Carbon | 0.7 | 1.1 |
| Manganese | --- | 1.5 |
| Chromium | 2.5 | 5.0 |
| Copper | --- | 0.05 |
| Molybdenum | --- | 0.2 |
| Iron | Balance | Balance |

C. The cable attached to the anodes shall be No. 8, stranded, single conductor, copper, Type HEMP, of sufficient length to connect to the anode junction box, and insulated for 600 volts. All exposed wiring shall be in hot-dip galvanized rigid steel conduit, ¾ inch

minimum. Any damage to the cable insulation or anode will require complete replacement of the cable and anode.

D. Anodes for the exterior shall be arranged in strings.

E. Potential Control:

1. Potential control which provides for setting the potential between reference electrodes and structure from +.5 to -3.0 volts.

2. Reference sensing circuits requiring a maximum current drain of one microampere.

F. Sacrificial Anodes: Sacrificial anodes shall be cast magnesium in type, 7-1/2 pounds with center bolt hole and plastisol (PVC coating). Anode chemical composition shall be:

| Element | Minimum % | Maximum % |
|---|---|---|
| Aluminum | 5 | 5 |
| Manganese | 0.15 | --- |
| Zinc | 2 | 4 |
| Silicon | --- | 0.3 |
| Copper | --- | 0.1 |
| Nickel | --- | 0.003 |
| Iron | --- | 0.003 |
| Other | --- | 0.3 |
| Magnesium | Balance | Balance |

2.04 CONDUCTORS

A. General: All conductors shall be copper.

B. Power wire, operating at 600 volts or less, shall be either UL Type THW or XHHW, single conductor stranded Type TW or CP. Power wire shall be #12 AWG or larger.

C. Drain cables and test cables shall be stranded single conductor, insulated for 600 volts, Type TW or CP.

D. Anode cables shall be as specified in Paragraph 2.03, Impressed Current Anodes.

E. Splices and Terminations:

1. Low Voltage Splices and Terminations:

a. Wire Connectors shall be either the springlock type twist-on pressure connector or the crimped sleeve type as appropriate for the application.

b. Pressure Connectors shall be the crimped sleeve type, split bolt type or bolted split sleeve type. Bolted pressure connectors of the type that the bolt or set screw bears directly on the conductor shall not be used.

c. Electrical Tape shall be PVC, pressure sensitive, 7-mil tape suitable for 600-volt applications.

F. Wire markers shall be vinyl cloth, numbered, adhesive type, Brady B-500; equivalent Thomas & Betts; or equal.

2.05 CABLES

A. All No.8 AWG and larger cables utilized for the cathodic protection circuit shall be single conductor, stranded, copper, Type CP, insulated for 600 volts with high molecular weight polyethylene in accordance with the requirements of ASTM D 1248, Type 1, Class C, Grade 5, and ICEA-NEMA S-61-402. All cables for AC power and No. 10 AWG and smaller utilized for the cathodic protection circuit shall be Type TW, stranded, copper, and shall conform to Federal Specification J-C-30.

2.06 ANODE BACKFILL

A. Backfill material for the tank exterior anodes shall be calcined coke breeze with a minimum carbon content of 98% by weight and a resistivity of 25 ohm-cm or less when tested with an applied pressure 2 pounds per square inch. The backfill material shall conform to the following gradation requirements:

| Sieve Size | Percent Passing |
|---|---|
| 3/8 | 100 Minimum |
| 1/8 | 5 Maximum |

2.07 REFERENCE ELECTRODES

A. The reference electrodes shall be 1.4 inch by 1.4 inch by 9 inch long copper-copper sulfate anodes suitable for long duration submerged or buried service. The electrodes shall be furnished

with a No. 10 AWG, Type TW stranded copper cable attached, and the length of cable shall be sufficient to extend to the rectifier without splicing. The cable shall be attached to the anode code by brazing or silver soldering and the connection shall be sealed watertight with epoxy. In addition, the tank exterior reference electrode shall be prepackaged with a backfill consisting of 75% hydrated gypsum, 20% bentonite and 5% sodium sulfate vibratory packed in a cotton bag around the electrode. The minimum weight of the backfill material shall be 15 pounds.

2.08 EPOXY

A. Epoxy used for sealing the anode to cable connection for the reference electrodes shall be Durcon 164, manufactured by the Duriron Company; Scotchcast Resin No. 4, manufactured by 3-D Company; CC-1 Potting Compound, manufactured by PSI Products; or equal.

2.09 RIGID PVC AND STEEL CONDUIT AND FITTINGS

A. All rigid PVC and steel conduit, fittings, junction boxes, pullboxes and switch boxes shall be painted.

2.10 SERVICE SWITCHES

A. Service switches shall be externally operable, fused heavy-duty with NEMA 3R enclosure rated at 30 amps, 120 volts, weatherproof, and tamperproof locking type enclosure. Provisions for locking in “ON” and “OFF” positions shall be padlock hinges.

2.11 GROUNDING CONDUCTORS

A. The grounding conductors shall be a No. 8 AWG, copper, minimum.

2.12 ANODE JUNCTION BOXES

A. The anode junction box enclosures shall be 11 gage galvanized steel, and shall conform to NEMA 4X. All surfaces of the enclosure shall be bonderized and exterior painted with one (1) coat of prime and two (2) finish coats.

B. The terminal blocks shall be heavy-duty, phenolic, insulated for 600 volts and sized for connecting cables. Number of circuits for each block and connectors shall be of the tubular screw type.

## 2.13 INSULATING FLANGED KITS

A. A full face central gasket, a full length sleeve for each flange bolt, two insulating washers and two stainless steel washers for each stainless steel bolt. Central gasket: 1/8 inch thick, neoprene faced phenolic gasket rated to 175°*F* with a dielectric strength of 500 VPM and a water adsorption of less than 0.45%. Bolt sleeves: phenolic NEMA grade LE or mylar. Insulating washers: fabric reinforced phenolic resin. Complete assembly shall have ANSI pressure rating equal to that of the flanges it is installed between. Advance Type E; Central Plastics; or equal.

# PART 3 - EXECUTION

## 3.01 INSTALLATION

A. Installation: The installation of the Cathodic Protection Systems shall be directed, at least in part, by a qualified Corrosion Engineer.

B. Electrical isolation shall be provided as necessary to isolate areas not to be cathodically protected.

C. Exothermic Welds: All cable connections to the tank for the cathodic protection systems shall be accomplished by the exothermic process using “Cadweld” by Erico Products, Inc., “Thermoweld” by Continental industries, Inc.; or approved equal. Each cable shall be fitted with a copper sleeve for accomplishing the weld and cartridge sleeves and molds for each weld shall be furnished by the same manufacturer. Weld kits shall be of the size and type recommended by the manufacturer for each application.

D. Attach sacrificial systems to clarifier/filter units and welded steel tank after painting.

## 3.02 RECTIFIERS

A. The rectifiers shall be mounted and connected to the power supply as illustrated on the approved submittal drawings. The cable connected to the tank shall be connected to the negative output terminal of the rectifiers, and the cables connected to the anodes shall be connected to the positive terminals of the rectifiers.

B. For the No. 10 AWF, Type TW cables each shall be run from the structure and the control reference electrodes to the auto potential

controlled rectifiers and shall be attached to the automatic potential control elements.

3.03 CABLE TO STRUCTURE CONNECTIONS

A. Cable to structure connections shall be accomplished. After installation of the connection, all exposed metal shall be coated to match the required coating of the steel tank.

3.04 REFERENCE ELECTRODES

A. Tank Interiors: The control reference electrode shall be enclosed in a perforated PVC enclosure and shall be constructed and installed in the tank. The reference electrode cable shall be looped over a clevis and spool insulator and secured with a serving sleeve designed to cause the least amount of deformation to the conductor and insulation. The reference electrode cable shall be of sufficient length extend to the automatic control unit within the rectifier without splicing.

B. Tank Bottom Exteriors: The reference electrode shall be installed in native soil, approximately 6 inches below the base. The electrode shall be wetted with 5 gallons of water before backfill. Care shall be exercised to prevent damage to the electrode or the cable during backfill and compaction. In case of any damage to the electrode or cable, complete assembly shall be replaced at no cost to the Owner. The electrode cable shall be of sufficient length to be terminated in the anode junction box.

3.05 ENERGIZING AND TESTING

A. After installation of the water tank, rehabilitation of the existing water tank and clarifier/filter tank and cathodic protection facilities, the Cathodic Protection Systems shall be tested, and adjusted by the Contractor's Corrosion Engineer in the presence of the Owner to assure conformance with the Cathodic Protection Specifications. Testing shall include a determination of proper operation of each rectifier and anode and electrical continuity of cables, and suitable resistance at insulating flanges.

B. The Contractor shall notify the Owner a minimum of 15 calendar days prior to the date he/she desires testing to begin. Upon completion of tests, a detailed report will be submitted by the

Corrosion Engineer to the Owner describing any deficiencies detected. Any and all deficiencies shall be corrected by the Contractor and retested prior to final acceptance. Costs for retesting shall be borne by the Contractor.

**END OF SECTION 13500**

# SECTION 13600 - FABRIC BAFFLE WALL

## PART 1 – GENERAL

### 1.01 DESCRIPTION

A. This specification covers the design, fabrication, and erection of tension-fabric baffle systems composed of NSF 61 compliant geo-membrane 8130 XR-3-PW as manufactured by the Seaman Corporation of Wooster, Ohio, or approved equal, for the storage tank as shown on the contract drawings and specified herein.

B. The tank contractor shall furnish all labor, materials, and equipment required to design, fabricate, deliver and install the tensioned-fabric baffle system.

### 1.02 RELATED SECTIONS

A. Section 05500 - Miscellaneous Metals

B. Section 09800 - Protective Coatings.

### 1.03 RELATEDREFERENCES

1. California Code of Regulations, Title 8: Industrial Safety (CCR).

2. NSF / ANSI 61: Drinking Water System Components – Health Effects

### 1.04 SHOP DRAWINGS AND SUBMITTALS

A. Before executing any of the work in this section, prints or drawings shall be submitted to the ENGINEER showing dimensions, sizes, thickness, gauges, materials, finishes, joints, attachment, anchorage, and erection procedures.

### 1.05 EXPERIENCE REQUIREMENTS

A. The baffle fabricator shall have furnished and had in satisfactory service for a period of not less than 5 years, at least 5 baffle systems with dimensions and quantities similar to the one specified for this project. The fabricator shall submit evidence of such with his submittal.

### 1.06 GUARANTEE

A. The baffle system shall be guaranteed for a period of 1 year from final acceptance against defective materials and workmanship.

1.07 WARRANTY

A. The geo-membrane manufacturer shall confirm in writing, that the material to be furnished will be free of defects in materials and workmanship at the time of the sale, and against deterioration due to effects of ozone, ultraviolet or other normal weathering on a pro-rated basis for up to 10 years from the date of completed installation. Manufacturer shall furnish a sample warranty for review and approval prior to shipment.

PART 2 – PRODUCTS

2.01 DESIGN REQUIREMENTS

A. The baffles shall confirm to the specified dimensions and shall be designed for installation in potable water with chlorine and ammonia present in the tank. The baffle system shall be suitable for expected water levels with daily fluctuations and shall have adequate strength to resist 0.5 inch of water depth difference across the baffle.

B. The baffles shall be erected and anchored to the floor, walls, and roof as shown in the plans to provide a flow path for maximum contact time for potable water in the tank.

2.02 FABRIC

A. The fabric shall be listed by NSF61 as being acceptable for use in potable water. The fabric shall have a knitted polymer coated polyester fabric with a 6.5 oz. /sq. yd. minimum weight.

B. The fabric shall be of good appearance and free of all defects such as holes, tears, blisters and any other defects that may affect its serviceability.

C. The coated fabric shall not be less than 30 mils thickness with a +10 percent allowable variation. There shall be not less than 7 mils thickness of polymer coating over the base fabric.

D. The polyester fabric shall be non-wicking.

E. The coated fabric shall be UV stable (either black or black/white) in order to possess maximum UV resistance when exposed to the atmosphere for extended periods of time.

F. The fabric shall meet or exceed the following minimum physical properties:

| **8130 XR®-3PW fabric** | **Standard** | **Metric** |
|---|---|---|
| Base Fabric Type | Polyester | |
| Base Fabric Weight (nominal) | 6.5 oz/yd$^2$ | 220 g/m$^2$ |
| Thickness<br>ASTM D 751 | 30.0 mils min | 0.75 mm min |
| Weight<br>ASTM D 751 | 30.0 ± 2 oz/yd$^2$ | 1020 ± 70 g/m$^2$ |
| Tear Strength<br>ASTM D 751, Trapezoid Tear | 35/35 lb min | 155/155 N min |
| Breaking Yield Strength<br>ASTM D 751, Grab Tensile Procedure A | 550/550 lb min | 2450/2450 N min |
| Low Temperature<br>ASTM D 2136, 4 hr - 1/8" mandrel | Pass @ -30°F | Pass @ -35° C |
| Dimensional Stability<br>ASTM D 1204, 212°F - 1 hr | 1.5% max each direction | 1.5% max each direction |
| Adhesion Heat Sealed Seam<br>ASTM D 751, Dielectric Weld | 35 lb/2 in min | 150 N/5 cm min |
| Dead Load Seam Shear Strength<br>ASTM D 751, 4 hr test | 2 in seam, 1 in strip<br>210 lb @ 70°F<br>105 lb @ 160°F | 5 cm seam, 2.5 cm strip<br>935 N @ 21°C<br>465 N @ 70°C |
| Bursting Strength<br>ASTM D 751, Ball Tip | 650 lb min<br>800 lb typical | 2890 N min<br>3560 N typical |
| Hydrostatic Resistance<br>ASTM D 751, Method A | 800 psi min | 540 N/sq cm min |
| Blocking Resistance<br>ASTM D 751, 180°F/82°C | #2 Rating max | |
| Adhesion - Ply<br>ASTM D 413, Type A | 15 lb/min<br>or Film Tearing Bond | 65 N/2.5 cm min<br>or Film Tearing Bond |
| Bonded Seam Strength<br>ASTM D 751, Grab Test Method, Procedure A | 550 lb min | 2450 N min |
| Abrasion Resistance<br>ASTM D 3389, H-18 Wheel<br>1000 g load | 2000 cycles (min) before fabric exposure<br>50 mg/100 cycles max weight loss | |
| Weathering Resistance<br>ASTM G 153 (Carbon-Arc) | 8000 hrs (min) - No appreciable changes or stiffening or cracking of coating | |
| Water Absorption<br>ASTM D 471, Section 12<br>7 Days | 0.025 kg/m$^2$ max @ 70°F/21°C<br>0.14 kg/m$^2$ max @ 212°F/100°C | |
| Wicking<br>ASTM D 751 | 1/8 in max | 0.3 cm max |
| Puncture Resistance<br>ASTM D 4833 | 250 lb min | 1110 N min |
| Coefficient Of Thermal Expansion/Contraction<br>ASTM D 696 | 8 x 10$^{-6}$ in/in/°F max | 1.4 x 10$^{-5}$ cm/cm/°C max |

**<u>Seaming:</u> Thermal welding methods are recommended.**
**No Sewing, glues, or solvents are suggested.**

## 2.03 FASTENERS AND HARDWARE

2.03.1 All bolts, washers, nuts, and expansion anchors shall be type 316 stainless steel, minimum 3/8-inch diameter.

2.03.2 Batten connection shall be type 316 stainless steel flat bar, minimum ¼-inch thickness by 2 inches wide.

2.03.3 Floor and Wall connection shall be type 316 stainless steel angle clips, minimum ¼-inch thickness by 2 inches wide by 2 inches wide by 2" long; type 316 stainless steel angle, minimum ¼-inch thickness by 2 inches wide by 2 inches wide; and type 316 stainless steel flat bar, minimum ¼-inch thickness by 2 inches wide.

2.03.4 Suspension and Tension for the top and open ends of the curtain(s) shall be type 316 stainless steel 3/16" diameter cable with type 316 stainless steel 3/16" cable clamps and thimbles.

## PART 3 – EXECUTION

### 3.01 COORDINATION

3.01.1 The baffle manufacturer shall coordinate with the Engineer and the tank manufacturer concerning loading on the reservoir, attachment details, and the sequence of construction. Installation details are shown on the plans are provided as a guide for the contractor and baffle manufacturer.

### 3.02 PREPARATION AND FABRICATION

3.02.1 Prior to factory seaming, all roll goods shall be inspected. All factory seams shall be made by thermal fusion methods. All factory seams shall have a minimum scrim-to-scrim overlap of one and one-half inches (1-1/2") when fabricated. Fabricated seams found to have less than the specified minimum overlap shall be repaired by adding an overlap or cap strip that provides the minimum specified overlap or will be rejected. All seams shall be made so that thermal fusion bond extends fully along the width of the sheet so that no loose edges are present.

3.02.2 Prior to installation, all unnecessary material and equipment shall be removed from the tank and the floor slab installation areas shall be swept clean.

### 3.03 INSPECTION

3.03.1 All sheets and seams shall be 100% visually inspected during fabrication. No defective seams or exposed scrim will be allowed. All exposed scrim

edges shall be sealed with an approved polypropylene edge sealant or capped with a strip of unreinforced polypropylene. All indicated repairs shall be made by the geomembrane fabricator before the panels are packaged for shipment.

3.03.2 In addition to visual inspection, a 48-inch (1.2m) weld sample shall be made with each factory seam welding unit used in this work at the beginning of every work shift and every four hours of production thereafter. Sample shall be taken from a seam specifically made for quality testing and not taken from the fabricated panel itself. Test specimens shall be cut at quarter points from each 48-inch seam sample (a total of three places) and tested for seam strength and peel adhesion. The shear seam strength shall be tested in accordance with ASTM D751 as modified in Annex A of ANSI/NSF 54. The peel adhesion shall be tested in accordance with ASTM D 4437 as modified in Annex A of ANSI/NSF 54.

3.03.2.1 A log shall be maintained showing the date, time, panel number and test results. Failure of the material and/or seams to meet all the requirements of these specifications may be cause for rejection of the material and/or seams as appropriate. The Fabricator shall provide the test results to the Owner or Engineer upon request.

3.03.3 Upon completion of baffle wall installation, contractor shall visually inspect the baffle walls for damage from ground level. Any repairs shall be made with newly manufactured material cut with rounded corners extending 4-inches in each direction from the damaged area. The entire repair shall be completely welded to the baffle wall.

3.04 <u>INSTALLATION</u>

3.04.1 CONTRACTOR shall field verify dimensions and provide the field dimensions to the baffle curtain fabricator <u>prior to fabrication of the baffle curtains.</u>

3.04.2 All work shall be fabricated and erected in accordance with the approved submittal drawings. For those baffles requiring widths greater than the coated fabric available from the manufacturer, a thermal fusion heat seam nominal 2 inches wide shall be used at those locations to join multiple widths of fabric together. The strength of the seam shall be as great as or greater than the parent material in shear strength.

3.04.3 Baffle shall be secured to the floor with type 316 Stainless Steel Angles. All baffle penetrations shall be punched. Provide 3/8-inch polypropylene rope in the 4” wide, double hem on the perimeter of the baffle curtain(s).

The 3/8-inch polypropylene rope inside the 4” wide hem shall be behind the stainless steel plates at floor locations.

3.04.4 Provide stainless steel pipe and stainless steel angle plates; or stainless steel flat plates sandwiching the baffle curtain on the top edge and open end of the baffle wall with 3/8-inch bolts for attaching the baffle to the top and the open end wall of the tank as shown on the drawings.

3.04.5 Provide carbon steel ¼” x 2” x 2” x 2” plates to be welded to the ceiling, the walls, and the floor of the tank for securing the baffle curtain to the tank wall using additional stainless steel flat bar and bolts. An insulation component must be used to separate the unlike metals.

3.04.6 Provide carbon steel ¼” x 2” x 2” x 2” plates to be welded to the ceiling and the open end wall of the tank for securing the baffle curtain to the tank wall the type 316 stainless steel 3/16” diameter cable from the tank wall to the top edge or open end of the baffle curtain to tension or suspend the baffle curtain. The type 316 stainless steel 3/16” diameter cable shall be secured using type 316 stainless steel 3/16” cable clamps. An insulation component must be used to separate the unlike metals.

3.04.7 Hardware and fasteners shall be made of type 316 stainless steel.

3.04.8 All of the carbon steel metals must be epoxy painted after the metals have been welded and the edges have been ground smooth using paint meeting AWWA Standards for Water Tank Coatings.

3.05 START-UP AND TRAINING

Not applicable.

END OF SECTION

# SECTION 15380 - MOTORS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. General: The Contractor shall furnish and install inverter duty rated motors, accessories, and appurtenances as specified herein for the replacement of the Finish Water Transfer pump motors. The furnish equipment shall be in conformance with the individual specifications of driven equipment, to provide a complete and operable installation, all in accordance with the requirements of the Contract Documents. The existing Finish Water Transfer pump motors will be returned to the Water Treatment Plant supervisor.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. The work of the following Sections and Divisions applies to the work of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this Work.

1. Section 16000 - General Electrical Requirements.

2. Section 16904 – Variable Frequency Drives – Low Voltage

### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. All work specified herein shall conform to or exceed the applicable requirements of the referenced portions of the following publications to the extent that the provisions thereof are not in conflict with other provisions of these specifications.

1. Commercial Standards:

| | |
|---|---|
| NEMA MG 1 | Motors and Generators |
| NEMA MG 2 | Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators |
| NEMA MG 10 | Energy Management Guide for Selection and Use of Polyphase Motors |

| | |
|---|---|
| I EEE 43 | Recommended Practice for Testing Insulation Resistance of Rotating Machinery |
| I EEE 85 | Standard Test Procedure for Airborne Sound Measurement on Rotating Electric Machinery |
| I EEE 112 | Standard Test Procedure for Polyphase Induction Motors and Generators. |
| I EEE 113 | Guide on Test Procedures for DC Machines |
| I EEE 115 | Test Procedure for Synchronons Machines |

1.04 CONTRACTOR SUBMITTALS

A. Submittals shall be made in accordance with the requirements of Section 01330 – Submittals/Shop Drawings and Section 16000 - General Electric Requirements.

B. Complete motor data shall be submitted with the driven machinery shop drawings. Motor data shall include:

1. Machine name and specification number of driven machine.

2. Motor manufacturer and personal contact information.

3. Motor type or model and dimension drawing.

4. Nominal horsepower.

5. NEMA design.

6. Frame size.

7. Enclosure.

8. Winding insulation class and treatment.

9. Rated ambient temperature.

10. Service factor.

11. Voltage, phase, and frequency rating.

12. Full load current at rated horsepower for application voltage.

13. Starting code letter, or locked rotor kVA, or current.

14. Special winding configuration such as part-winding, star-delta. Include winding diagram.

15. Rated full load speed.

16. Power Factor at full load.

17. Noise certification and data sheets.

18. Replica of motor nameplate.

19. Bearing types and catalog numbers.

20. Lists of special characteristics and features being provided as specified:

    For Vertical Motors: Thrust bearing life; type of thrust bearing lubrication; type of guide bearing lubrication.

    For Wound Rotor Motors: Statement that carbon brushes are being provided that are suitable for the low speed, continuous operation specified (for wound rotor motors).

C. A single-line drawing, signed and stamped, by a registered engineer in the State of California, is to be developed to reflect associated system electrical requirements such as breaker(s), wire(s) and conduit sizing; drawing is to include updated system load calculations. The single-line drawing is to be incorporated into the design package developed in association with plant controls system upgrade/replacement.

## 1.05 QUALITY ASSURANCE

A. Quality assurance shall be in accordance with all applicable requirements of Section 16000 - General Electric Requirements.

B. Adjustable frequency driven motors shall be tested as an assembly with the drive and the driven equipment prior to delivery to the site.

1.06 SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. Where motors are part of packaged equipment a qualified manufacturer's representative shall supervise the unpacking, installation and field testing.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. U.S. Motors
Brithinee Electric
620 S. Rancho Ave.
Colton, CA 92324
(909) 825-7971

B. Or Approved Equal

2.02 MATERIALS

A. Materials and equipment shall be standard products of established manufacturers who have produced continuously the type of equipment specified. All equipment and material shall be new and of high-quality insuring long life and reliable operation.

B. Accessories to be included with furnishing the two (2) motors are: Two (2) Shaft Ground Ring, Two (2) 115 Volt Space Heaters, and Two (2) Thermostats – Normally Closed

2.03 SERVICE CONDITIONS

A. Motors shall be designed and manufactured for continuous severe duty service.

2.04 RATING AND APPLICATION

A. Unless indicated otherwise in which the design equipment is specified, motor enclosures shall be of the following type(s) approved for its intended purpose:

1. Motors installed indoors and outdoors shall be totally enclosed fan cooled (TEFC) with a service factor of 1.15.

B. The Motors shall be 40 HP and rated for 230/460 volts, three phase, 60 Hertz.

C. Motor mechanical design shall be in accordance with this Specification and the detailed requirements indicated on the individual motor data sheet.

D. The design and construction of all motors shall be coordinated with the driven equipment requirements.

E. Motors shall be designed for full-voltage starting and rated for continuous operation.

F. Motors shall operate successfully under running conditions at rated load at plus or minus 10 percent of rated voltage or plus or minus 5 percent of rated frequency or a combination of the two.

G. In sizing motors, the horsepower rating of the motor, as stamped on the nameplate, shall not be exceeded during any operating conditions of the driven equipment.

H. Starting current at full voltage shall not exceed 650 percent of the motor full load current for all integral horsepower alternating current motors.

I. All motors shall have a safe stall (locked rotor) time equal to or greater than the maximum accelerating time under the worst voltage conditions specified.

J. Motor fans shall be suitable for rotation in either direction. They shall be nonsparking, corrosion resistant material, accurately balanced before assembly on the motor.

K. The motors shall be NEMA Design "B".

L. Totally enclosed motors shall be "Severe Duty Chemical Service" type including shaft seals, internal surfaces coated with corrosion resistant paint or epoxy varnish, external surfaces coated with epoxy enamel.

M. All motors shall be "premium-efficiency" design, capable of operating at premium efficiency than the standard industry design.

1. The Motors frame size shall be 324 TP and have a guaranteed efficiency stamped on the nameplate. The basis for motor efficiency evaluation shall be IEEE test procedure 112, Method B, using accuracy improvement by segregated loss determination including stray load loss measurements.

N. All motors will be Counter-clockwise rotation facing opposite drive end.

## 2.05 TERMINAL BOXES

A. Terminal boxes of the split type shall be furnished for each motor unless the base or housing of the motor is of a design which incorporates provisions for incoming cables.

B. Terminal boxes for medium-voltage motors shall have sufficient interior space to permit stress cones to be formed on the incoming cables and to permit the cable shields to be properly terminated and grounded. In addition, boxes shall be sized to contain surge protection equipment.

C. Separate terminal boxes shall be furnished for each accessory device, such as space heaters, temperature detectors, and other items.

D. All boxes shall be heavy duty class, weather tight and thoroughly coated internally and externally with corrosion-resistant paint.

## 2.06 INSULATION

A. The insulation system shall be Class “F” with temperature rise (based on maximum ambient temperature of 40 °C) of 80 °C measured by the resistance method.

## 2.07 BEARINGS AND LUBRICATION

A. Motors shall be hollow shaft and bearings shall be anti-friction type grease.

B. Motors for "Process" or "In-Line" service shall be "In-Line, Solid Shaft" type construction with a clamped and locked bearing arrangement. Mounting and shaft extension dimensions and tolerances shall be in accordance with NEMA MG1-18.620 or 18.625. The bearings shall be rated for a L10 minimum life of 2 years or 17,500 hours at the maximum expected up or down thrust the driven equipment may impose during startup or operation at any capacity including shutoff.

## 2.08 GROUNDING

A. Each motor shall have a threaded hole in the motor frame with either a bronze bolt and lock washer or a bronze post-type connector for connection to an external ground conductor. The size of the bolt or post-type connector may be 3/8 inch. The hole in the motor frame shall be threaded to a depth not less than 1-1/2 times the diameter of the hole to ensure a firm connection. If necessary, a metal pad shall be bonded to the motor frame to provide this depth for the threaded hole. The grounding means shall be located on the same side of the motor as the main lead terminal box.

2.09 BALANCE AND VIBRATION

A. Motors shall be special balance.

B. Motors shall have a maximum peak-to peak amplitude of vibration in accordance with MG1-20.52 when measured in accordance with MG1-12.06 B or MG1-20.53.

2.10 NOISE

A. Maximum sound pressure levels 3 feet from any motor shall not exceed 85dbA.

B. All motors shall be "quiet line" type and shall be so indicated on the submittals, Quiet Line type motors shall be capable of operating at a lower noise level than the standard industry design.

C. Measurement procedures shall in general be guided by the provisions of IEEE Publication No. 85.

2.11 NAMEPLATES

A. Each motor shall have a corrosive-resistant nameplate containing information in accordance with NEMA MG1. In addition the service factor and efficiency shall be included.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Motors shall be installed in accordance with Division 15 - Mechanical, Division 16 – Electrical, and in accordance with the manufacturer’s recommendations.

B. Motor control shall be provided by the two (2) new Variable Frequency Drive (VFD) Finish Water Pump Starters within the existing electrical room. See Electrical and Instrumentation Plan Sheet and Specifications.

C. Contractor shall make provision to protect motors from moisture by connecting space heaters. The space heaters shall be connected while in storage and/or before Commissioning.

**END OF SECTION 15380**

# SECTION 15615 - VALVES

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. The Contractor shall provide all tools, supplies, materials, equipment, and labor necessary for furnishing, epoxy coating, installing, adjusting, and testing of all valves, check valves, combination air and vacuum release valves and appurtenant work, complete and operable, in accordance with the requirements of the Contract Documents. Where buried valves are illustrated on the Plans, the Contractor shall furnish and install valve boxes to grade, with covers, extensions, and position indicators.

B. The provisions of this Section shall apply to all valves and valve operators specified in the various Sections of Divisions 2, 13, 15 and 17 of these Specifications except where otherwise specified in the Contract Documents. Valves and operators in particular locations may require a combination of units, sensors, limit switches, and controls specified in other sections of these Specifications.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Divisions 2 and 15, applicable sections, Pipe, Fittings, and Valves

B. Section 09800 - Protective Coatings

C. Division 16 - Electrical, applicable sections

### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Comply with the reference specifications of the General Requirements.

B. Comply with the current provisions of the following Codes and Standards.

| | |
|---|---|
| ANSI B 16.1 | Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800 |
| ANSI B 16.5 | Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys |

| | |
|---|---|
| ANSI/ASME B 1.20.1 | General Purpose Pipe Threads (inch) |
| ANSI/ASME B 31.1 | Power Piping |
| ASTM A 36 | Specification for Structural Steel |
| ASTM A 48 | Specification for Gray Iron Castings |
| ASTM A 126 | Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings |
| ASTM A 536 | Specification for Ductile Iron Castings |
| ASTM B 61 | Specification for Steam or Valve Bronze Castings |
| ASTM B 62 | Specification for Composition Bronze or Ounce Metal Castings |
| ASTM B 148 | Specification for Aluminum-Bronze Castings |
| ASTM B 584 | Specification for Copper Alloy Sand Castings or General Applications |
| ANSI/AWWA C 500 | Gate Valves for Water and Sewage Systems |
| ANSI/AWWA C 502 | Dry-Barrel Fire Hydrants |
| ANSI/AWWA C 503 | Wet-Barrel Fire Hydrants |
| ANSI/AWWA C 504 | Rubber-Seated Butterfly Valves |
| ANSI/AWWA C 506 | Backflow Prevention Devices - Reduced Pressure Principle and Double Check Valves Types |
| ANSI/AWWA C 507 | Ball Valves 6 inches through 48 inches |
| AWWA C 508 | Swing-Check Valves for Waterworks Service, 2 inches Through 24 inches NPS |
| ANSI/AWWA C 509 | Resilient-Seated Gate Valves for Water and Sewage Systems |

| | |
|---|---|
| AWWA C 550 | Protective Interior Coatings for Valves and Hydrants |
| SSPC-SP-5 | White Metal Blast Cleaning |
| MSS-SP-70 | Manufacturers Standardization Society of the Valve and Fitting Industry; Cast Iron Gate Valves. Flanged and Threaded Ends |
| NSF / ANSI 61: | Drinking Water System Components – Health Effects |

1.04 CONTRACTOR SUBMITTALS

A. Submittals shall be made in accordance with General Requirements. In addition to product information, the Contractor shall submit for approval lay-out drawings showing valve locations within the piping system, supports, and identification numbers.

B. The following submittals and specific information shall be provided.

1. Shop Drawings: Shop drawings of all valves and operators including associated wiring diagrams and electrical data, shall be furnished as specified in General Requirements. Submit for approval the following:

a. Manufacturer's literature, illustrations, paint certifications, specifications, detailed drawings, data and descriptive literature on all valves and appurtenances.

b. Deviations from Contract Documents

c. Engineering data including dimensions, materials, size and weight.

d. Fabrication, assembly and installation drawings.

e. CV values, head loss curves, and as required, calculations.

f. Special tools list.

2. Valve Labeling: The Contractor shall submit a schedule of valves to be labeled indicating in each case the valve location and the proposed wording for the label. Complete nameplate data of valves and actuators is required.

3. Operation and Maintenance Manuals:

   a. Submit complete installation, operation and maintenance manuals including test reports, maintenance data and schedules, description of operation, and spare parts information.

   b. Furnish Operation and Maintenance Manuals in conformance with the requirements of the General Requirements.

4. Shop Tests: Hydrostatic tests shall be performed, when required by the valve specifications included herein.

5. Certificates: Where specified or otherwise required by Engineer, submit Test Certificates and Certificates of Compliance with AWWA standards and other specifications, especially where it concerns the suitability of the materials of construction for the particular application.

## 1.05 QUALITY ASSURANCE

A. Valve Testing: Valves shall be shop tested per manufacturer's recommendations and applicable AWWA/ANSI specifications prior to shipment. Manufacturer's certification that valves have been shop tested shall be submitted for approval 30 days prior to scheduled shipment.

B. Bronze Parts: Where specified, all interior bronze parts of valves shall conform to the requirements of ASTM B 62, or, where not subject to dezincification, to ASTM B 584.

C. Shop Inspection: Shop inspection of valve construction, testing and coating shall be witnessed and approved by the ENGINEER. All valves will be shop inspected unless otherwise waived in writing by the Engineer.

D. The Contractor shall demonstrate that each valve installed as a part of a piping system will operate under field conditions in a manner consistent with the design of the system. All testing of valves shall be witnessed and approved by the Engineer.

E. For all pneumatic, hydraulic, and electric motor operators and controls, it shall be the responsibility of the Contractor to provide a qualified representative of the valve manufacturer to perform all field adjustments to set operator limit switches for the required functions. The cost of providing a qualified representative of the valve manufacturer for field adjustments shall be included in the Contractor's bid. All wiring of motor operators shall be identified with a unique number unlike any other wiring identification. It is the responsibility of the Contractor to coordinate the requirements of this section with those involving both specifications of Division 16, "Electrical" and Division 17, "Instrumentation."

F. All adjustments, calibration, and/or testing shall be done in the presence of the Engineer.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the site to ensure uninterrupted progress of the Work. Deliver anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to not delay the Work.

B. All boxes, crates and packages shall be inspected by Contractor upon delivery to the site. Contractor shall notify Engineer if any loss or damage exists to equipment or components. Replace loss and repair damage to new condition, in accordance with manufacturer's instructions.

C. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms or other supports. Protect steel members and packaged materials from corrosion and deterioration.

D. Provide full-face protectors of waterproof material fastened to each side of the valve body to protect joints and the valve interior.

PART 2 - PRODUCTS

2.01 GENERAL VALVE REQUIREMENTS

A. General: The Contractor shall furnish all valves, operators, actuators, valve-operating units, stem extensions, and other accessories as shown or specified. All valves shall have the name of the manufacturer and the site of the valve cast on the body or bonnet or shown on a permanently attached plate in raised letters.

All valves shall be new and of current manufacture. All valves, 6 inch and larger, shall have operators with position indicators. Where buried, these valves shall be provided with valve boxes and covers containing position indicators, and valve extensions.

B. Valve Flanges: The flanges of valves shall be in accordance with Divisions 2 and 15.

C. Valve Stems: Except where otherwise specified, valves with motorized operators shall have stems conforming to ASTM A 276 Type 316 stainless steel with minimum tensile strength of 95,000 psi, and a minimum yield point of 75,000 PSI, and elongation of 25% in 2 inches. Manually operated valves shall have silicon-bronze stems conforming to ASTM B 584-875, having minimum tensile strength of 60,000 PSI, a minimum yield point of 24,000 PSI, and elongation of 16% in 2 inches. Where subject to dezincification, manually operated valve stems shall be of bronze conforming to ASTM B 62, containing no more than 5% zinc, nor more than 2% aluminum.

D. Protective Coating: Except where otherwise specified, ferrous surfaces, exclusive of stainless steel surfaces, in the water passages of all valves 4 inch and larger, as well as the exterior surfaces of all submerged, buried or aboveground valves and operators, shall be fusion bonded epoxy. Flange faces of valves shall not be coated. The valve manufacturer shall certify in writing that such coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications.

E. Valve Operators:

1. Valve operators shall be provided for specific valves as required by the specification section.

2. When one, or more, underground valve is installed, an adjustable valve key shall be provided to the Owner.

G. Nuts and Bolts: All nuts and bolts on valve flanges and supports shall be coated with a flouropolymer as manufactured by Tripac (Tripac 2000 Blue), or an approved equal. All bolts on valve bonnets and exterior valve hardware shall be Type 316 stainless steel.

## 2.02 RESILIENT SEATED GATE VALVES

Resilient seated gate valves shall conform to AWWA C 509, latest edition. The wedge shall be fully encapsulated in the elastomer, including the guides. The brass stem nut shall be rigidly enclosed in the wedge to maintain alignment. The valve body shall be composed of ductile iron.

The stem shall have two (2) O-rings and a wiper above the collar and one (1) O-ring below the collar. Stem seals must be replaceable with the valve under pressure.

The stem material shall be standard bronze. Stainless steel (ANSI-420) shall also be acceptable for use as an alternative.

The waterway shall be full size to allow for tapping use; no cavities or depressions shall be permitted in the seat area.

Valve body and bonnet shall be electrostatically applied, fusion bonded, epoxy coated both inside and out by the valve manufacturer. The coating shall meet the requirements of AWWA C 550, latest edition. Coating shall be applied only at the valve manufacturer's facilities. Exterior hardware shall be composed of Type 316 stainless steel.

The bonnet bolts shall not be exposed to the environment.

O-ring style seals shall be used as gaskets on the bonnet and on the stuffing box. The below grade valves shall be supplied with a standard 2 inch operating nut. All valves shall be wrapped with a polyethylene material.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering resilient wedge gates valves which may be incorporated into the work are:

a. AFC
b. Clow
c. AVK
d. Waterous
e. M&H Valve Company
f. Mueller
g. Or Equal.

## 2.03 BUTTERFLY VALVES

A. General:

All butterfly valves shall be of the rubber-seated tight-closing type. They shall meet or exceed AWWA Standard C 504.

Both valve ends shall be mechanical-joint (or other, as available) per AWWA Standard C 111. Accessories (bolts, glands and gaskets) shall be supplied by the valve manufacturer.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering butterfly valves which may be incorporated into the work are:

a. Bray
b. Pratt
c. Dezurik
d. Clow
e. Or Equal.

All valves must use full AWWA C 504 Class 150B valve shaft diameter, and full Class 150B underground-service-operator torque rating throughout entire travel, to provide capability for operation in emergency service. All valves shall be NSF approved.

B. Valve:

Valve body shall be composed of ductile iron with 18-8 Type 304 stainless steel body seat. Valve vane shall be ductile iron, having rubber seat mechanically secured with an integral 18-8 stainless steel clamp ring and 18-8 stainless steel self-locked screws.

Rubber seat shall be a full-circle 360 degree seat not penetrated by the valve shaft. For valves 4” - 12”, the valve shaft shall be one piece, extending full size through the entire valve. Valve shaft shall be 304 stainless steel. Packing shall be O-ring cartridge designed for permanent duty in underground service. For 14 inches and larger valve shaft shall be 18-8 stainless steel stub shaft design keyed to the vane with stainless steel taper pins.

Body Type: All butterfly valves shall be of the rubber-seated tight-closing type. They shall meet or exceed AWWA Standard C 504.

Valve ends shall be: As noted in the Plans.

Wafer: Suitable for installation between 125# or 150# ASA flanges (available 4 inch through 20 inch).

Flanged: Short body valves per Table 2 of AWWA Spec C 504. Flanges shall be 125# ANSI (available all sizes). Also flanged by MJ in 6 inch, 8 inch and 16 inch sizes.

Mechanical Joint: Both ends of valve shall be "MJ" per AWWA C 111. "MJ" accessories (bolts, glands, gaskets) must be supplied by valve manufacturer (available all sizes - also flanged by MJ in 6 inch, 8 inch, 12 inch and 16 inch sizes). Both ends of valve shall be "MJ" per AWWA C111. "MJ" accessories (bolts, glands, gaskets) shall be supplied by valve manufacturer (available all sizes - also flanged by MJ in 6 inch, 8 inch, 12 inch and 16 inch sizes).

C. Operator:

Valve operator shall be of the traveling-nut type, sealed, gasketed, and lubricated for underground service. It shall be capable of withstanding an overload input torque of 450 ft. lbs at full-open or full-closed position without damage to the valve or valve operator. It shall be designed for submergence in water to 25 feet head pressure for up to 72 hours.

Valve shall be capable of easy closure by one man using standard valve key, even under emergency line-break conditions as severe as those that would cause a valve maximum opening torque requirement of as much as two times AWWA Class 150B.

All valves shall open left (clockwise to close), and be equipped with 2 inch AWWA operating nut.

Crank, Handwheel or Chainwheel: All manual operators for service other than underground shall have position indicator and shall be totally enclosed and permanently lubricated. In any event, a maximum pull of 80 pounds on the crank or wheel shall produce full Table 1 output torque throughout entire travel. Operators shall full-closed positions without damage to valve or operator. Operators shall be of the "traveling-nut" type. All valves shall open left (clockwise to close).

Cylinder: Cylinder operator shall be of the base mounted configuration. Cylinder barrel shall be of molybdenum-disulfide lined glass fiber reinforced epoxy tubing, to provide a corrosion-free, self-lubricated high strength barrel. Rod seal shall be of urethane, molybdenum-disulfide filled, to provide a self-lubricated, long life seal.

Piston rod shall be of hard chromium plated 18-8 stainless steel, and shall be top and bottom guided in a heavy cast iron mechanism housing for positive alignment. Guiding shall be accomplished by bronze bearings at ends of housing straddling all side loads improved in operation. Entire operator including piston rod shall be fully enclosed. Operator shall produce full AWWA Standard C 504 Table 1 output torque throughout entire travel for Class (25A) (25B) (75B) (150B) with a minimum supply pressure of PSI (water) (air) (oil).

Electric Valve Actuators: Actuators shall be provided as called out in the improvement Plans. The actuator shall be compact and low profile to minimize space requirements. The actuator shall operate over 90º. The actuator shall provide easy access for field wiring and adjustment. The actuator shall be built to withstand line vibration and shock without failure.

The enclosure shall be die-cast aluminum for environmental protection. The waterproof enclosure shall be certified to UL, CSA and CE NEMA 4 waterproof standards. The waterproof/explosion proof enclosure shall be certified to UL NEMA 4 hazardous locations. The enclosure shall be provided with captive cover bolts to prevent loss of cover bolts when cover is removed. The enclosure shall have two conduit connections (one for power wiring and one for control signal wiring) in either NPT or metric threads as specified. The actuator enclosure shall be provided with a high visibility valve position display prominently labeled and color coded to indicate the valve position throughout the full range of travel.

The motor shall be a single phase, permanent split capacitor reversible induction type with Class F or better insulation. The motor shall contain a built-in UL approved automatic reset thermal overload protector set at 275º F (135ºC) embedded in the motor windings. Motors shall be 24 VAC, 120 VAC 50/60 Hz or 240 VAC 50/60 Hz as specified on the Electrical and or Instrumentation Plans.

The actuator shall have a self-locking gear train system consisting of a worm and worm gear output drive mechanism which will hold the valve in the desired position without the need for an electro-mechanical braking system. The spur gear train shall have precision cut multi-staged gears which will withstand locked rotor conditions and are permanently lubricated at the factory.

Mechanical stainless-steel travel stops shall be provided and located outside the actuator enclosure for ease of adjustment.

Stainless steel lock nuts to hold the travel stops in position and o-ring seals for waterproof protection shall be provided. The mechanical travel stops shall be capable of limiting the travel of the actuator in either direction from full closed to full open.

The actuator shall be equipped with a manual override handwheel to rotate the valve without electrical power. The manual override system shall ensure positive and efficient manual operation without the use of extra tools or levers.

An automatic power cutout switch shall be provided to cut power to the motor when the actuator manual override is engaged. This cutout shall also function as a safety emergency power shutdown device and shall be accessible from outside the actuator enclosure.

All travel switches shall be:

Single Pole, Double Throw Form C Type
UL Listed and CSA Approved
10A at 125/250 VAC and 1/2A at 125 VDC

The actuator switches shall be pre-wired to a terminal block for ease of access and all internal wiring shall range from 12-22 AWG. The travel limit switches shall limit the actuator travel in both the open and closed direction of travel. Cams for each travel limit switch shall be infinitely adjustable by finger touch or screw driver.

Actuators shall be designed for electric operation for the following service conditions:

Temperature ranges of -40ºF (-40ºC) to +150ºF (+65ºC)
Duty Cycle: 25% for Intermittent Operation
100% for Continuous Operation

All actuators shall be factory tested to ensure proper operation.

All actuators shall mount directly to the valve mounting flange and stem without the need for any brackets or couplings.

The actuator shall be designed to accept any of the following optional accessories if specified during the submittal review process:

A. Torque Limiting System:
- Shall include a 2 SPDT mechanical switches and 2 factory calibrated adjusting screws.

- The switches, in response to a predetermined load on the actuator output shaft, shall interrupt power to the motor.
- The switches shall operate at any point and in both directions of actuator level.

B. Heater:

- Shall include a self-regulating temperature control to prevent condensation build-up.
- Shall be pre-wired to the terminal block for ease of connection to external source.
- Rated output shall be 15W at 120 or 220 VAC.

C. Microprocessor Servo:

- Shall provide precise modulating control of the valve position in response to an analog input signal.
- Shall have an analog output signal proportional to the actual valve position and the signal shall be configurable to either current or voltage output.
- Voltage spike protection shall be provide on all input terminals.
- Independent adjustments shall be provided for Deadband and for both open and closed Speed Control of the actuator.
- Input signals shall be:
  - 4-20 mADC 250 Ohm Input Impedance
  - 0-10 VDC 2.1k Ohm Input Impedance
  - 2-10 VDC
  - 10k Ohm or great potentiometer
- Calibration shall be accomplished by pressing a single button to initiate the calibration routine.
- Control characteristics shall be linear and duty cycle shall be 100%.
- Internal feedback shall be by means of a 10k Ohm potentiometer.
- Retransmission outputs shall be:
  - 4-20 mADC
  - 0-5 VDC
  - 0-10 VDC
  - 2-10 VDC
- Separate Speed Control adjustments shall be provided for adjustment of open and close travel speeds.

- Inputs for the control box, handwheel, LED status indicators and self-diagnostic capability shall also be provided.
- DeviceNet Servos shall also be available if specified.

D. Local Control Station:

- For local electrical operation of the actuator.
- Shall flush mount to the actuator and include:
  -a local/off/remote control switch
  -an open/stop/close switch
  -two lights which indicate open and closed valve position
- Enclosure shall be aluminum and waterproof (NEMA 4, 4X, IP 65)

D. Coating:

Standard coating shall be universal primer. Coating shall be applied to entire valve body and vane before final assembly.

Valve body shall be electrostatically applied, fusion bonded, epoxy coated to all surfaces of valve body and vane to an average minimum film thickness of 5 mils, conforming to AWWA C 550 Standard. Coating shall be applied only at the valve manufacturer's facilities. Exterior valve hardware shall be composed of Type 316 stainless steel hardware for butterfly valve flanges shall consist of flouropolymer coated hardware as manufactured by Tripac (Tripac 2000 Blue) or an approved equal.

E. Tests:

All valves shall be tested bottle-tight at rated working pressure by the manufacturer as follows:

| | |
|---|---|
| 4" through 12" | 200 PSI |
| 14" Up | 150 PSI |

In addition, a hydrostatic test with vane partially open shall be given to the assembled valve as follows:

| | |
|---|---|
| 4" | 400 PSI |
| 14" Up | 300 PSI |

2.04 VALVE RISER AND VALVE COVER

A 6 inch diameter cast iron valve riser and ductile iron cover shall be placed over each below grade valve. The 6 inch diameter cast iron valve riser and cover shall be manufactured by Star Pipe Products, or an approved equivalent of equal substance and function.

Place an 8 inch deep, 8 inch wide PCC collar concentric with the exterior of the valve extension riser. Place the top of the riser 0.10-feet above the finish grade.

Two (2) 6-foot valve keys for operating of gate valves shall be furnished by the Contractor to the Owner prior to completion of the project.

## PART 3 - EXECUTION

### 3.01 VALVE INSTALLATION

A. General: All valves, operating units, controls, stem extensions, valve boxes, and accessories shall be handled in a manner to prevent any injury to any part of the valve. Valves shall be installed in accordance with the manufacturer's written instructions and as shown and specified. All valves shall be adequately braced to prevent warpage and bending under the intended use. Valves shall be firmly supported to avoid undue stresses on the pipe. All valves shall be installed so that the valve stems are plumb.

B. Access: All valves shall be installed to provide easy access for operation, removal, and maintenance and to avoid conflicts between valve operators and structural members or handrails.

C. Valve Accessories:

1. Where combinations of valves, sensors, switches, and controls are specified, it shall be the responsibility of the Contractor to properly assemble and install these various items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on Shop drawing submittals.

2. Valve operators and controls are to be installed where specified and designated on the Plans. The Contractor is responsible for installation of the correct valve operator and

control as specified to provide a complete piping system as specified.

D. All valves shall be field tested following installation to demonstrate that the valve operates under field conditions in a manner consistent with the design of the system.

E. All testing of valves shall be witnessed and approved by the Engineer.

F. The Contractor shall demonstrate that each valve operator and control installed as a part of a piping system will operate under field conditions as designed and in the manner for which the operator was specified.

END OF SECTION 15615

SECTION 16000

GENERAL ELECTRICAL REQUIREMENTS

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Section Includes
   1. Work and materials necessary for erecting a complete electrical and instrumentation system, tested and ready for continuous use.

B. Related Sections
   1. Division 0 Bid Requirements, Contract Forms, and Contract Conditions
   2. Division 1 General Requirements
   3. Division 2 Site Construction
   4. Division 3 Concrete
   5. Division 9 Finishes
   6. Division 11 Equipment
   7. Division 13 Special Construction
   8. Division 15 Mechanical
   9. Division 17 Instrumentation

### 1.02 DEFINITIONS

A. The term “Provide” means “Furnish and Install”.

### 1.03 SYSTEM DESCRIPTION

A. Design Requirements
   1. If any contradictions, contrasts, or inconsistency appears, the most strict criteria noted and the collective requirements in any and all of the project documents shall apply.

### 1.04 SUBMITTALS

A. Intent
   1. Organize work so that a complete electrical, instrumentation, and control system for the facility will be provided and will be supported by accurate shop drawings, record drawings, and O&M manuals.
   2. Submit detailed shop drawings and data prepared and organized by the suppliers.
   3. Submittals shall be neatly grouped and organized by specification section number, and sub-section. Related information shall be highlighted, and the specific product shall be marked. All submittals shall be complete, and presented in one package. Incomplete submittals will be returned without review. If a portion of the project requires a fast track schedule, that portion only may be submitted earlier under a separate cover letter.

4. Work performed or equipment provided without engineer approved submittals is done at contractor's risk. Cost to re-work or re-supply will be born solely by the contractor.

B. Product Data
1. A complete list of the equipment and materials, including the manufacturer's name, product specification, descriptive data, technical literature, performance charts, catalog cuts, installation instructions, and spare part recommendations for each different item of the equipment specified. The above shall clearly show all the specified requirements as described in the Specifications including but not limited to specific UL and NEMA rating, technical capabilities, test result verifications, and acceptance letters.
2. Submittals not in compliance with the specifications must include the following information:
   a. Reason for non-compliance or variance
   b. Calculations and drawings for redesign of related components including detail drawings showing internal and assembly details, with installation instructions.
   c. Proposed layout showing any modifications or exceptions to related work made necessary by this work, with calculations and drawings showing such modifications or exceptions.

C. Shop Drawings
1. Drawings containing complete wiring and schematic diagrams, control diagrams, and any other details required to demonstrate that the system has been coordinated and will operate as intended. Drawings shall show proposed layout, anchoring, support, and appurtenances of equipment, and equipment relationship to other parts of the work including clearances for maintenance and operations.

D. Utility Coordination
1. N/A

E. Closeout Submittals
1. Provide "Record Drawings" of the electrical, control, and instrumentation work to include:
   a. Step-by-step procedure manuals for the installation, operation start-up, and maintenance of the equipment.
   b. Installation, operating, troubleshooting, and maintenance and overhaul instructions in complete detail.
   c. Possible breakdowns and repairs, and troubleshooting guides, as well as simplified wiring and control diagrams of the system installed. This shall provide the Owner with comprehensive information on all systems and components to enable operation, service, maintenance and repair.
   d. Exploded or other detailed views of all equipment, devices, assemblies, and accessory components shall be included, together with complete parts lists and ordering instructions.
2. Provide an "As Built" set of Plans to Owner. Maintain at all times a marked up set of Plans showing the following information:

a. Actual installed circuit numbers, conduit sizes, cable tray routing, number of conductors, conductor sizes (larger than #12 AWG), and all other deviations from the design Plans.
b. Underground conduit, duct banks, and concealed items dimensioned on the Plans from permanent, visible, building features.
c. Actual motor size, starter size, and overload heater size, along with all other protective equipment for all 480 V and 4160 V motor circuits.
d. Conductor identification and panel schedules.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements
1. Electrical work, including connection to electrical equipment integral with mechanical equipment, shall be performed in accordance with the latest published regulations, codes, and standards, of the following:
a. National Electrical Code (NEC)
b. State and local codes
c. Institute of Electrical and Electronic Engineers (IEEE)
d. American National Standards Institute (ANSI)
e. American Society for Testing and Materials (ASTM)
f. Insulated Cable Engineers Association (ICEA)
g. National Electrical Manufacturers Association (NEMA) Standards
h. Federal Occupational Safety and Health Act (OSHA)
i. National Fire Protection Association (NFPA)
j. National Electrical Testing Association (NETA)

1.06 DELIVERY, STORAGE, AND HANDLING

A. Electrical panels, switchgear, motor control centers, and other electrical equipment, shall be shipped in sealed dust and moisture proof plastic sheet enclosures, and the seal maintained until units are installed. Said units shall be new and free of any dirt, dust, water, grease, rust, damaged parts or components.

1.07 PROJECT/SITE CONDITIONS

A. Verify site conditions before bidding or performing work.

1.08 SCHEDULING

A. Maintain a work schedule showing work to be performed, sequence of work, major milestones, and manpower loading. Coordinate schedule requirements with other trades. Provide adequate staff to perform the work in the time required by the schedule.

1.09 SYSTEM STARTUP

A. After installation and testing of all electrical and instrumentation equipment and systems, energize all equipment and leave ready for continuous operation.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

A. Manufacturers and model numbers shown on Plans or listed in the specifications are intended to establish a minimum standard of quality and acceptability.

### 2.02 MATERIALS

A. Materials, equipment, and parts comprising any unit, or part thereof, specified or indicated on the Plans, shall be new and unused, of current manufacture, and of highest grade consistent with the state of the art. Damaged materials, equipment, and parts, are not considered to be new and unused, and will not be accepted.

### 2.03 MANUFACTURED UNITS

A. The fabricator of major components and manufactured units, such as distribution panel boards, switchgear, and motor control centers, shall also be the manufacturer of the major devices therein.

B. Electrical equipment provided with mechanical equipment assemblies shall be in compliance with this specification.

### 2.04 EQUIPMENT

A. Minimum sizes of equipment, and electrical devices, are indicated but it is not intended to show every offset and fitting, nor every structural or mechanical difficulty that will be encountered during the installation of the work.

B. Electrical equipment shall be capable of operating successfully at full-rated load, without failure, at an ambient air temperature of 60 degrees C (unless otherwise noted), and specifically rated for the altitude indicated on the Plans. Provide air conditioning to meet the manufacturers' operating temperature for electrical equipment not rated for operation at that temperature.

C. When applicable, the material used in the performance of the electrical work shall be listed by the Underwriters' Laboratories, Inc. (UL) for the class of service for which they are intended.

D. Provide nameplates where indicated elsewhere in these specifications or on the Plans. Nameplates shall be black laminate with white letters and fastened to the various devices with round head stainless steel screws. Provide nameplates for each disconnecting means for service, feeder, branch, or equipment conductors, indicating its purpose.

### 2.05 FABRICATION

A. Shop Assembly

1. Equipment assemblies, such as Service Entrance Sections, Switchgear, Switchboards, Control and Distribution Panels (PLC, RIO), and other custom fabricated electrical enclosures shall bear a UL label as a complete assembly. The UL label on the individual components making up the assembly will not be considered sufficient to meet the present requirement. Whenever a generic UL label does not apply for the assembly, a serialized UL label shall be affixed to the assembly, and the serial number shall be submitted with the assembly record shop drawings.
2. Custom fabricated electrical control panels, and enclosures, shall bear a UL label affixed by a local UL inspector.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Site Verification of Conditions
   1. Verify site conditions before bidding or performing work.

### 3.02 INSTALLATION

A. Coordinate work with other trades and with certified vendor shop drawing submittals.

B. Provide equipment in accordance with the manufacturers' requirements.

C. Identify each conductor as required by the Contract Documents.

D. Equipment Access:
   1. Install equipment so it is readily accessible for operation and maintenance.
   2. Equipment shall not be blocked or concealed.
   3. Do not install electrical equipment such that it interferes with normal maintenance requirements of other equipment.

E. Equipment shall be installed plumb, square and true with the building construction, and shall be securely fastened.

F. Outdoor wall-mounted equipment, and indoor equipment mounted on earth, or water bearing walls, shall be provided with corrosion-resistant spacers to maintain ¼-inch separation between the equipment and the wall.

G. Arrange for the building in of equipment during structure construction. Where equipment cannot be built-in during construction, arrange for sleeves, box-outs, and other openings, as required to allow installation of equipment after structure construction is complete.

H. Verify that equipment will fit support layouts indicated.

I. Screen or seal all openings into outdoor equipment to prevent the entrance of rodents and insects.

J. Equipment fabricated from aluminum shall not be imbedded in earth or concrete.

K. Provide all necessary anchoring devices and supports.
   1. Use supports as detailed on the Plans and as specified.
   2. Supports and anchoring devices shall be rated and sized based on dimensions and weights verified from approved equipment submittals.
   3. Hardware shall be stainless steel.
   4. Do not cut, or weld to, building structural members.
   5. Do not mount safety switches and external equipment to other equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.

L. Verify exact rough-in location and dimensions for connection to electrical items furnished by others.
   1. Obtain shop drawings from those furnishing the equipment.
   2. Proceeding without proper information may require the Contractor to remove and replace work that does not meet the conditions imposed by the equipment supplied.
   3. Provide sleeves wherever openings are required through new concrete or masonry members. Place sleeves accurately and coordinate locations with the Engineer.
   4. Do not endanger the stability of any structural member by cutting, digging, chasing, or drilling and shall not, at any time, cut or alter the work without the Engineer's written consent.
      a. Provide additional reinforcing if required.
      b. Use proper tools and methods to cut, core drill, or make other penetrations.
      c. Restore walls, ceilings, or floors to their original condition.

M. Provide concrete foundations or pads required for electrical equipment as indicated or specified.
   1. Provide a 4-inch concrete housekeeping pad for floor mounted electrical equipment. Pour on top of the finished floor or slab. Drill existing slab and epoxy rebar to anchor housekeeping pad in place.

N. Do not use equipment that exceeds the indicated dimensions except as approved in writing by the Engineer.

O. Do not use equipment or arrangements of equipment that reduce required clearances or exceed the space allocation.

P. Work indicated on the Plans is approximately to scale, but actual dimensions and detailed Plans should be followed as closely as field conditions permit. Field verification of scale dimensions on Plans is governed by field conditions. Installation of systems and equipment is subject to clarification as indicated in reviewed shop drawings and field coordination.

Q. Discrepancies indicated on different Plans, between Plans and actual field conditions, or between Plans and Contract Documents shall be promptly brought to the attention of the Engineer for clarification, prior to purchasing and installing equipment.

R. Adjust the alignment of equipment and conduit to accommodate architectural changes or to avoid work of other trades.

S. Provide parts and pieces necessary to the installation of equipment, in accordance with the best practice of the trade, and in conformance with the requirements of these Contract Documents.

T. Items not specifically mentioned in these Contract Documents, or noted on the Plans, or indicated on reviewed shop drawings, but which are obviously necessary to make a complete working installation, shall be deemed to be included herein.

U. Lay out and install electrical work prior to placing floors and walls. Provide sleeves and openings through floors and walls, required for installation of conduits. Sleeves shall be rigidly supported and suitably packed, or sealed, to prevent ingress of wet concrete. Spacers shall be installed in order to prevent conduit movement. Dimensions indicated for electrical equipment and their installation are restrictive dimensions.

V. Provide inserts and hangers required to support conduits and other electrical equipment. Coordinate inserts and hangers with other trades. Replace inserts, hangers, sleeves, or other mounting hardware which are improperly placed.

W. Perform necessary saw cutting, core drilling, excavating, removal, shoring, backfilling, and other work required for the proper installation of conduits, whether inside, or outside of the buildings and structures. Use core drills to make circular holes.

X. TEMPORARY POWER
   1. N/A.

Y. CORROSION PROTECTION
   1. Wherever dissimilar metals, except conduit and conduit fittings, come in contact, the Contractor shall isolate these metals, as required, with neoprene washers, 9 mil polyethylene tape, or gaskets. Where fastening conduit, electro plated, or equivalent fasteners and stainless steel bolts shall be used.

3.03 REPAIR/RESTORATION

A. Repair damage caused by construction or demolition work to restore damaged areas to original condition.

B. Factory finishes damaged during shipping, or construction, shall be restored to original new condition. Rust shall be removed, and bare metal surfaces shall be primed and painted to match the original surrounding finish.

## 3.04 FIELD QUALITY CONTROL

A. Site Tests

1. The electrical work shall be free from improper grounds and from short circuits. Visually compare the conductor connections with connection diagrams. Perform individual circuit continuity checks using electrical circuit testers. Demonstrate proper operation of the energized electrical and mechanical devices. Correct any wiring deficiencies.

## 3.05 COORDINATION STUDY

A. N/A

## 3.06 ADJUSTING

A. Calibrate and set all adjustable electrical equipment including circuit breakers, motor circuit protectors, overload relays. Align photo cells and lights to achieve desired effects.

## 3.07 CLEANING

A. Relays, starters, circuit breakers, switches, contacts, insulators, mechanisms, and buses shall be free of dust, dirt, oil, moisture, metal shavings, and other debris before testing and energizing equipment. Vacuum and wipe down inside and outside of electrical enclosures and control panels.

## 3.08 PROTECTION

A. Once equipment is installed, it shall be protected at all times with plastic sheet covers until the area is free of dirt, dust, paint spray, water, and other trades. Provide heat to eliminate condensation.

End of Section

SECTION 16010

ELECTRICAL: BASIC REQUIREMENTS

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Section Includes:
   1. Basic requirements for electrical work.

B. Install and wire all equipment, including prepurchased equipment, and perform all tests necessary to assure conformance to the Drawings and Specifications and ensure that equipment is ready and safe before energizing.

C. Related Sections include but are not necessarily limited to:
Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
Division 1 - General Requirements.

D. Drawings Use and Interpretation:
   1. Drawings indicate the location and arrangement of electrical equipment and the approximate location of other equipment requiring electrical work.
      a. For exact locations of building elements, refer to dimensioned architectural/structural drawings.
      b. Field measurements take precedence over dimensioned drawings.

E. Installation of all systems and equipment is subject to clarification as indicated in reviewed shop drawings and field coordination drawings.

### 1.02 AREA CLASSIFICATIONS

A. Outdoor locations may contain corrosive and hazardous areas:
   1. Corrosive and hazardous areas are identified on the Drawings.
      a. Areas not identified as such shall be considered wet.

B. Indoor locations may contain damp, wet corrosive and hazardous areas:
   1. Damp, wet, corrosive and hazardous areas are identified on the Drawings.
      a. Areas not identified as such shall be considered unclassified.

### 1.03 DEFINITIONS

A. Outdoor Areas:
   1. Those locations on the Project site where the equipment is normally exposed to wind, dust, rain, snow, etc.

B. Indoor Areas:

1. Those locations on the Project site where the equipment is normally protected from wind, dust, rain, snow, etc.

C. Shop Fabricated:
1. Manufactured or assembled equipment for which a UL test procedure has not been established.

1.04 QUALITY ASSURANCE

A. Referenced Standards:
1. American Iron and Steel Institute (AISI):
   a. Steel Products Manual - Stainless and Heat Resisting Steel.
2. American National Standards Institute (ANSI):
   a. C2, National Electrical Safety Code.
3. American Society for Testing and Materials (ASTM):
   a. A36, Specification for Structural Steel.
   b. A153, Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. Factory Mutual System (FM):
   a. A Guide to Equipment, Materials and Services.
5. Institute of Electrical and Electronics Engineers (IEEE):
   a. 141, Recommended Practice for Electrical Power Distribution for Industrial Plants.
   b. 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.
6. National Electrical Manufacturers Association (NEMA):
   a. ICS 6, Enclosures for Industrial Controls and Systems.
7. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC).
8. Underwriters Laboratories, Inc (UL):
   a. 508, Safety Industrial Control Equipment.
   b. 698, Industrial Control Equipment for Use in Hazardous Locations.

B. When a specific code or standard has not been cited, the applicable codes and standards of the following code-making authorities and standards organizations shall apply:
1. American Association of State Highway and Transportation Officials (AASHTO).
2. American Iron and Steel Institute (AISI).
3. American National Standard Institute (ANSI).
4. American Society for Testing and Materials (ASTM).
5. ETL Testing Laboratories, Inc (ETL).
6. Insulated Cable Engineers Association (ICEA).
7. Institute of Electrical and Electronic Engineers (IEEE).
8. Illuminating Engineering Society of North America (IES).
9. Instrument Society of America (ISA).
10. Lightning Protection Institute (LPI).
11. National Electrical Manufacturers Association (NEMA).
12. National Fire Protection Association (NFPA).

13. Occupational, Health and Safety Administration (OSHA).
14. Underwriters Laboratories Inc (UL).

C. In case of conflict or disagreement between codes, standards, laws, ordinances, rules, regulations, drawings and specifications, or within either document itself, the more stringent condition shall govern.

1.05 SYSTEM DESCRIPTION

A. Provide functional systems in compliance with manufacturer's instructions, performance requirements specified or shown on the Drawings, and modifications resulting from reviewed shop drawings and field coordinated drawings.

1.06 SUBMITTALS

A. Shop Drawings:
1. See Contract Documents for other requirements.
2. Submit shop drawings prior to purchase or fabrication of equipment. See individual Division 16 sections for specific requirements.
3. Prior to submittals of shop drawings, coordinate electrical equipment, particularly motor control equipment, control panels, and instrumentation, with all applicable equipment and systems interfacing with that equipment.
4. For each product, clearly identify manufacturer by name.
5. Provide manufacturer's technical information on products to be used, including:
   a. Product descriptive bulletin.
   b. Electrical data pertinent to the Project and necessary to assure compliance with Specifications and Drawings.
   c. Equipment dimensions, where applicable.
   d. Evidence that the products submitted meet the requirements of the standards referenced.
6. When general data sheets are provided as part of the submittal, specifically identify the products to be used on this Project.
7. Ensure that all submittals clearly indicate the equipment is UL or ETL listed or is constructed utilizing UL or ETL listed or UL recognized components. Where an UL standard has not been established clearly identify that no UL standard exists for that equipment.
8. For all equipment, provide manufacturer's installation instructions.

B. Operation and Maintenance Manuals:
1. See Contract Documents for requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Ensure that equipment is not used as steps, ladders, scaffolds, platforms, or for storage-either inside or on top of enclosures.

B. Protect nameplates on electrical equipment to prevent defacing.

C. Repair, restore or replace damaged, corroded and rejected items at no additional cost to the Owner.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

A. Refer to related Division 16 sections.
   1. All equipment of a similar type shall be by one manufacturer unless otherwise noted in the Specifications.

### 2.02 MATERIALS

A. Trade names and catalog numbers may be used in the Drawings or Specifications to establish quality standards and basics of design.
   1. Other listed manufacturers in the applicable specification sections with equal equipment may be acceptable.
   2. If no other manufacturer is listed, then manufacturers of equal equipment may be acceptable.

B. Listed:
   1. Where UL test procedures have been established for the product type, electrical equipment shall be approved by UL or ETL and shall be provided with the UL or ETL label.

C. Structural Steel Supports:
   1. Galvanized steel: ASTM A36.
      a. PVC coated in Class I and in corrosive areas.
   2. Stainless steel: AISI Type 316.

### 2.03 FABRICATION

A. When equipment is shop fabricated for the Project, the electrical devices and enclosures utilized shall be UL or ETL listed and labeled or shall be UL recognized.

B. Shop or Factory Finishes:
   1. Interiors of other painted equipment shall be either white or light gray.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

A. Equipment shall be installed in accordance with the requirements of the NEC.

B. Enclosures for Use with Electrical Equipment:
   1. NEMA 12: Use in unclassified indoor locations.

2. NEMA 3R: Use with HVAC equipment in wet outdoor locations.
3. NEMA 4:
   a. Use in wet indoor locations.
   b. Use in wet outdoor locations except with HVAC equipment.
4. NEMA 4X: Use in all corrosive locations.
5. Exceptions:
   a. As modified in other Division 16 sections.
   b. As otherwise indicated on the Drawings.
6. Standards:
   a. NEMA ICS-6, Enclosures for Industrial Controls and Systems.
   b. UL 508, Safety Industrial Control Equipment.
   c. UL 698, Industrial Control Equipment for Use in Hazardous Locations.

C. Coordinate the installation of electrical equipment with other trades.
   1. Arrange for the building in of equipment during structure construction.
   2. Where equipment cannot be built-in during construction, arrange for sleeves, box-outs, openings, etc., as required to allow installation of equipment after structure construction is complete.

D. Verify that equipment will fit support layouts indicated.

E. Equipment Dimensions and Clearances:
   1. Do not use equipment that exceeds the indicated dimensions.
      a. Except as approved in writing by the Engineer.
   2. Do not use equipment or arrangements of equipment that reduce required clearances or exceed the space allocation.

F. Install equipment in accordance with the manufacturer's instructions.

G. Equipment Access:
   1. Install equipment so it is readily accessible for operation and maintenance.
   2. Equipment shall not be blocked or concealed.
   3. Do not install electrical equipment such that it interferes with normal maintenance requirements of other equipment.

H. Equipment shall be installed plumbed, square and true with the building construction and shall be securely fastened.

I. Outdoor wall-mounted equipment and indoor equipment mounted on earth or water bearing walls shall be provided with corrosion-resistant spacers to maintain 1/4 IN separation between the equipment and the wall.

J. Screen or seal all openings into outdoor equipment to prevent the entrance of rodents and insects.

K. Equipment fabricated from aluminum shall not be placed in direct contact with earth or concrete.

L. Provide all necessary anchoring devices and supports.
   1. Use supports as detailed on the Drawings and as specified.
      a. Where not detailed on the Drawings or specified, use supports and anchoring devices rated for the equipment load and as recommended by the manufacturer.
   2. Supports and anchoring devices shall be rated and sized based on dimensions and weights verified from approved equipment submittals.
   3. Hardware shall be malleable type, corrosion resistant and shall be supported by heavily plated machine screws or brass, bronze or stainless steel bolts.
   4. Do not cut, or weld to, building structural members.
   5. Do not mount safety switches and external equipment to other equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.

M. Provide concrete foundations or pads required for electrical equipment as indicated or specified.
   1. Floor-mounted equipment shall be mounted on a 4 IN high concrete housekeeping pad. Pad shall be poured on top of the finished floor or slab.

N. Material that may cause rusting or streaking on a building surface shall not be used.

O. To avoid interference with structural members and equipment of other trades, it may be necessary to adjust the intended location of electrical equipment. Unless specifically dimensioned or detailed, the Contractor may, at his discretion, make minor adjustments in equipment location without obtaining the Engineer's approval.

P. Provide tagging of electrical equipment, conduits, and conductors in accordance with the Contract Documents.
   1. Each equipment item shall be provided with a nameplate identifying the equipment by the tag number shown on the Drawings.
   2. Each branch circuit and feeder shall be provided with a nameplate identifying, by name and tag number as shown on the Drawings, the load served.
      a. Do not abbreviate.
   3. Each control device shall be provided with an escutcheon defining the device function and a nameplate identifying the controlled equipment.

Q. Provide electrical danger, caution, warning or safety instruction signs in accordance with applicable safety standards.

R. Conduit and wire between temperature control thermostats and the associated HVAC equipment shall be furnished and installed with the equipment (see Division 15 of the Specifications).
   1. Conduit and wire between alarm or shutdown thermostats and air flow switches and the associated alarm devices or panels shall be furnished and installed as part of Division 16.
   2. Thermostats included as part of a heat trace system shall be installed as part of Division 16.

3.02 FIELD QUALITY CONTROL

A. Do not remove or damage fireproofing materials.
   1. Install hangers, inserts, supports, and anchors prior to installation of fireproofing.
   2. Repair or replace fireproofing removed or damaged.

B. Make all penetrations through roofs prior to installation of roofing.
   1. For penetrations required after installation of roofing:
      a. In built-up roofing (BUR), provide all curbs, cants and base flashings.
      b. In elastic sheet roofing (ESR), arrange and pay for base flashing work by authorized roofer.

C. Make all penetrations of electrical work through walls and roofs water and weather-tight.

D. Equipment furnished under this Contract for use on future work and all concealed equipment, including conduits, shall be dimensioned, on the record drawings, from visible and permanent building features.

E. After installation, test all electrical equipment and systems as recommended by the manufacturer and in accordance with Specification 16920 – ELECTRICAL ACCEPTANCE TESTING.

F. Test Equipment Interface:
   1. Verify systems coordination and operation.

3.03 CLEANING

A. Clean dirt and debris from all surfaces.

B. Apply touch-up paint as required to repair scratches, etc.

C. Replace nameplates damaged during installation.

D. Thoroughly vacuum the interior of all enclosures to remove dirt and debris.

3.04 DEMONSTRATION

A. Demonstrate equipment in accordance with the Contract Documents.

End Of Section

SECTION 16111

CONDUITS

## PART 1 - GENERAL

### 1.01 SCOPE OF WORK

A. Furnish and install conduits as required, and as shown on the Drawings. Materials employed shall be as shown on the Drawings.

### 1.02 SUBMITTALS

A. Submit product literature including manufacturer part number, model number, material, size, and specifications. Material shall not be installed until the Engineer has reviewed the submittal data.

B. Shop Drawings shall be submitted for review and acceptance showing routing, conduit size, and number and size of wires in each conduit before installation of conduit and any related work.

C. Proposed routing of conduits buried under floor slabs-on-grade.

D. Identify conduit by tag number of equipment served or by circuit schedule number.

E. Proposed routing and details of construction including conduit and rebar embedded in floor slabs, columns, etc. Identify conduit by tag number of equipment served or by circuit schedule number.

F. Proposed location and details of construction for openings in slabs and walls for raceway runs.

G. Refer to Section 16000 for further submittal requirements.

### 1.03 REFERENCES

A. American National Standards Institute (ANSI): C80.1, Rigid Steel Conduit - Zinc-Coated.

B. National Electric Manufacturers Association (NEMA): RN-1, Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit.

C. Underwriters Laboratories Inc. (UL):

1. 1, Flexible Metal Conduit.

2. 6, Rigid Metal Conduit.
3. 360, Liquid-Tight Flexible Steel Conduit.
4. 467, Grounding and Bonding Equipment.
5. 514, Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers.
6. 651, Schedule 40 and 80 Rigid PVC Conduit.
7. 870, Wireways, Auxiliary Gutters, and Associated Fittings.
8. 884, Underfloor Raceways and Fittings.
9. 886, Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.

## PART 2 - PRODUCTS

### 2.01 RACEWAYS

A. Exposed conduit in an unclassified or hazardous area shall be galvanized rigid steel (GRS) unless specifically indicated otherwise on the Drawings. Conduits in the corrosive areas shall be PVC coated GRS unless otherwise indicated. Underground and/or concrete encased conduits shall be PVC, unless otherwise indicated. All wiring, except as otherwise noted, shall be in conduit. Conduit size shall not be less than the National Electrical Code (NEC) size required for the conductors therein and shall not be smaller than 3/4-inch. No underground conduit shall be less than one inch.

B. Condulet type fittings shall be Crouse-Hinds, Appleton, or equal with wedge nut covers. All condulets located outdoors or in wet locations shall be weathertight.

C. In unclassified areas, flexible conduit shall be grounding type, weatherproof, corrosion resistant, and watertight.

D. Couplings, connectors, and fittings shall be standard types specifically designed and manufactured for the purpose. They shall be installed to provide a firm mechanical assembly and electrical conductivity throughout.

E. Expansion fittings shall be OZ type AX with jumper for exposed locations and type DX at structural expansion joints, Spring City, or equal. Conduits shall have expansion fittings in accordance with NEC.

F. The conduits and fittings shall be supported per NEC requirements as a minimum.

2.02 GALVANIZED RIGID STEEL (GRS)

A. Conduit and couplings shall be hot-dipped galvanized with zinc coated threads and outer coating of zinc bichromate, in accordance with ANSI C80.1 standards, as manufactured by Jones & Laughlin Steel Corporation, Allied Tube & Conduit Corporation, Triangle PWC, or equal.

B. Steel conduit shall not be buried in earth without concrete encasement and additional corrosion protection. A half lapped rapping of 20 mil PVC based corrosion protection tape shall be used.

2.03 PVC COATED GALVANIZED RIGID STEEL (PVC-GRS)

A. PVC coated GRS conduit shall be installed where shown on the Drawings or elsewhere specified and shall conform to NEMA RN-1 and ANSI C80.1 standards.

B. The PVC coated galvanized rigid conduit must be UL Listed. The PVC coating must have been investigated by UL as providing the primary corrosion protection for the rigid metal conduit. Ferrous fittings for general service locations must be UL Listed with PVC as the primary corrosion protection. Hazardous location fittings, prior to plastic coating must be UL listed. All conduit and fittings must be new, unused material. Applicable UL standards may include: UL 6 Standard for Safety, Rigid Metal Conduit, UL514B Standard for Safety, Fittings for Conduit and Outlet Boxes.

C. The zinc surface of the conduit shall remain intact on both the inside and the outside of the conduit throughout the preparation and application processing. A Polyvinyl Chloride (PVC) coating shall be bonded to the galvanized outer surface of the conduit. The bond between the PVC coating and the conduit surface shall be greater than the tensile strength of the plastic. The thickness of the PVC coating shall be a minimum of 0.040-inch (40 mil).

D. A loose coupling shall be furnished with each length of conduit. A PVC coating shall be bonded to the outer surface of the coupling and a PVC sleeve equal to the outside diameter of the uncoated conduit shall extend beyond both ends of the coupling approximately one pipe diameter or 1-1/2 inches, whichever is smaller. The wall thickness of the coating on the coupling and the sleeve shall be a minimum of 0.040-inch (40 mil).

E. A PVC coating shall be bonded to the outer surface of all conduit bodies and fittings and a PVC sleeve shall extend from all hubs. A urethane coating shall be uniformly and consistently applied to the interior of all conduit and fittings. This internal coating shall be a nominal 2 mil thickness. Conduit or fittings having areas with thin or no coating shall be unacceptable. The wall thickness of the coating on conduit bodies and fittings and the sleeve walls shall be identical to those on couplings in length and thickness. The covers on all conduit bodies shall be coated on both sides and shall be designed to be

completely interchangeable within size and family of fitting. Form 8 Condulets, 1/2" through 2" diameters, shall have a v-seal tongue-in-groove gasket to effectively seal against the elements. Form 8 condulets shall be supplied with plastic encapsulated stainless steel cover screws.

F. Type 304 stainless steel screws shall be furnished and used to attach the cover to the conduit body. All coated material shall be installed and patched according to the manufacturer's recommended installation and patching instructions.

G. Conduit straps shall be PVC coated or stainless steel.

H. PVC coated conduit and fittings shall be as manufactured by Plasti-Bond, Perma-Cote, KorKap or equal

I. PVC coated flexible conduits shall be liquid and vaportight and manufactured in accordance with UL 360 standards.

J. Installation of the PVC Coated Conduit System shall be performed in accordance with the Manufacturer's recommendations and Installation Manual. Install with manufacturer-approved tools and compounds to prevent damage to the PVC coating. The installer should be certified by Manufacturer to install coated conduit.

2.04 RIGID NONMETALLIC - PVC

A. Where specifically indicated on the Drawings, or elsewhere specified, conduit may be high density Schedule 40, 90 degrees C, heavy-duty PVC. The conduit shall be manufactured from virgin polyvinyl chloride compound which meets ASTM D1784, NEMA TC-2, ANSI C33.91, and UL 651 standards. Smoke emissions shall be limited to less than 6 grams per 100 grams of material tested.

B. Where conduit concrete encasement is indicated on the Drawings, conduit supports shall be installed at five foot intervals. PVC conduit shall be manufactured by Carlon, Triangle Conduit & Cable, or equal.

2.05 INTERMEDIATE METAL CONDUIT

A. Conduit and couplings shall be galvanized intermediate metal conduit manufactured in accordance with UL 1242 and as manufactured by Allied Tube & Conduit Corporation, Jones & Laughlin Steel Corporation, or equal.

B. Intermediate metal conduit shall not be buried without concrete encasement. Threadless couplings and connectors shall not be used.

## 2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Liquidtight flexible metal conduit shall be liquid and vaportight, oil and ultraviolet ray resistant and manufactured in accordance with UL 360 standards. Liquidtight flexible metal conduit shall be formed of a continuous, spiral wound, galvanized steel core with an extruded PVC jacket. The PVC jacket shall be rated for high ambient heat applications, 90 degrees Celsius.

B. For corrosive locations, liquidtight flexible metal conduit shall be formed of a continuous, spiral wound, aluminum core with an extruded PVC jacket. The PVC jacket shall be impervious to corrosive liquids and vapors.

C. An external bonding conductor shall be required for flexible conduit connections containing circuits rated at 60 amps or greater and for sizes 1 1/2 " or larger. Flexible conduit and connectors for 1 1/4" and smaller shall be listed for grounding.

D. Connectors for liquidtight flexible conduit shall be galvanized, furnished with a sealing ring and locknut, and suitable for wet locations.

# PART 3 - EXECUTION

## 3.01 INSTALLATION

A. Conduit runs are schematic only, and shall be modified as required to suit field conditions, subject to review and acceptance by the Engineer.

B. Conduit shall run continuously between outlets and shall be provided with junction boxes where connections are made. Couplings, connectors, and fittings shall be acceptable types designed and manufactured for the purpose, and shall provide a firm mechanical assembly, and electrical conductivity throughout.

C. Conduit runs shall be straight and true. Elbows, offsets, and bends shall be uniform and symmetrical. Changes in direction shall be made with long radius bends, or with fittings of the condulet type.

D. Conduit runs in buildings and structures shall be exposed except as specifically noted, or accepted by the Engineer.

E. Conduit runs shall not interfere with the proper and safe operation of equipment, and shall not block or interfere with ingress or egress, including equipment removal hatches.

F. Exposed conduits shall be securely fastened with clamps, or straps, intended for conduit use. All exposed conduit shall be run on the walls and ceiling only and shall be parallel to the planes of the walls or ceiling. No diagonal runs will be permitted. Flexible

conduit shall be used only for short lengths required to facilitate connections between rigid conduit to motors from junction boxes, or control equipment.

G. Conduit runs on water-bearing walls shall be supported one inch away from the wall on an accepted channel. When channel galvanizing, or other coating, is cut or otherwise damaged, it shall be field coated to original condition. No conduit shall be run in water-bearing walls, unless specifically designated otherwise.

H. Conduit shall be thoroughly reamed to remove burrs. IMC or GRS shall be reamed during the threading process, and Rigid Nonmetallic PVC shall be reamed before applying fittings. A zinc rich cold galvanizing shall be used to restore corrosion protection on field cut threads. Bushings and lock nuts or hubs shall be used at conduit termination's. The total number of bends in any run between pull points shall not exceed 360 degrees. Junction boxes and pull boxes shall be installed at points acceptable to the Engineer. Conduit ends shall be plugged to prevent the entrance of moisture or debris during construction. All spare conduits shall be adequately capped and shall contain a suitable pull string.

I. Joints shall be set up tight. Hangers and fastenings shall be secure, and of a type appropriate in design, and dimensions, for the particular application.

J. Conduit runs shall be cleaned and internally sized (obstruction tested) so that no foreign objects, or obstructions remain in the conduit prior to pulling in conductors.

K. After installation of complete conduit runs 2 inches and larger, conduits shall be snaked with a conduit cleaner equipped with a cylindrical mandrel of a diameter not less than 85 percent of the nominal diameter of the conduit. Conduits through which the mandrel will not pass shall not be used.

L. Expansion fittings shall be installed across all expansion joints and at other locations where necessary to compensate for thermal expansion and contraction.

M. Provide trenching, backfill, and compaction for conduits installed underground.

N. Unless approved in advance by the Engineer, all conduits which transition from underground to aboveground will utilize galvanized rigid steel conduit for the bend from horizontal to vertical and for the extension above the ground. Factory 90 degree GRS bends shall be used. GRS bends and conduits shall be half lapped with 20 mil PVC tape in non-corrosive areas and shall be PVC coated rigid steel in corrosive areas. Tape wrapping shall extend a minimum 6 inches above top of slab or above finished grade.

O. Liquid tight flexible metallic conduit 1-1/2 inch and larger shall be provided with grounding style bushings and shall have an external ground wire sized and installed in accordance with the NEC.

End of Section

SECTION 16123

600 VOLT CLASS CABLE

## PART 1 - GENERAL

### 1.01 SCOPE OF WORK

A. This section covers the furnishing and installation of 600 Volt Class cables and conductors, terminations and splicing, and pulling lubricants.

### 1.02 SUBMITTALS

A. Products shall be submitted in accordance with Section 16000, and elsewhere in the Contract Documents, prior to installation.

### 1.03 REFERENCES

A. Insulated Cable Engineers Association/National Electrical Manufacturers Association (ICEA/NEMA):
   1. S-68-516/WC 8, ethylene-propylene rubber-insulated wire and cable for the transmission and distribution of electrical energy.
   2. S-61-402/WC 5, thermoplastic-insulated wire and cable for the transmission and distribution of electrical energy.
   3. S-66-524/WC 7, cross-linked thermosetting-polyethylene-insulated wire and cable for transmission and distribution of electrical energy.

B. Underwriters Laboratory, Inc.
   1. 44, rubber insulated wires and cables.
   2. 83, thermoplastic-insulated wires and cables.
   3. 486A, wire connectors and soldering lugs for use with copper conductors.
   4. 486B, wire connectors for use with aluminum conductors.
   5. 510, insulating tape.

C. National Electric Code

## PART 2 - PRODUCTS

### 2.01 ACCEPTED MANUFACTURERS

A. Conductors and Multi Conductor Cables (MCC), subject to compliance with Contract Documents, the following manufacturers are acceptable: American Insulated Wire Corporation, Cablec Corporation, Okonite Company, Southwire Company, or equal.

2.02 CONDUCTORS

A. Wire sizes shall be American Wire Gauge (AWG) sizes with Class B stranded construction. Number 2 AWG and smaller shall be factory color coded with a separate color for each phase and neutral, which shall be used consistently throughout the system. Larger cables shall be coded by the use of colored tape. Conductors sized # 1 and larger shall be Type 2, rated for 90 degrees C. All circuit conductors, #6 or smaller shall be "THWN" stranded copper. All other conductors shall be "XHHW-2" stranded copper.

B. Individual or multiple conductor cables for power, control, and alarm circuits of 480 volts or less shall be insulated for not less than 600 volts and shall have insulation type as indicated on the Drawings. "THHW" shall conform to ICEA S-61-402/NEMA WC 5 and UL 83 and "XHHW" shall conform to ICEA S-66-524/NEMA WC 7 and UL 44. Where wire size is not indicated, they shall be of the size required by the NEC, except that no wire external to panels and motor control centers shall be less than No. 12 AWG, unless specifically noted on the Drawings. Panel control wiring shall not be less than No. 14 AWG.

C. All wiring shall be as indicated on the Drawings. Wires shall be new and shall be soft drawn copper with not less than 97 percent conductivity. The wire and cable shall have size, grade of insulation, voltage, and manufacturer's name permanently marked on the outer covering at not more than 2-foot intervals. All wires shall conform to the latest Standards of the ASTM, and ICEA, and shall be tested for their full length by these Standards. Insulation thickness shall be not less than that specified by the National Electrical Code.

D. Power conductors for lighting and receptacles only may utilize "THWN" solid conductors.

2.03 TERMINATIONS AND SPLICES

A. Cable shall be rated 600 volts. Other parts of cable systems such as splices and terminations shall be rated at not less than 600 volts. Splicing shall join conductors mechanically and electrically to provide a complete circuit prior to installation of insulation.

B. Splices in wires No. 10 AWG and smaller shall be made with an insulated, solderless, pressure type connector, Type I, Class 1, Grade B, Style G, or Type II, Class 1 of FS W-S-610 and conforming to the applicable requirements of UL 486A.

C. Splices in wires No. 8 AWG and larger shall be made with non-insulated, solderless, pressure type connector, Type II, Class 2 of FS W-S-610, conforming to the applicable requirements of UL 486A and UL 486B. They shall then be covered with an insulation and jacket material equivalent to the conductor insulation and jacket.

D. Insulated conductor splices below grade or in wet locations shall be sealed type conforming to ANSI C119.1 or shall be waterproofed by a sealant-filled, thick wall, heat

shrinkable, thermosetting tubing or by pouring a thermosetting resin into a mold that surrounds the joined conductors.

E. Bare conductor splices in wet locations or below grade shall be of the exothermic type.

2.04 PULLING LUBRICANT

A. All cables shall be properly coated with pulling compound such as ClearGluide, Aqua Gel, Polywater, or equal before being pulled into conduits so as to prevent mechanical damage to the cables during installation. “Yellow 77” is not acceptable.

B. Other lubricants to be substituted must be accompanied by a statement from the cable manufacturer as to its acceptable use with the cable being installed.

2.05 IDENTIFICATION

A. All conductors shall be numbered with "tube sleeve" type tags with heat impressed letters and numbers.

B. Color code all wiring as follows:

1. Lighting and power wiring:

| **CONDUCTOR** | **120/208 VAC** | **480VAC** | **24V DC** | **120 VAC Control/ Power** |
|---|---|---|---|---|
| Phase 1 | Black | Brown | Blue | Red |
| Phase 2 | Red | Orange | (-) Blue w/ white stripe | |
| Phase 3 | Blue | Yellow | | |
| Neutrals | White | White or Gray | | White |

2. Color code ends of feeder phase conductors only.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The pulling tension and side-wall pressures, as recommended by the cable manufacturer, shall not be exceeded.

B. As far as practical, all circuits shall be continuous from origin to termination without splices in intermediate pull boxes. Sufficient slack shall be left at the termination to make proper connections. In no case shall a splice be pulled into the conduit. Conductor splicing shall not be permitted without the Engineer's approval.

C. Install all cables in conduit.

D. Each feeder and branch circuit shall be installed in its own individual conduit unless combining feeder and branch circuits is permitted as defined in the following:
   1. As specifically indicated on the Drawings.
   2. For lighting, multiple branch circuits may be installed in a conduit as allowed by the NEC and with the wire ampacity derated in accordance with the requirements of the NEC. Conduit fill shall not exceed the limits established by the NEC.
   3. When field conditions dictate and written permission is obtained from the Engineer.

E. Feeder and branch circuits shall be isolated from each other and from all instrumentation and control circuits.

F. Control circuits shall be isolated from all other feeder, branch and instrumentation circuits, except as noted below.
   1. 12 V DC, 24 V DC and 48 V DC control circuits may be combined in common conduit.
   2. 125 V DC control circuits shall be isolated from all other DC and AC control circuits.
   3. 120 V AC control circuits shall be isolated from all DC control circuits.

G. Make splices only at pull or junction boxes.
   1. Crimp or indented-type connectors are not allowed, except for control circuits landed on terminal strips.

3.02 TESTING

A. In accordance with Specification 16920 – ELECTRICAL ACCEPTANCE TESTING.

End of Section

SECTION 16124

INSTRUMENTATION CLASS CABLE

## PART 1 - GENERAL

### 1.01 SCOPE OF WORK

A. This section covers cable use for process signal and controls.

### 1.02 SUBMITTALS

A. Products shall be submitted in accordance with Section 16000, and elsewhere in the Contract Documents, prior to installation.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with Contract Documents, the instrumentation cable shall be as manufactured by Belden, Okonite, or equal.

### 2.02 INSTRUMENTATION CABLE

A. Instrument cable shall be Type TC, and have the number of individually shielded twisted pairs indicated on the Drawings and shall be insulated for not less than 600 volts. Unless otherwise indicated, conductor size shall be No. 18 AWG minimum. Shielded, grounded instrumentation cable shall be used for all analog signals.

B. The jacket shall be flame retardant with 90 degrees C temperature rating. The cable shield shall be a minimum of 2.3 mil aluminum or copper tape overlapped to provide 100 percent coverage and a tinned copper drain wire.

C. The conductors shall be bare soft annealed copper, Class B, 7 strand minimum concentric lay with 15 mils nominal thickness, nylon jacket, 4 mil nominal thickness, 90 degrees C temperature rating. One conductor within each pair shall be numerically identified.

D. Pairs shall be assembled with a nominal 2-inch lay and shall then be group shielded with a minimum of 1.3 mil aluminum or copper tape overlapped to provide 100 percent coverage. All group shields shall be completely isolated from each other.

## PART 3 - EXECUTION

## 3.01 INSTALLATION

A. Feeder and branch circuits shall be isolated from each other, and from instrumentation and control circuits. Instrumentation cables shall be installed in separate raceways from other cables and wiring. This includes portions running through manholes. Instrumentation cable shall be continuous between instruments or between field devices and instrument enclosures. There shall be no intermediate splices or terminal boards, unless otherwise shown on the Drawings.

B. Maintain electrical continuity of the shield when splicing twisted shielded pair conductors. Drain wires shall be terminated inside enclosures at grounded terminal blocks. Only one end of each instrument loop cable drain wire shall be grounded. Ground drain wire of shielded conductors at one end only.

C. Terminate instrumentation and control wiring, including spare wires, at control panels and motor control centers on terminal boards mounted inside the equipment.
   1. Contractor shall supply terminal boards as required.
   2. Do not field wire directly to devices.

End of Section

SECTION 16130

OUTLET, PULL, AND JUNCTION BOXES

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Section Includes:
   1. Outlet, pull and junction boxes.

B. Related Sections include but are not necessarily limited to:
   Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   Division 1 - General Requirements.
   Section 16000 - Electrical: Basic Requirements.
   Section 16111 - Conduits.
   Section 16141 - Wiring Devices.
   Section 16170 - Grounding.

### 1.02 QUALITY ASSURANCE

A. Referenced Standards:
   1. Refer to Section 16000.

### 1.03 SUBMITTALS

A. Shop Drawings:
   1. Refer to the Contract Documents and Section 16000.

### 1.04 DELIVERY, STORAGE, AND HANDLING

A. See Section 16000.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Galvanized steel boxes:
      a. Appleton Electric Co.
      b. Steel City.
      c. Raco.
   2. Sheet metal boxes for non-classified areas:
      a. Hoffman Engineering Co.
   3. Corrosion-resistant boxes:

a. Hoffman Engineering Co.
b. Crouse-Hinds.

4. Hazardous location boxes (Class I, II & III):
   a. Appleton Electric Co.
   b. Crouse-Hinds.
   c. Killark.
   d. O-Z/Gedney.
5. Raintight and watertight boxes:
   a. Appleton Electric Co.
   b. Crouse-Hinds.
6. Terminal boxes:
   a. Hoffman Engineering Co.
7. Boxes in sidewalk:
   a. Appleton Electric Co.
   b. Crouse-Hinds.
   c. O-Z/Gedney.
8. Boxes in earth:
   a. Carlon Electric Products.
9. Exposed switch and receptacle boxes:
   a. Appleton Electric Co.
   b. Crouse-Hinds.
   c. Killark.

B. Submit requests for substitution in accordance with Specification Section 01630.

2.02 MATERIALS

A. Pull and Junction Boxes for Offices and other Dry Architecturally Finished Areas:
   1. Material: 14 GA, galvanized steel.
   2. Concentric knockouts on all four sides.
   3. Flat cover fastened with screws.
   4. NEMA 1 classification.
   5. UL listed.

B. Pull and Junction Boxes for General Use Unclassified Areas Suitable for NEMA 12 Enclosures:
   1. Material: 14 GA galvanized steel with seams continuously welded, ground smooth and no knockouts.
   2. Zinc rich coating on all seams.
   3. Stainless steel captivated cover screws threaded into sealed wells.
   4. Flat door with oil resistant gasket.
   5. NEMA 12 classification.
   6. UL listed.

C. Pull and Junction Boxes for Wet Areas:
   1. Material: 14 GA steel with polyester powder coating inside and out over phosphatized surfaces.

2. Seams continuously welded, ground smooth, no knockouts.
3. Stainless steel clamps on four sides.
4. Flat cover with oil resistant gasket.
5. NEMA 4 classification.
6. UL listed.

D. Pull and Junction Boxes for Corrosive Areas:
1. Material: 304L or 316L stainless steel or fiberglass-reinforced polyester material.
2. Stainless steel boxes:
   a. Seams continuously welded, ground smooth, no knockouts.
   b. Rolled lip around all sides.
   c. Hinged door.
   d. Captivated stainless steel door screws.
   e. Flat door with oil-resistant gasket.
3. Fiberglass-reinforced polyester boxes:
   a. Hinged door with latch and lockout.
   b. Neoprene door gasket.
   c. Grounding bushing(s).
4. NEMA 4X classification.
5. UL listed.

E. Pull and Junction Boxes for Hazardous Areas:
1. Material: Cast gray iron alloy or copper-free cast aluminum.
2. Drilled and tapped openings or tapered threaded hub equipped.
3. Flat bolted-down or threaded cover with neoprene gasket.
4. Stainless steel hex head screws.
5. Explosion proof, UL listed for Class 1 Groups C and D.

F. Pull and Junction Boxes for Sidewalks:
1. Cast-iron box and cover, hot-dip galvanized.
2. Flange for flush mounting.
3. Checkered cover with neoprene gasket, pry bar slots and stainless steel screws.
4. UL listed.
5. Drilled and tapped holes.
6. Watertight NEMA 4 classification.

G. Large Pull and Junction Boxes (100 CU IN and larger):
1. Located in offices and other dry architecturally finished areas where EMT is utilized:
   a. NEMA 1 gasketed without knockouts.
2. Located in general use areas:
   a. NEMA 12 construction:
      1) Welded steel.
      2) Furnished with gray enamel inside and out over phosphatized surfaces.
3. Located in wet and corrosive areas:
   a. NEMA 4X with stainless steel screws.

b. Type 304 L welded stainless steel:

4. Constructed of 14 GA steel with seams continuously welded, ground smooth, no knockouts.
5. Rolled lip around all sides.
6. Rigid handles for covers larger than 9 SF or heavier than 25 LBS.
7. Split covers when heavier than 25 LBS.

H. Terminal Boxes:

1. Galvanized 16 GA steel box provided with plain blank screw cover, subpanel, and terminal points.
2. Refer to Drawing for dimensions and number of terminals.

I. Fiberglass Cable-Pulling Enclosure:

1. Use: Access points to facilitate pulling of electrical cables in buried conduit runs.
2. Size and quantity: As shown on Drawings.
3. Type: Rectangular fiberglass composite, suitable for direct burial pedestrian traffic on top, -50 DegF, chemical, sunlight, and weather resistant.
4. Provide matching top with "ELECTRIC" logo.

J. Outlet Boxes:

1. Use: Installation of wiring devices.
2. Boxes for exposed wiring:
   a. Cadmium plated, cast, ferrous metal, with threaded hubs.
3. Boxes for concealed wiring:
   a. Code gage, hot-dip galvanized steel.
   b. Include bar hangers for metal stud partitions.
   c. Provide barriers between switches in boxes with 277 V switches on opposite phases.
   d. Use extension and plaster rings where required.
   e. Provide grounding screw.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

A. Use locknut and bushing for boxes in non-classified areas.

B. Use cast metal boxes with threaded conduit hubs in hazardous areas.

C. Use Type FS and FD boxes in wet areas and where exposed rigid steel conduit is required.

D. Fill unused punched-out, tapped, or threaded hub openings with insert plugs.

E. Use outlet boxes sized to accommodate quantity of conductors enclosed.

F. Use boxes sized to accommodate conduit tying into box.

G. Install pull boxes or junction boxes in conduit runs where indicated or required to facilitate pulling of wires or making connections.
   1. Make covers of boxes accessible.

H. Install pull boxes or junction boxes rated for the area classification.

I. Install rigid conduit squarely into boxes which do not have hubs or are drilled and tapped.
   1. Install with locknut on the outside and bushing on inside.

J. Install conduit into boxes with hubs, or that are tapped, using thread lubricant.

K. Do not use back-to-back boxes on this Project.

L. Seal all points of conduit entry into fiberglass cable-pulling enclosures for a waterproof installation.

M. Support outlet boxes for incandescent fixtures and other ceiling-mounted devices in lay-in acoustical tile ceilings by bar hangers anchored to ceiling construction members which do not interfere with tile removal.

End Of Section

SECTION 16170

GROUNDING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Whether indicated on the Drawings or not, neutral conductors, cable shields, metallic conduits, cable terminations, junction boxes, poles, surge arresters, and other noncurrent-carrying metallic parts of equipment shall be grounded.

1.02 SUBMITTALS

A. Products shall be submitted in accordance with Section 16000, and elsewhere in the Contract Documents, prior to installation.

1.03 REFERENCES

A. National Electrical Code (NEC) Article 250.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

2.02 GROUND RODS

A. Ground rods shall be copper-clad steel conforming to UL 467, 3/4 inch in diameter by 10 feet in length.

2.03 CONNECTIONS

A. Connections above grade shall be made with bolted solderless connectors, and those below grade shall be made by a fusion-welding process. In lieu of a fusion-welding process, a compression ground grid connector of a type which uses a hydraulic compression tool to provide the correct circumferential pressure may be used. Tools and dies shall be as recommended by the manufacturer. An embossing die code or other standard method shall provide visible indication that a connector has been adequately compressed on the ground wire.

2.04 GROUNDING ELECTRODE CONDUCTOR

A. N/A

## 2.05 EQUIPMENT GROUNDING CONDUCTOR

A. Equipment grounding conductors shall be sized in accordance with NEC Table 250.122, unless otherwise indicated. Ground wires shall be protected by conduit, where such wires run exposed above grade in nonfence-enclosed areas, or are run through concrete construction. Where concrete penetration is necessary, nonmetallic conduit shall be cast flush with the points of concrete entrance and exit, so as to provide an opening for the ground wire. The opening shall be sealed with a suitable compound after installation of the ground wire. Bends greater than 45 degrees in ground wire connections to the ground rods, or counterpoises are not permitted.

## 2.06 EQUIPMENT GROUNDING

A. Equipment frames of motor housings, metallic tanks, metallic equipment enclosures, metal splicing boxes, chain-link fencing, and other metallic noncurrent-carrying metal items, shall be grounded. Connections to earth shall be made in the same manner as required for system grounding. Equipment or devices operating at less than 750 volts may be connected to secondary neutral grounding electrodes.

## 2.07 SURGE ARRESTER GROUNDING

A. Surge arresters shall be grounded. Resistance to ground for intermediate-class arresters shall be not more than 10 ohms and for distribution-class arresters shall be not more than 25 ohms. Ground wire connections shall be not less than No. 4 AWG for distribution arresters and No. 1/0 AWG for intermediate arresters. Connections to earth shall be made in the same manner as required for neutral conductors. Surge arrester grounds may use the same ground wires provided for equipment operating at more than 750 volts. Surge arrester and secondary neutral grounds shall be separate from and independent of each other but both grounds shall be bonded together below grade at the ground rods or may utilize a common counterpoise.

## 2.08 METALLIC STRUCTURES

A. Metallic structures and buildings shall be grounded per NEC.

# PART 3 - EXECUTION

## 3.01 INSTALLATION

A. It is the intent of these Contract Documents that all device and equipment grounds shall be run as a separate conductor in the conduit from the equipment to the distribution panels or system ground. Wireways and enclosures shall be properly bonded and grounded, and ground conductors shall be run for all circuits.

B. Equipment cases and devices shall be grounded. Ground rods shall be driven, and concrete encased conduits installed, before a building, or structure is built, and ground conductors brought through the concrete to accessible points for grounding equipment.

These systems shall be installed at each structure, where transformers, switchboards, panelboards, and MCCs are installed.

C. Duct banks shall contain a bare copper ground conductor. The system ground conductors shall run continuously in duct banks, through handholes and other raceway boxes. The system ground shall be connected to the structure grounding systems to provide a continuous grounding system. Each metallic raceway, panel, switchboard, and other metallic devices associated with the electrical and control systems shall be bonded to this grounding system.

D. Ground rods (if required) shall be installed not less than 6 inches below grade. In counterpoise systems, tops of ground rods shall be approximately at elevations of counterpoises. Where the specified ground resistance cannot be met with the indicated number of ground rods, additional ground rods, longer ground rods, or deep-driven sectional rods shall be installed and connected until the specified resistance is obtained, except that not more than three additional ground rods shall be required at any one installation. Ground rods shall be spaced as evenly as possible at least 6 feet apart and connected below grade. Equipment, neutral, and surge arrester ground wires shall be connected to the ground grid as indicated.

3.02 TESTS

A. N/A

End Of Section

SECTION 16190

SUPPORTING DEVICES

## PART 1 - GENERAL

### 1.01 SCOPE OF WORK

A. Supports, anchors, sleeves, and seals, are indicated on the Drawings, schedules, and specified in other sections of these Specifications.

B. Types of supports, anchors, sleeves and seals specified in this section include the following:
   1. One-hole Conduit Straps
   2. One-Hole Conduit Straps with Clamp Backs
   3. Two-Hole Conduit Straps
   4. Conduit Hangers
   5. I-beam Clamps
   6. Channel Clamps
   7. Round Steel Rods
   8. Drop-in Anchors
   9. Wedge Type Anchor Bolts
   10. Lead Expansion Anchors
   11. Toggle Bolts
   12. Wall and Floor Seals
   13. Cable Supports
   14. U-Channel Strut System
   15. Sleeves

### 1.02 SUBMITTALS

A. Products shall be submitted in accordance with Section 16000, and elsewhere in the Contract Documents, prior to installation.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following: Abbeon Cal Inc., Ackerman Johnson Fastening Systems Inc., Elcen Metal Products Co., Ideal Industries, Inc., Josyln Mfg and Supply Co., McGraw Edison Co., Rawlplug Co. Inc., Star Expansion Co., U.S. Expansion Bolt Co., Allied Tube and Conduit Corp., B-Line Systems, Inc., Greenfield Mfg Co., Inc., Midland-Ross Corp., O-Z/Gedney Div; General Signal Corp., Power-Strut Div.; Van Huffel Tube Corp., and Unistrut Div; GTE Products Corp., and Robroy Industries.

## 2.02 GENERAL

A. Provide supporting devices that comply with manufacturers standard materials, design, and construction, in accordance with published product information, and as required for complete installations, and as specified herein.

## 2.03 SUPPORTS

A. Provide supporting devices of types, sizes, and materials indicated, and having the following construction features:
   1. One-Hole Conduit Straps: For supporting electrical metallic tubing, and liquidtight flexible conduit; zinc plated steel, stainless steel or galvanized steel; snap-on, heavy duty.
   2. One-Hole Conduit Straps with Clamp Backs: For supporting rigid metal conduit, and intermediate metal conduit; cast galvanized steel.
   3. Two-Hole Conduit Straps: For supporting electrical metallic tubing, rigid metal conduit, and intermediate metal conduit; zinc plated steel, stainless steel or galvanized steel.
   4. Conduit Hangers: For supporting electrical metallic tubing, rigid metal conduit, and intermediate metal conduit; zinc plated steel, stainless steel or galvanized steel.
   5. I-Beam Clamps: Electroplated zinc or hot dipped galvanized malleable iron.
   6. Channel Clamps: Electroplated zinc or hot dipped galvanized steel.
   7. Round Steel Rod: National coarse thread, electroplated.

## 2.04 ANCHORS

A. Provide anchors of types, sizes, and materials indicated, with the following construction features:
   1. Lead Expansion Anchors: For CMU walls, 1/4”-20 threads, set tool required.
   2. Toggle Bolts: Electroplated steel, size as required.
   3. Drop-in Anchors: Stainless steel, size as required.
   4. Anchor Bolts: Stainless steel, size as required.
   5. Half-round head, non-removable anchor bolts shall not be used.

## 2.05 SEALS

A. Provide seals of types, sizes and materials indicated; with the following construction features:
   1. Wall and Floor Seals: Provide factory-assembled watertight wall and floor seals, of types and sized indicated; suitable for sealing around conduit, pipe, or tubing passing through concrete floors and walls. Construct seals with steel sleeves, malleable iron body, neoprene sealing grommets and rings, metal pressure rings, pressure clamps, and cap screws.
   2. Conduit sealing bushings shall be manufactured by O-Z/Gedney, Model CSMI, or equal.
   3. The conductor sealing bushings shall be manufactured by O-Z/Gedney, Model CSBG, or equal.

## 2.06 CONDUIT CABLE SUPPORTS

A. Provide cable supports with insulating wedging plug for non-armored type electrical cables in risers; construct 2" rigid metal conduit; 3-wires, type wire as indicated; construct body of malleable-iron casting with hot-dip galvanized finish.

## 2.07 U-CHANNEL STRUT SYSTEM

A. Provide U-channel strut system for supporting electrical equipment, 12-gage hot-dip galvanized steel, of types and sizes indicated; construct with 9/16" dia. holes, 8" o.c. on top surface, with the following fittings that mate and match with U-Channel:
   1. Fixture hangers
   2. Channel hangers
   3. End caps
   4. Beam clamps
   5. Wiring stud
   6. Thinwall conduit clamps
   7. Rigid conduit clamps
   8. Post Bases
   9. U-bolts

## 2.08 PIPE SLEEVES

A. Provide pipe sleeves from the following:
   1. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.

## 2.09 PVC COATED U-CHANNEL STRUT SYSTEM

A. Provide PVC Coated U-channel strut system for supporting electrical equipment, 20 mil PVC coated steel, of types and sizes indicated; construct with 9/16" dia. holes, 8" o.c. on top surface, with all Stainless Steel hardware, and the following fittings that mate and match with PVC Coated U-Channel:
   1. PVC Coated Strut nut
   2. PVC Coated Pipe straps
   3. Touch up compound (Gray)

## 2.10 STAINLESS STEEL U-CHANNEL STRUT SYSTEM

A. Provide Stainless Steel U-channel strut system for supporting electrical equipment, of types and sizes indicated; construct with 9/16" dia. holes, 8" o.c. on top surface, with all stainless steel hardware, and the following stainless steel fittings that mate and match with Stainless Steel U-Channel:
   1. Fixture hangers
   2. Channel hangers
   3. End caps
   4. Beam clamps
   5. Wiring stud

6. Post bases
7. Rigid conduit clamps
8. U-bolts

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install hangers, anchors, sleeves and seals as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to insure supporting devices comply with requirements. Comply with requirements of NECA and NEC for installation of supporting devices.

B. Coordinate with other electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.

C. Install hangers, supports, clamps and attachments to support piping properly from building structure. Arrange for grouping of 2 or more parallel runs of conduits to be supported together on channel type hangers where possible. Install supports with spacing indicated and in compliance with NEC requirements.

D. Torque sleeve seal nuts, complying with manufacturer's recommended values. Ensure that sealing grommets expand to form watertight seal.

E. Comply with manufacturer’s recommendations for touch up of field cut ends or damaged PVC coated U-channel and fittings.

F. Remove burrs and apply a cold zinc galvanizing paint to field cut galvanized U-channel strut.

End of Section

SECTION 16195

ELECTRICAL IDENTIFICATION

## PART 1 - GENERAL

### 1.01 SCOPE OF WORK

A. Electrical identification work specified in this section covers the following:
   1. Buried cable warnings
   2. Electrical power, control and communication conductors
   3. Operational instructions and warnings
   4. Danger signs
   5. Equipment/system identification signs

### 1.02 SUBMITTALS

A. Submittals to the engineer shall include the following:
   1. Manufacturers data on electrical identification materials and products
   2. Samples of each color, lettering style and other graphic representation required for each identification material or system

### 1.03 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering electrical identification products maybe incorporated in the work include, but not limited to, the following:
   1. Brady, W.H. Co.
   2. Ideal Industries, Inc.
   3. Panduit Corp.
   4. or, equal

### 1.04 QUALITY COMPLIANCE

A. Comply with applicable requirements of UL Std. 969, "Marking and Labeling Systems", pertaining to electrical identification systems.

B. Comply with applicable requirements of NEMA Std. No's WC-1 and WC-2 pertaining to identification of power and control conductors.

## PART 2 - PRODUCTS

### 2.01 GENERAL

A. Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an

application, selection is Installer's option, but provide single selection for each application.

2.02 CONDUIT MARKERS

A. Conduit tags shall be 1-1/2-inch diameter, round, aluminum tags, laser engraved or standard engraving with the conduit number. Punched or stamped lettering is not allowed. Font shall be 1/4-inch Arial or Helvetica. The conduit tags shall be manufactured by Brady, Catalog No. 49900 or equal.

B. Each tag shall be attached with nylon-coated 48-mil stainless steel wire and fasteners, as manufactured by Brady, Catalog No. 38091, and brass wire clamps, double ferrule design, as manufactured by Brady Catalog No. 38090 to secure the stainless steel wire or equal.

C. Unless otherwise indicated or required by governing regulations, provide white markers with black letters.

2.03 CABLE AND CONDUCTOR WIRE MARKERS

A. Cable and conductor wire markers shall be self laminating vinyl on white background, printed using a Brady TLS2200 printer, Seton printer, or equal. Handwritten wire markers are not acceptable.

2.04 SELF-ADHESIVE PLASTIC SIGNS

A. Provide manufacturer's standard, self-adhesive or pressure-sensitive, pre-printed, flexible vinyl signs for operational instructions or warnings; of sizes suitable for application areas and adequate for visibility, with proper wording for each application, e.g., 208V, EXHAUST FAN, RECTIFIER.

B. Unless otherwise indicated or required by governing regulations, provide white signs with black lettering.

2.05 LETTERING AND GRAPHICS

A. Coordinate names, abbreviations and other designations used in electrical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of electrical systems and equipment. Comply with ANSI A13.1 pertaining to minimum sizes for letters and numbers.

PART 3 - EXECUTION

## 3.01 INSTALLATION

A. Install electrical identification products as indicated, in accordance with manufacturer's written instructions, and requirements of NEC.

B. Where identification is to be applied to surfaces that require finish, install identification after completion of painting.

C. Comply with governing regulations and requests of governing authorities for identification of electrical work.

## 3.02 CONDUIT IDENTIFICATION

A. Where electrical conduit is exposed in spaces with exposed mechanical piping that is identified by a color-coded method, apply color-coded identification on electrical conduit in manner similar to piping identification. Except as otherwise indicated, use white as coded color for conduit.

## 3.03 CABLE/CONDUCTOR IDENTIFICATION

A. Apply cable/conductor identification, including voltage, phase and feeder number, on each cable/conductor in each box/enclosure/cabinet where wires of more than one circuit or communication/signal system are present, except where another form of identification (such as color-coded conductors) is provided. Match identification with marking system used in panelboards, shop drawings, contract documents, and similar previously established identification for project's electrical work.

## 3.04 EQUIPMENT/SYSTEM IDENTIFICATION

A. Install engraved plastic-laminate sign on each major unit of electrical equipment in building; including central or master unit of each electrical system including communication-control-signal systems, unless unit is specified with its own self-explanatory identification or signal system. Except as otherwise indicated, provide single line of text, 1/2” high lettering on 1-1/2” high sign (2” high where 2 lines are required), white lettering in black field. Provide text matching terminology and numbering of the contract documents and shop drawings. Provide signs for each unit of the following categories of electrical work:
   1. Panelboards, electrical cabinets and enclosures.
   2. Access panel/doors to electrical facilities.
   3. Major electrical switchgear.

B. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment. Secure to substrate with brass or stainless steel screws, except use adhesive where screws should not or cannot penetrate the substrate.

## 3.05 CIRCUIT IDENTIFICATION

A. The 3-phase wires shall be identified at the switchgear, panelboards and motor control centers as Phases A, B, and C. At 277/480V, Phase A shall be brown, Phase B shall be orange, and Phase C shall be yellow. The neutral shall be gray or white.

B. In addition to color coding all conductors, each conductor shall be identified in each pull box, manhole, panelboard, cable tray, or termination with circuit identification markers. This identification is applicable to all power, control, alarm, and instrumentation conductors and these markings shall be recorded on the Record Documents. Markers shall be slip-on PVC sleeve type as manufactured by Brady, Seton, or equal.

C. Markers for other cabling shall be B-292 vinyl as manufactured by Brady, Seton, or equal.

D. Exposed medium voltage conduits shall be labeled at 50-foot intervals with 1-inch letters stating the voltage - example - "12,470 volts". Labels shall be vinyl plastic as manufactured by Brady, Seton, or equal.

## 3.06 AUTOMATIC EQUIPMENT WARNING SIGNS

A. Permanent warning signs shall be mounted at all mechanical equipment that may be started automatically or from remote locations. Signs shall be in accordance with OSHA regulations and shall be suitable for exterior use. The warning signs shall be fastened with round head brass screws or bolts, located and mounted in a manner acceptable to the Engineer.

B. Warning signs shall be 7 inches high by 10 inches wide, colored yellow and black, on not less than 18 gauge vitreous enameling stock. Sign shall read:

CAUTION
THIS EQUIPMENT STARTS
AUTOMATICALLY
BY REMOTE CONTROL

## 3.07 HIGH VOLTAGE WARNING SIGNS

A. Permanent and conspicuous warning signs shall be mounted on all equipment, doorways to equipment rooms, pull boxes, manholes, where the voltage exceeds 600 volts.

B. Signs shall be in accordance with OSHA regulation, and shall be suitable for exterior use. The warning signs shall be fastened with round head brass screws or bolts, located and mounted in a manner acceptable to the Engineer.

C. Signs shall be 7 inches high by 10 inches wide, colored red and white, on not less than 18 gauge vitreous enameling stock. Sign shall read:

WARNING

HIGH VOLTAGE
KEEP OUT

3.08 CONDUCTOR FASTENERS

A. Glue-on type conductor fasteners shall not be used in any panels, panelboards, switchboards, switchgear, motor control centers, or other enclosures containing electrical devices and/or conductors.

End of Section

SECTION 16920

ELECTRICAL ACCEPTANCE TESTING

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Section Includes
   1. Requirements for electrical acceptance testing of electrical equipment and materials.
   2. It is the intent of the tests described herein to assure that all electrical equipment is operational and within industry and manufacturer's tolerances and is installed in accordance with design specifications.
   3. Acceptance testing performed by equipment vendors at the point of manufacturer must conform to all requirements of this specification. Testing performed at the point of manufacture which conforms to generally accepted industry practices is also acceptable so long as adequate test result documentation is provided.

B. Scope
   1. Testing of equipment defined elsewhere in this Section.

C. Related Documents
   1. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division 1 Specification sections, apply to the work of this section.
   2. All work performed under this Section of the work is subject to all requirements contained under Section 16000 "General Electrical Requirements".
   3. All Division 16 specifications for electrical equipment provided for this project that requires electrical acceptance testing.

### 1.02 REFERENCES

A. NETA ATS – Acceptance Testing Specifications, 2003 Edition

B. NFPA 70 – National Electrical Code, 2002 Edition

C. Incorporated by reference all Codes, Standards, and Specifications referred to in the "APPLICABLE REFERENCES" section of NETA ATS-2003.

### 1.03 DEFINITIONS

A. NETA InterNational Electrical Testing Association Inc.

B. NEC National Electrical Code

## 1.04 SYSTEM DESCRIPTION

A. Conditions
   1. Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on drawings and/or herein including all labor, materials, equipment and incidentals necessary and required for Electrical Acceptance Testing.
   2. Following established procedures, equipment shall be energized after certification by the testing organization that the installation is satisfactory.
   3. Correct or replace any current-carrying circuit, electrical equipment, or system which is defective or grounded and correct all other troubles encountered by these tests. All defects, whether through faulty workmanship or materials furnished, shall be corrected under this Section at the Contractors expense.

## 1.05 SUBMITTALS

A. Test Report Forms
   1. All test reports shall be submitted using NETA or approved similar format and, where appropriate, test forms. Reports shall be legible using permanent ink. Pencil is not acceptable.
   2. Provide for engineers review and approval a copy of each test form to be used on the project. No testing shall be started prior to approval of all test forms.
   3. All test reports shall include the following information:
      a. Summary/Description of the Project
      b. Description of equipment tested.
      c. Description of the tests.
      d. Test data and analysis of the data indicating whether the equipment passed or failed the test.
   4. All test data records shall include the following minimum requirements:
      a. Equipment identification including tag numbers.
      b. Humidity, temperature, and other conditions that may affect the results of the tests and/or calibrations.
      c. Date of inspections, tests, maintenance, and/or calibrations.
      d. Identification of the testing technician and their employer.
      e. Indication of inspections, tests, maintenance, and/or calibrations to be performed and recorded.
      f. Indication of expected results when calibrations are to be performed.
      g. Indication of “as-found” and “as-left” results, as applicable.
      h. Sufficient spaces to allow all results and comments to be indicated..

B. Closeout Submittals
   1. Provide one copy each to engineer and owner of all testing reports organized as follows:
      a. Bind report in 3-ring binder(s).
      b. Identify project name, description, testing organizations name, and submittal date on front face and back cover of binder.
      c. Provide all test reports, organized by equipment tag number.
      d. Separate different equipment numbers with colored or numbered tabs.

e. Provide an index/table of contents.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

A. Any materials provided as part of the testing shall be new, unused, and in manufacturer's original packing.

### 2.02 TEST INSTRUMENT CALIBRATION

A. Contractor performing the testing shall have a calibration program which assures that all applicable test instruments are maintained within rated accuracy for each test instrument calibrated.

B. Contractor performing the testing shall maintain up-to-date instrument calibration instructions and procedures for each test instrument calibrated.

C. It is preferred that instrument calibration accuracy be directly traceable to the national Institute of Standards and Technology (NIST).

D. Instruments shall be calibrated in accordance with the following frequency schedule:
   1. Field instruments: Analog, 12 months maximum. Digital, 12 months maximum
   2. Laboratory instruments: 12 months maximum
   3. Leased specialty equipment: 12 months maximum.

E. Dated calibration labels shall be visible on all test equipment.

F. Records, which show date and results of instruments calibrated or tested, must be kept up to date.

G. Calibrating standard shall be better accuracy than that of the instrument tested.

## PART 3 - EXECUTION

### 3.01 QUALIFICATIONS

A. It is preferred that the testing organization shall be an independent, third party entity which can function as an unbiased testing authority, professionally independent of the manufacturers, suppliers, and installers of equipment or systems being evaluated. When such testing organization is used, it must meet the following requirements:
   1. The testing organization shall be regularly engaged in the testing of electrical equipment, devices, installations, and systems.
   2. The testing organization shall use technicians who are regularly employed for testing purposes.
   3. The testing organization shall be a member of NETA or be able to prove qualifications equal to or better than required for membership in NETA.

4. Submit appropriate documentation demonstrating that the testing organization meets the requirements listed above.
5. Technicians performing these electrical tests and inspections shall be trained and experienced concerning the apparatus and systems being evaluated. These individuals shall be capable of conducting the tests in a safe manner and with complete knowledge of the hazards involved. They must evaluate the test data and make a judgment on the serviceability of the specific equipment.
6. Technicians shall be certified in accordance with ANSI/NETA ETT-2000, "Standard for Certification of Electrical Testing Personnel". Each on-site crew leader shall hold a current certification, Level III or higher, in electrical testing.

B. Contractor may perform the electrical acceptance testing under the following conditions:
1. Contractor's personnel performing the testing and their testing equipment meets all other requirements of this specification.
2. Written approval is received from engineer after review of testing personnel qualifications. At a minimum, contractor's testing personnel must have specific instruction on the testing instruments, accessories, and tests being performed and must be able to evaluate the test results.

3.02 NOTIFICATION

A. Notify engineer and construction manager at least 2 days prior to testing so that they may be present during testing.

3.03 SAFETY AND PRECAUTIONS

A. Safety practices shall include, but are not limited to, the following requirements:
1. Occupational Safety and Health Act OSHA
2. Accident Prevention Manual for Industrial Operations, National Safety Council, Chapter 4
3. Applicable State and Local safety operating procedures
4. NETA Safety/Accident Prevention Program
5. National Fire Protection Association –NFPA 70E
6. ANSI Z244.1 American National Standards for Personnel Protection

B. All tests shall be performed with apparatus de-energized except where otherwise specifically specified.

C. The testing firm shall have a designated safety representative on the project to supervise operations with respect to safety.

3.04 EQUIPMENT TESTING REQUIREMENTS

A. The intent of this specification is not to duplicate testing performed at the point of manufacture or to impose additional burden on the contractor which does not benefit the project. The intent is to verify that electrical equipment has been securely fastened down, supported, and installed in accordance with the manufacturer's requirements. The intent is also to verify that all electrical connections are correctly torqued, properly aligned,

properly insulated, and properly supported and that equipment is clean and ready for operation.

B. Except as noted below or as approved by engineer, test the following equipment and assemblies in full accordance with NETA-ATS 2003.

C. Circuit Breakers, Air, Insulated-Case, Molded-Case
   1. Perform visual and mechanical inspections in accordance with NETA for all circuit breakers.
   2. Perform electrical tests only on circuit breakers rated 100 amps or higher provided in power distribution and lighting/receptacle panelboards.
   3. No testing is required for circuit breakers provided as part of any of the following:
      a. A UL listed control panel.
      b. UL listed factory supplied motor control centers.
      c. Stand-alone combination motor starters.

D. Motor Control, Motor Starters, Low-Voltage

E. Adjustable Speed Drive Systems

F. Fiber-Optic Cables

3.05 CONSTRUCTION

A. Interface with Other Work
   1. Coordinate all testing activities with other disciplines. Retest any equipment disturbed or damaged in any manner after initial testing.

3.06 CLOSEOUT REPORT

A. Provide comprehensive bound test report in accordance with Part 1 of this specification.

End of Section

SECTION 17000

INSTRUMENTATION

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Section Includes
   1. Provide complete instrumentation and control systems as indicated on the Drawings, in the Specifications, and as required by other contract documents. These documents include descriptions of functional operation and performance, as well as standards, but do not necessarily enumerate detailed specifications for all components and devices which are necessary. However, all components and devices shall be furnished and installed as required to provide complete and operable systems for accomplishing the functions and meeting the performance requirements.
   2. Scope of work includes:
      a. Provide all instruments.
      b. Provide all control panels, PLC panels, SCADA consoles.
      c. Provide all communication equipment required to make the control system fully operational including but not limited to radios, antennas, switches, routers, hubs, protocol converters, communication cables, and communication racks and power supplies.
      d. Provide all conduit, conductors, enclosures, materials, and labor to fully interconnect and make operational all control system components.
      e. Provide power at proper voltage and ampacity to all system components.
      f. Provide programming for the PLC and SCADA components.
      g. Provide startup and commissioning assistance
      h. Train Owner's personnel on proper use and maintenance of the control systems
      i. Other equipment, materials, and work as necessary to achieve a fully tested and operational control system.

B. Products Supplied But Not Installed Under This Section
   1. None

C. Products Installed But Not Supplied Under This Section
   1. Instruments and controls provided loose for field installation by packaged equipment or skid-mounted equipment vendors.

D. Related Sections
   1. All Division 16 specifications provided for this project.
   2. All Division 17 specifications provided for this project.
   3. Other division specifications provided for this project as they relate to submittals, concrete, structural, piping/plumbing, mechanical, and HVAC systems.

E. Allowances
   1. Not applicable this section.

F. Unit Prices
   1. Not applicable this section.

G. Measurement Procedures
   1. Not applicable this section.

H. Special Payment Procedures
   1. Not applicable this section.

I. Alternates/Alternatives
   1. All alternates, alternatives, or proposed substitutions of materials or equipment must be approved by ENGINEER.

1.02 REFERENCES

1.03 DEFINITIONS

A. The word “provide” means “furnish and install”.

B. PLC means Programmable Logic Controller

C. SCADA means Supervisory Control and Data Acquisition System

1.04 SYSTEM DESCRIPTION

A. Design Requirements
   1. Using sound engineering principals and current best design practices, provide engineering drawings and design documents specifying system components and detailing their interconnection and installation.

B. Performance Requirements
   1. The instrumentation and control systems shall be furnished and installed complete and ready to operate, including all necessary interconnections and connections to sources of electrical power, air, water, drains and vents, with all required valves, switches and accessories as specified or as recommended for best operation by the manufacturer of the equipment furnished.

1.05 SUBMITTALS

A. General
   1. Submittals for the equipment shall be provided in accordance with Section 16000, and as required elsewhere in the Contract Documents.

B. Product Data
   1. Detailed catalog information for all system components in sufficient detail so that

ENGINEER has sufficient information to determine if the equipment is acceptable for the intended purpose. Minimum information shall be:

a. Instrument or Equipment tag number
b. Manufacturer
c. Model number
d. Materials of construction
e. Materials in contact with process fluids
f. Dimensional information
g. Weight
h. Power consumption with required voltage and ampacity
i. Heat dissipation if greater than 200 watts
j. Process connection information detailing connection size, type (threaded, flanged, socket weld, etc…)
k. Recommended mounting details
l. Recommended spare parts for one year of operation

2. Instrument Data Sheets in ISA S20 format for all instruments.

C. Shop Drawings

1. For complex control systems consisting of mechanical, electrical, and control components, provide the following:
   a. A Piping and Instrument Diagram in ISA format
   b. Electrical load calculations with conduit and conductor sizing
2. For integrated control panels or control assemblies, provide the following:
   a. Dimensioned layout of the control enclosure and mounted equipment and instruments.
   b. Full bill of material for all components with detailed catalog information on all components.
   c. 11”x17” fully developed schematic diagram(s) showing power and control wiring, terminal block assignments, and identifying field and enclosure wiring. Provide a drawing index and symbols and legend sheet with all schematics. Show all I/O card details including rack, slot, channel numbers, field termination points, and control power wiring. Label all conductors and identify conductor size and color. Identify all field devices by tag number and by description. Provide over current protection in accordance with NEC requirements.
   d. 11”x17” instrument loop drawings in ISA format for all analog control loops. Alternatively, multiple loops may be combined on a single analog input or analog output I/O card schematic diagram.
   e. Nameplate legend
   f. Paint color and type for painted assemblies
3. Any special installation details.

D. Samples

1. Not applicable for this section

E. Quality Assurance/Control Submittals

1. Design Data, Test Reports

a. Submit calibration sheets for all field instruments containing the following information:
   1) Instrument tag number
   2) Instrument manufacturer and model number
   3) Person who performed the calibration
   4) Manufacturer, model and serial number of the calibrating device
   5) Date that calibrating device was last calibrated
   6) For analog instruments, process range and associated analog signal in at least 5 increments (For example: 4.00 maDC/0 psig, 8.00 maDC/25 psig, 12.00 maDC/50 psig, 16.00 maDC/75 psig, 20.00 maDC/100 psig)
   7) For switches, process values at which the switch changes state and at which the switch resets.
   8) For instruments calibrated by manufacturer, manufacturer's calibration report is acceptable as proof of calibration.
b. Factory acceptance test reports on all fabricated control panels or assemblies containing the following information:
   1) Date of test
   2) Test participants
   3) Visual inspection of components
   4) Successful application of power
   5) Validation of all internal wiring
   6) Validation of correct control operation
   7) Validation of screen graphics or alarm operation (if applicable)
   8) Validation of program installation into PLC's and that I/O is functioning properly (if applicable)

2. Certificates, Manufacturer's
   a. UL 508 certification for all assembled control panels and assemblies
3. Instructions, Manufacturer's Field
   a. Furnish a complete Operations and Maintenance Manual for all assembled control panels and assemblies
4. Reports
   a. Not applicable to this section

F. Closeout Submittals
1. Furnish Operations and Maintenance Manuals in 3-ring binders complete with the following:
   a. On front and spine of binders provide the project name, owners name and project number.
   b. Within the binder, identify the contractor and provide contact information
   c. Inside binders, provide a volume index and table of contents for each binder. Each instrument or control component tag number must be cross referenced to a specific binder tab.
   d. Furnish manufacturers complete operations and maintenance manuals for all discrete instruments and controls.
   e. Furnish custom Operations and Maintenance section for each custom control system, control panel, or fabricated assembly.
   f. Furnish "As-Built" loop and wiring diagrams.

g. Furnish the written warranty

2. Turn over all spare parts to owner with documentation showing which instrument or control system the spare parts are for.

G. Schedule

1. Submit a detailed work schedule showing start/finish dates, task duration, task sequencing, critical path, and available float. Identify task predecessors and identify coordination activities with other trades.

H. Startup and Commissioning Plan

1. Submit a detailed startup and commissioning plan for review by Owner and Engineer. Plan should include the following information:
   a. The order in which the various plant systems will be started up
   b. What work must be performed prior to the startup
   c. What documentation will be maintained by the contractor and provided to the owner validating that the startup was performed in a safe and efficient manner.

## 1.06 QUALITY ASSURANCE

A. Qualifications

1. Contractor performing the work shall have a minimum 5 years experience performing similar work in similar industries. All contractors' personnel shall be trained and experienced in best current construction practices.

B. Regulatory Requirements

1. Perform all work in accordance with all applicable national and local codes.

C. Certifications

1. Not applicable this section

D. Field Samples

1. Not applicable this section

E. Mock-Ups

1. Not applicable this section

F. Pre-Installation Meetings

1. Not applicable this section

## 1.07 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading

1. Perform these activities in a manner which assures instruments and equipment will arrive undamaged and in proper working order. Replace any instrument or equipment damaged upon arrival at no additional cost to owner.

B. Acceptance at Site

1. Maintain a comprehensive log by instrument or equipment tag number of all received instruments or equipment

C. Storage and Protection
1. Store all instruments and equipment as recommended by manufacturer. Protect from physical damage, moisture, dirt/dust, or extremes of temperature

1.08 PROJECT/SITE CONDITIONS

A. Environmental Requirements
1. Follow any and all environmental requirements pertaining to the site
2. Maintain a safe and clean job site
3. Dispose of all trash and construction debris in an approved manner

B. Existing Conditions
1. Contractor is to examine the site and be thoroughly familiar with any site requirements which may affect the work or storage of instruments or equipment.

1.09 SEQUENCING

A. Coordinate all work with other trades.

1.10 SCHEDULING

A. Provide and maintain a detailed schedule for performance of the work identifying start/finish dates, durations, required preceding activities, and coordination with other trades. Organize procurement, deliveries, and staff labor to meet the overall construction schedule and to assure that other trades are not delayed.

1.11 WARRANTY

A. Instrumentation
1. One year from system acceptance by owner for all discrete instrumentation, control devices, or equipment. During this period, replace any defective or malfunctioning device with 15 working days after notification by owner.
2. One year from system acceptance by owner for the performance of the overall control system. Correct the defect within 5 working days after notification by owner. Warranty repair work includes but is not limited to the following:
   a. Improper sequencing or interlocking of equipment control systems
   b. Wiring errors or omissions
   c. Improper calibration of field instruments
   d. Improper operation of programmable logic controllers or operator interface terminals
   e. Improper operation of communications systems installed as part of the overall control system
   f. Unsafe operations or maintenance conditions
   g. Other system malfunctions which prevent or impair the plant from operating at design capacity, requires excessive operator intervention, or results in

unsafe operating conditions.

## 1.12 SYSTEM STARTUP/COMMISSIONING

A. General
   1. Provide labor, tools, and equipment to start up the facility in a safe and efficient manner.
   2. Plant shall be started up by system. A system is defined as a collection of mechanical, electrical, and controls equipment configured to perform a specific function or purpose. Examples may be a UV disinfection system, a dissolved oxygen blower system, a grit removal system, etc… The order in which the systems will be started shall be submitted by contractor in the startup plan and approved by owner and engineer. Any variance in this schedule must be approved by owner and engineer.
   3. Unless approved otherwise by owner and engineer, contractor is to follow the startup sequence detailed below. The following work must be complete prior to beginning the startup:
      a. All mechanical equipment installed and tested in accordance with manufacturers recommendations.
      b. All motors must have been rotation checked.
      c. Electrical power is available and wired to all mechanical equipment
      d. All instruments must have been calibrated and installed in accordance with the manufacturer's recommendations.
      e. Control system communication systems are installed and fully operational. This includes DH+ networks, Modbus+ networks, Ethernet networks, radio telemetry systems, telephone systems, etc…
      f. All power and control wiring must be installed, rung out, and validated to be in accordance with approved construction drawings.
      g. Programmable logic controllers, SCADA computers, and Operator Interface Terminals all are installed, have their programs installed, and these devices are fully operational and functioning in their design configuration.

B. System Startup Sequence
   1. By manipulation of the instrument or direct signal injection at the instrument, verify that the control signal (discrete or analog) is received at the programmable logic controller or by the hard wired control circuit.
   2. For motorized equipment, disconnect the power leads at the starter, VFD, or solid state motor controller.
   3. Completely exercise the control circuit in Manual, Remote, and Automatic modes and verify that all interlocks and permissives are functioning correctly.
   4. Verify that the programmable logic controller can start and stop the motor in Auto or Remote. Motors may be "bumped" by forcing PLC outputs but these program forces must be removed immediately afterward.
   5. Verify that run status, signal levels, and alarms display properly on the OIT and the SCADA screens.
   6. Reconnect the motor power leads.
   7. Verify PID loop operating correctly (either direct or reverse) and adjust gain

constants to achieve critically damped operation.

8. Configure the mechanical system for normal operation and leave system ready for normal operation.
9. Utilize colored tagging scheme to identify startup condition. Red is not ready for startup, yellow is mechanically and electrically ready but not yet tested or started up, and green is fully tested and ready for normal operation. Place these tags on all mechanical, electrical, instrumentation, and control components of each system.
10. As plant systems are started up, coordinate and remedy any coordination or interface issues between systems.

C. Remedies for Damages
1. Contractor is liable for any and all damage done to mechanical or electrical equipment due to improper startup procedures and shall repair or replace any damaged equipment at owner's discretion without additional cost to owner.
2. Contractor is forbidden to jumper around any process or safety interlock either with wiring or within a PLC program without the express written permission of both the owner and engineer. All jumpers, hardwired and programmed, must be maintained in a log book. Entries shall include:
   a. Name of person placing the jumper
   b. Date of installation
   c. Reason for installation
   d. Approval of owner and engineer
   e. Date of removal
   f. Name of person removing the jumper

1.13 OWNER'S INSTRUCTIONS

A. Not applicable this section

1.14 MAINTENANCE

A. Extra Materials
1. Not required this section

B. Maintenance Service
1. Not required this section

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Approved manufacturers are listed in the other Electrical and Instrument Specification Sections.

2.02 EXISTING PRODUCTS

A. Not applicable this section

2.03 MATERIALS

A. All materials are to be new and the manufacturers most current model.

2.04 MANUFACTURED UNITS

A. Manufactured units are to be fully assembled and tested at the point of manufacture and delivered to the job site ready for installation and start-up.

B. Regulated dc power supplies for instrument loops shall be designed and arranged so that loss of one supply does not affect more than one instrument loop or system. Power supplies shall be suitable for an input voltage variation of plus or minus 10 percent, and the supply output shall be fused or short circuit protected. Output voltage regulation shall be as required by the instrumentation equipment being supplied. Multi-loop, or multi-system power supplies, will be acceptable if backup power supply units are provided which will automatically supply the load upon failure of the primary supply. The backup supply systems shall be designed so that either the primary or backup supply can be removed, repaired, and returned to service without disrupting the instrument system operation.

C. The power distribution from multi-loop supplies shall be selectively fused such that a fault in one instrument loop will be isolated from the other loops being fed from the same supply. Fuses shall be clearly labeled and located for easy access. Multi-loop supply systems shall be oversized for an additional 10 percent future load. Failure of a multi-loop supply shall be indicated on the respective instrument panel or enclosure.

2.05 EQUIPMENT

A. All equipment is to be new and the manufacturers most current model. All instruments and control devices and assemblies shall be standard devices constructed of corrosion-resistant materials enclosed in a water and dust proof case and mounted as specified in the individual application. Enclosures shall be manufacturer's standard color unless specified otherwise.

2.06 COMPONENTS

A. Not applicable this section

2.07 ACCESSORIES

A. Not applicable this section

2.08 MIXES

A. Not applicable this section

2.09 FABRICATION

A. Shop Assembly
   1. Fabricate assemblies in accordance with approved drawings. Notify engineer and owner at least 5 working days prior to start of testing so that they may witness the testing if they choose to do so.

2.10 FINISHES

A. General
   1. Finishes for all components, equipment, and fabricated assemblies must take into account the environment in which they will be installed. NEMA ratings must be appropriate for the environment. Ratings for corrosive areas must be NEMA 4X, for outdoor areas NEMA 4 or 3R, indoor dusty areas may be NEMA 12.

B. Shop Finishing
   1. Where called for in other sections, sandblast, prime, and paint assemblies.

2.11 SOURCE QUALITY CONTROL

A. Fabrication/Tolerances
   1. In accordance with generally accepted manufacturing standards

B. Tests, Inspections
   1. In accordance with generally accepted manufacturing standards

C. Verification of Performance
   1. Not applicable this section

PART 3 - EXECUTION

3.01 ACCEPTABLE INSTALLERS

A. Contractors having a minimum 5 years experience in the design, procurement, and construction of industrial water/wastewater instrumentation and control systems.

3.02 EXAMINATION

A. Site Verification of Conditions
   1. Visit job site and ascertain any environmental or physical conditions which may affect the performance of the work or the equipment requirements

3.03 PREPARATION

A. Protection
   1. Not applicable this section

B. Surface Preparation
   1. Not applicable this section

3.04 ERECTION

A. Provide 4 inch tall reinforced concrete housekeeping pads for all control panels and floor mounted fabricated control assemblies and consoles. Dowel into concrete base and extend a minimum of 2” past edges of equipment.

B. Provide unistrut or fabricated structural supports for heavy equipment or assemblies. Prime and paint supports so that they are unaffected by the environment in which they are installed.

C. Securely fasten all panels and assemblies to their housekeeping pads or structural supports.

D. All interconnecting wiring shall be run in conduit in accordance with the division 16 sections requirements.

3.05 INSTALLATION

A. Install all instruments and controls in accordance with manufacturer’s recommendations and all applicable electrical codes and standards. Connect all required utilities including electrical power, air, hydraulics, etc…

B. Provide stainless steel tags for each instrument engraved with instrument tag number. Attach to instrument with stainless steel wire.

C. Provide engraved nameplates for all panel mounted instruments. Attach to panel with stainless steel screws.

3.06 APPLICATION

A. Not applicable this section

3.07 CONSTRUCTION

A. Special Techniques
   1. In accordance with manufacturers recommended installation procedure

B. Interface with Other Work
   1. Coordinate with all other trades

C. Sequences of Operation
   1. Not applicable this section

D. Site Tolerances
   1. Not applicable this section

3.08 REPAIR/RESTORATION

A. Repair any damages caused by the installation or erection to original condition.

3.09 RE-INSTALLATION

A. Not applicable this section.

3.10 FIELD QUALITY CONTROL

A. Site Tests
   1. Test and calibrate instrumentation in accordance with other parts of this section

B. Inspection
   1. Not required this section

C. Manufacturer's Field Services
   1. If recommended by manufacturer, have equipment/control systems inspected, tested, and started up by manufacturer's representative.

3.11 ADJUSTING

A. Not required this section

3.12 CLEANING

A. Remove and dispose of construction debris daily. Wipe down and vacuum out all enclosures.

3.13 DEMONSTRATION/TRAINING

A. In accordance with the Startup part of this section.

B. Provide training of personnel in the operation and maintenance of the furnished control systems.

C. Training shall be provided as required elsewhere in the Contract Documents.

3.14 PROTECTION

A. Protect instrumentation and control equipment from environmental damage and from damage by other trades.

3.15 SCHEDULES

A. Not applicable this section.

End of Section

SECTION 17123

ULTRASONIC LEVEL TRANSMITTER

## PART 1 - GENERAL

### 1.01 SCOPE OF WORK

A. This section covers the Ultrasonic Level Transmitters and Controllers to be provided where indicated on the Drawings.

B. Related work specified elsewhere includes, but is not limited to section 16000 Electrical. Also, refer to requirements of Contract Documents for testing, adjusting and balancing of systems.

### 1.02 QUALITY ASSURANCE

A. Equipment to be furnished under this section shall be the product of firms regularly engaged in the design and manufacture of this type of equipment. Manufacturer shall assume responsibility for, and guarantee performance of equipment furnished. However, this shall not be construed as relieving the Contractor from responsibility for the proper installation and functioning of the work.

### 1.03 SUBMITTALS

A. The following material shall be submitted to the Engineer prior to installation, in accordance with Section 16000, and as required elsewhere in the Contract Documents:
   1. Where applicable, provide complete manufacturer's part number, identifying scaling, operating range, housing and wetted parts materials, NEMA rating, product options, consumable materials, and other pertinent information.
   2. Prior to Final Acceptance of the work, the Contractor shall provide Operations and Maintenance Manuals, in accordance with the Contract Documents.

## PART 2 - PRODUCTS

### 2.01 ULTRASONIC LEVEL TRANSMITTER

A. Where ultrasonic measurement is indicated on the Drawings, but relay control is not required, and the measurement span is less than 16 feet, the Milltronics Probe shall be used.

B. Power requirement shall be 24 VDC, and a 2-wire shielded cable with 600-volt insulation, and 16 AWG conductors with a tinned drain wire shall be provided.

C. The instrument shall have a measurement range of 0.8 to 16.4 feet. Accuracy in air shall be 0.25% of range with built-in temperature compensation. Operating temperature shall be -20 to +60 degrees C.

D. Output shall be 4-20 mA into 750 ohms. A status relay contact shall close on loss of echo, internal failure, or loss of power to the instrument.

E. All mounting hardware shall be 316 stainless steel, and the instrument enclosure shall be rated NEMA 4.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

A. Equipment and materials specified in this section shall be installed and connected as specified, and as shown on the Drawings. The Contractor shall coordinate the installation with the other trades, to insure proper installation of the transducer, transmitter, and associated conduit and cables.

B. The Contractor shall calibrate the instruments to the proper ranges, as required by the Owner and the Engineer. Where analog signals are connected to local, or remote monitoring equipment, the Contractor shall verify that the calibrated ranges and scaling of the local and remote indicators are correct.

### 3.02 ACCEPTANCE

A. Prior to final acceptance of the work, the Contractor shall certify the equipment and installation included under this section to be free of defects, and suitable for trouble-free operation under the conditions set forth in these specifications. This requirement is in addition to the manufacturer's guarantee.

### 3.03 SPARE PARTS

A. Provide the Owner with a list of the manufacturers' recommended spare parts.

End of Section

SECTION 17134

FLOW SWITCHES

## PART 1 - GENERAL

### 1.01 SCOPE

A. This section covers chemical metering pump flow switches.

### 1.02 QUALITY ASSURANCE

A. Equipment to be furnished under this section shall be the product of firms regularly engaged in the design and manufacture of this type of equipment. Manufacturer shall assume responsibility for, and guarantee performance, of equipment furnished. However, this shall not be construed as relieving the Contractor from their responsibility for the proper installation and functioning of the work.

### 1.03 SUBMITTALS

A. The following material shall be submitted to the Engineer in accordance with the Contract Documents, and Section 16000.

## PART 2 - PRODUCTS

### 2.01 FLOW SWITCHES

A. Flow switches for metering pump discharge monitoring shall measure flow via integral digital paddlewheel based flowmeter. Flow switch shall be capable of displaying associated flow rate and flow total locally on an integral six digit LCD display. Flow switch shall be equipped with an alarm/status output that activates whenever flow rises above or below a user defined setpoint. Flow switch hall be capable of generating a pulse output that is proportional to flow rate. Flow 'switch' shall be a MICRO-FLO as manufactured by Blue-White Industries.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

A. Equipment and materials specified in this section shall be installed as shown on Drawings.

### 3.02 GUARANTEE

A. Contractor shall fully guarantee all work under this section for a period of one year from date of final acceptance by the owner against faulty workmanship and failure or

malfunction of materials and/or equipment due to faulty or imperfect workmanship. This guarantee shall be given in writing to the owner at the time of issuing final certificate. Work, materials or equipment found to be defective within this period shall be replaced without cost to the owner.

3.03 ACCEPTANCE

A. As a condition precedent to final acceptance of the work, the Contractor shall certify the equipment and installation included under this section to be free of defects, and suitable for trouble-free operation under the conditions set forth in these specifications. This requirement is in addition to the manufacturer's guarantee.

End of Section

SECTION 17501

HUMAN MACHINE INTERFACE SOFTWARE AND HARDWARE

## PART 1 - GENERAL

### 1.01 SCOPE

A. This section covers plant Human Machine Interface (HMI) software and hardware requirements. Associated programming and configuration of software and hardware is to be contractor's responsibility, reference Section 16907 (Programming and Control Description) for system programming and functionality requirements. HMI system development shall include, but not be limited to, database and graphics development, run-time displays, I/O communication device drivers, alarming, logging, trending, and reporting functions.

### 1.02 GENERAL

A. HMI application development shall be in accordance with requirements defined in Section 16907 (Programming and Control Description), system P&IDs and as defined in this Section. The addition or modification of HMI software signals during construction and start-up to meet the requirements of the original specifications shall be implemented at no extra cost to the Owner. Memory Type I/O tag names that must be created for the HMI software are not listed, and shall be provided as required at no extra cost to Owner.

B. The Contractor shall be responsible for purchasing any required runtime software/licenses. Contractor will be required to utilize their own development software/license for development of HMI application.

C. HMI screens are to be based on site layout and function as indicated in P&ID's and Controls Descriptions.

D. At a minimum, HMI screens shall be created for each process area in addition to a screen for each of the following: Plant Overview, Alarm Management, Alarm History, Ad-hoc Trends, Master PLC I/O, and PLC/Comm Health.

E. The Contractor shall possess Certification and have a minimum of 3-years programming experience on proposed HMI software package.

1.03 SUBMITTALS

A. Manufacturer's data for all computer system related components including all installed software, peripherals and options.

B. HMI Software indicating I/O capacity and client count.

C. HMI/PLC Interface List - A list shall be created and approved which details all data communicated between PLC and SCADA, list shall include; PLC Tag names, corresponding SCADA Tag names, and data types. For analog signals range and engineering units shall be included.

D. Popup window sample for each type proposed in the HMI system.

E. A color copy of each graphic screen shown in normal and alarmed state.

F. System O&M manual(s)

1.04 WARRANTY

A. All parts and components of the HMI system are to be warranted for a period of 12 months starting the day the system is fully operational and accepted as complete by owner. Repair or replace components within 5 working days of notification by OWNER. If OWNER uses a provided spare part and makes the repair themselves, replace the component within the same time period.

B. HMI programming issues/problems – System programming is to be warranted for a period of 12 months starting the day the system has been deemed fully operational and accepted as complete by owner. Any programming corrections required are to be made within 5 working days of notification by OWNER.

1.05 TRAINING

A. Training is to be completed only after system testing has been completed and OWNER has deemed system to be fully operational. Training is to consist of (2) 4 hour training sessions each scheduled with Owner a minimum of (2) weeks prior to scheduled training date. Each training session is to cover the following topics at a minimum:

1. System overview and navigation
2. Alarm management (local and remote callout)

3. Trending; to include configuration of custom trends
4. Equipment control and monitoring
5. Security
6. Remote access
7. System hardware failure recovery and basic maintenance
8. Basic hardware troubleshooting

## PART 2 - PRODUCTS

### 2.01 SCADA SYSTEM COMPUTERS

A. Server - Primary

1. Computer minimum requirements:
   a. Base Unit: PowerEdge T130 Tower Server with up to (4) 3.5-Inch Hard Drives or equal
   b. Intel Xeon E3 or greater
   c. RAID 1 for S130, S130 RAID controller
   d. 1TB 7.2 RPM, 6GBS configured in a mirrored RAID 1 configuration
   e. 32GB RAM
   f. (2) 1GBE Ethernet ports
   g. 3 Years ProSupport plus next business day on-site service
   h. Optical Mouse
   i. DVD ROM R/W drive
   j. Nvidia or Radeon video card with 2GB integrated memory and 2 HDMI ports
2. Operation system shall be Window Server 2012 R2.
3. Database Software: Microsoft SQL Server 2012 Standard license or approved equivalent.
4. Two 32” LCD flat monitors with ultra-fast response time of less than 10ms, 800:1 contrast ratio, 1920 X 1080 resolution (min.). Monitors shall be of the non-touch screen type.

B. Server - Backup

1. Computer minimum requirements:

a. Base Unit: PowerEdge T130 Tower Server with up to (4) 3.5-Inch Hard Drives or equal

b. Intel Xeon E3 or greater

c. RAID 1 for S130, S130 RAID controller

d. 1TB 7.2 RPM, 6GBS configured in a mirrored RAID 1

e. 32GB RAM

f. (2) 1GBE Ethernet ports

g. 3 Years ProSupport plus next business day on-site service

h. Optical Mouse

i. DVD ROM R/W drive

j. Nvidia or Radeon video card with 2GB integrated memory and 2 HDMI ports

2. Operation system shall be Window Server 2012 R2 with software as required

3. Database Software: The SCADA system shall be provided with a Microsoft SQL Server 2012 Standard configured to mirror the Primary database.

## 2.02 MISCELLANEOUS HARDWARE

A. Uninterruptable Power Supply (UPS) required to supply a minimum of 30 minutes backup power to Primary and Backup HMI servers. Shall include a power fail interlock for alarming.

## 2.03 HMI SOFTWARE

A. The SCADA software shall be Ignition by Inductive Automation or approved equivalent. Minimum functionality requirements shall be as follows:

1. Development and design of graphical user interface (HMI).

2. Client server functionality with unlimited clients

3. Alarm logging

4. Alarm voice and SMS notification.

5. Automated Report Generation

6. Real-time graphical displays

7. Minimum of 5 concurrent users

8. Execute supervisory control functions such as adjust values or start motors

9. Tag historian and trending

10. 10000 tag minimum

11. Allow remote login

12. Connectivity drivers necessary to facilitate communications identified on system network communications diagram.

2.04 MISCELLANEOUS SOFTWARE

A. Remote access management software is to be installed on server computers so as to facilitate remote connection to HMI application.

1. To be LOGMEIN remote access software or approved equal.

PART 3 - EXECUTION

3.01 SYSTEM OVERVIEW

A. Two SCADA computers located in the Laboratory Building Control Room shall contain a human-machine interface software package to monitor and, in some cases control, the entire plant.

B. The HMI software shall enable the Operators to monitor process signals such as tank levels, motor status, pressure, and alarms. The Operator should also have the ability to perform certain control functions from the SCADA computer such as alter alarm/control set points, run/stop pumps, open/close valves, and disable/acknowledge/reset alarms; reference controls description for additional information/requirements.

C. System is to be configured so as to allow operator's ability to remotely access system via mobile device. Remote connection should be configured so as to allow operator ability to remotely monitor, control and adjust system.

D. System security and remote access configuration/requirements are to be coordinated with owner designated IT representative.

3.02 SYSTEM ARCHITECTURE

A. The SCADA computers communicate with the new Master PLC and OEM PLCs over Ethernet. The Master PLC will serve as the primary controller for executing SCADA commands and

reporting status. Communication between the Master PLC and existing equipment shall be included by Contractor in the scope of this project.

B. Servers to be labeled and configured as Primary and Backup. All required software for failover functionality shall be provided. If additional software not specified in this document is required, the Contractor shall supply at no additional cost to Owner.

3.03 TESTING

A. System functionality shall be demonstrated to OWNER and/or OWNER'S engineer. Testing will be considered complete only after all functionality requirements defined in project scope documents (i.e. P&ID's, Controls Description, requirements defined in this section) have been satisfied as determined by OWNER and/or OWNER'S engineer.

PART 4 - GRAPHIC STANDARDS

4.01 HEADER/NAVIGATION

A. A common header template shall be used which includes:

1. Site Name
2. City
3. Date/time
4. Which node is operational (Primary or Backup)
5. Logged in user
6. Login/Logout button
7. Active screen name
8. Navigation buttons to access each screen
9. Mini Alarm table

4.02 TRENDS

A. A Trend for all analog values shall be provided and scaled to engineering units. Indicate and animate the HH/Hi/Lo/LL levels wherever applicable. Time period of the trend is to be determined by Owner.

B. An ad-hoc trends screen shall also be provided to allow for custom trend creation, with all analog tags available for trending.

C. Specific trending and report generation requirements are to be confirmed with operations staff so as to ensure all necessary agency compliance requirements are met.

4.03 COLOR CODE

A. Green – Running/Open

B. Red – Stopped/Closed

C. Yellow flashing – Alarm Active

D. Yellow – Alarm

E. Non animated graphics should be neutral colors.

F. Color codes are to be confirmed with operations staff prior to implementation.

End of Section

SECTION 17790

FIBER OPTIC CABLING

## PART 1 - GENERAL

### 1.01 SCOPE OF WORK

A. This Section covers the requirements for the fiber optic cable to be furnished and installed, as shown on Plans and specified herein. Also included are fiber testing procedures and equipment accessory and splicing requirements.

B. The entire fiber optic system is considered to be one component and provided by a single source, hereafter referred to as the Supplier.

C. The Contractor shall furnish and install all hardware, trenching, conduit and fiber optic cable as shown on Plans.

D. See Drawings for coordination

### 1.02 SUBMITTALS

A. Products shall be submitted to the Engineer for review in accordance with Section 16000.

B. Include the following information in the submittal for this Section:
   1. Cut sheets and catalog literature for proposed fiber optic cable, and fiber optic cable accessories (pigtails, connectors).
   2. Manufacturer specifications and data that clearly shows that the fiber optic cable meets all requirements specified herein.
   3. Physical dimension drawings of all fiber optic accessories.
   4. Proposed fiber identification sequence and labeling.
   5. Provide a Recommended Spare Parts List (RSPL).
   6. Provide a list of recommended special tools for fiber installation testing or maintenance.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Corning, or equal.

### 2.02 DESIGN AND FABRICATION

A. Design Specifications:

1. Fiber Type: Multimode.
2. Core Diameter: 50 microns.
3. Cladding Diameter: 125 microns.
4. Maximum Attenuation: 3.5 dB/km @ 850 nm; 1.0 dB/km @ 1300 nm.
5. Bandwidth: 500 MHz-km
6. Buffer Type: Loose Tube, gel filled.
7. Number of Fibers: 12 (6 pair).
8. Cable Central Strength Member: Dielectric.
9. Cable Fill: Water blocking gel.
10. Outer Jacket: MDPE.
11. Maximum Pulling Load: 600 lbf (2700 N).
12. Operating Temperature Range: -40°C to -70°C.
13. Parallel Plate Crush Resistance: 400 lbf.
14. Quantity: As shown on the Plans.
15. Packaging: Spools/reels, protected during and after shipment.

B. Fabrication:
1. Fibers within the cable shall be color-coded so that each fiber may individually identified. The color sequence suggested is as follows: blue, orange, green, brown, slate, white, red, black, yellow, and violet. Dashed versions of the same colors may be used to continue the sequence, depending on the cable structure and fiber count.
2. The outer jackets of the cable shall be armored and continuous, free from holes, splits, blisters or inclusions. The same requirement holds for any inner jackets within a given cable structure as well as for fiber coatings.
3. Materials used for fiber optic cable shall present no environmental or toxicological hazards as defined by current industry standards and shall comply with OSHA and EPA standards or applicable federal or state laws or regulations.
4. The color of the polyethylene outer jacket material shall be black in accordance with ASTM D 1248, and contain a suitable antioxidant substance. The carbon black used shall be furnace-type conforming to designation N 110 in ASTM D 1765. The carbon black content in the jacket material when measured in accordance with ASTM D 1603 shall be 2.6% ± 0.25% by weight. The light absorption coefficient of jacket material shall be at least 400 when measured at wavelength of 375 nm per ASTM D 3349.
   a. Outer polyethylene jacket materials shall meet tensile strength and elongation minimum requirements for unaged and aged samples as follows:
      1) Tensile Strength at: 2800 psi (Unaged), 2100 psi (Aged).
      2) Elongation at Rupture: 400% (Unaged), 375% (Aged).
5. The cable jacket shrinkage test measures the shrinkage or expansion of a cable jacket exposed to temperature aging for specified period of time. Maximum shrinkage shall be less than 5% for each specimen tested. The Test procedure is described in EIA-RS455, FOTP-86.

C. Cable Packaging:
1. The cable shall be permanently marked to identify the manufacturer, date of manufacture, length markings, a product identification code, and UL messages

where appropriate. The markings shall be printed at regular intervals of not more than two feet apart.

2. The cable shall be packaged on a reel with inner hub diameter greater than the recommended minimum bending diameter of cable. The anchor holes on the reels shall admit a 2½ IN diameter spindle with binding. The package shall be sturdy enough to endure reasonable handling in the process of shipping and storage. The package shall bear the name of the manufacturer, the product identification code and the total amount of product on the reel.
3. The following information shall be securely attached to the reel as a tag or clearly and permanently stenciled or labeled on each reel:
   a. Customer Order Number.
   b. Customer Job Number.
   c. Customer Reel Number.
   d. Termination.
   e. Ship Date.
   f. Manufacturer's Name.
   g. Factory Reel Number.
   h. Manufacturer's Cable Code (Type and Fiber count).
   i. Length of Cable.
   j. Weight of Cable and Reel.
   k. Defect Tag.
4. The ends of all cable shall be sealed to prevent the escape of filling compound and to prevent the entry of moisture during shipping, handling, storage and installation.

D. Fiber Testing:
1. Each fiber will be tested prior to and upon completion of cable installation to verify that all fibers meet these specifications. If testing reveals that any fiber does not meet the requirements, the Contractor shall replace the cable with a new cable and perform all tests for the new cable.

E. Manufacturer Test Documentation:
1. Test documentation from the fiber optic cable manufacturer shall be delivered to the Engineer upon delivery of the cable to the job site, as a prerequisite for cable installation.
2. The documentation shall include Optical Time Domain Reflectometer (OTDR) traces for each fiber of each reel at 850 nm and 1300 nm. Optical attenuation test data shall be furnished for each fiber of each reel, as measured at 850 nm and 1300 nm.

F. Installation Testing:
1. The Contractor shall test the fiber optic cable prior to its installation. This testing shall be witnessed by the Engineer.
2. Testing shall consist of making an OTDR trace of each fiber of each reel, at both 850 nm and 1300 nm. The test shall incorporate a 1 km long backscatter suppression cable inserted between the OTDR and the fiber end. Each trace shall include the optical length and average attenuation.

3. The results of the testing shall be submitted to the Engineer prior to installation. Any cable which shows out-of-spec performance shall be replaced at no increase in Contract price or schedule.

G. Splicing:
   1. Not allowed.

H. Each fiber optic cable shall be installed in innerduct.

## PART 3 - EXECUTION

### 3.01 CABLE INSTALLATION

A. All fiber optic cable shall be installed, terminated, and tested by the fiber supplier as specified herein and as shown on the Plans.

B. In pulling the cable, strain-release, or other tension limiting devices shall be used to limit the pull tension to less than 600 lbs.

C. Minimum bend radius restrictions shall be observed both during and after cable installation.

D. All conduit and cabinet entrances shall be sealed with RTV or other re-enterable sealant material to prevent ingress of water, dust or other foreign materials.

### 3.02 CABLE DAMAGE DURING INSTALLATION

A. If the cable becomes damaged during installation, the Contractor shall stop work and notify the Engineer immediately. The Owner and Engineer will decide whether to replace the entire reel of cable or to install a splice at the damaged section.

B. If the Owner decides to replace the entire reel of cable, the Contractor shall begin the installation at the last designated splice point. The damaged cable between these points shall be removed, coiled, tagged, and given to the Owner. Installation of new cable to replace damaged cable shall not be a basis of extra payment or contract completion time.

C. If the Owner decides to install a splice at the damaged point, and the cable is damaged a second time, the entire reel of damaged cable (and all subsequent damaged reels) shall be replaced with new reels at the Contractor's expense.

End of Section