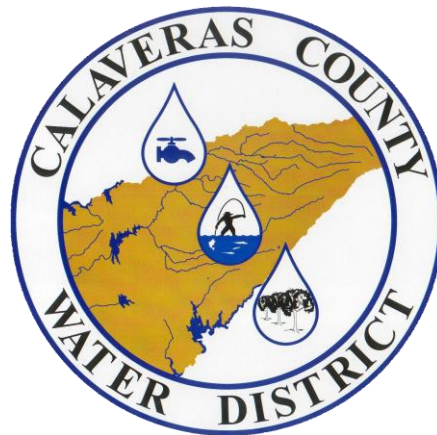


# COPPER COVE C-TANK BOOSTER PUMP STATION MODIFICATIONS AND TRANSMISSION LINE

CIP NO. 11122

PROJECT MANUAL  
VOLUME 1

ISSUED FOR BID  
January 14<sup>th</sup>, 2025



Bids will be received at the office of:

Calaveras County Water District  
120 Toma Court  
San Andreas, California 95249

no later than

**2pm local time March 5<sup>th</sup>, 2025**

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1/13/2025

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**SECTION 00 01 00**  
**ADVERTISEMENT FOR BIDS**

CALAVERAS COUNTY WATER DISTRICT  
COPPER COVE  
C-TANK BOOSTER PUMP STATION MODIFICATIONS AND TRANSMISSION LINE  
CCWD CIP #11122

Separate sealed Bids for the construction of the Copper Cove C-Tank Booster Pump Station Modifications and Transmission Line Project will be received at the office of the Calaveras County Water District at 120 Toma Court, San Andreas, CA 95249 **until 2pm local time on March 5<sup>th</sup>, 2025**, at which time Bids will be publicly opened and read aloud.

The Project for the Calaveras County Water District is located in the community of Copperopolis, California. The Project consists of the following work:

1. Construction of approximately 12,000 LF of 20" ductile iron transmission main, connecting the Copper Cove Water Treatment Plant (WTP) booster pump station (BPS) (located at Kiva Place) to the C-Tanks.
2. Installation of three (3) high-head pumps at the BPS as indicated on the Drawings and specifications.
3. Installation of Electrical, Instrumentation, and Controls associated with the high-head pumps as indication on the Drawings and Specifications.

The project manual, plans and bid documents will be available as of January 14<sup>th</sup>, 2025, and may be examined at our website [CCWD.org](http://CCWD.org), [PUBLICPURCHASE.com](http://PUBLICPURCHASE.com), or the following locations:

Calaveras County Water District  
120 Toma Ct.  
San Andreas, CA 95249  
Contact: Haley Airola / Phone: (209) 754-3181

Dodge Data & Analytics  
3315 Central Ave  
Hot Springs, AR 71913  
Phone: (800) 393-6343

Sacramento Regional Builders Exchange  
5370 Elvas Avenue  
Sacramento, CA 95819  
Phone: (916) 442-8991

Placer County Builders Exchange  
10656 Industrial Ave, Suite 160  
Roseville, CA 95678  
Phone: (916) 771-7229

Builders' Exchange of San Joaquin  
4561 Quail Lakes Drive, Suite B-2  
Stockton, CA 95207  
Phone: (209) 478-1000

Bay Area Builders Exchange  
3055 Alvarado Street  
San Leandro, CA 94577  
Phone: (510) 483-8880

Valley Builders Exchange  
1118 Kansas Avenue  
Modesto, CA 95351  
Phone: (209) 522-9031

Central CA Builders Exchange  
1244 N Mariposa Street  
Fresno, CA 93703  
Phone: (559) 237-1831

The Contract Documents will be available starting January 14<sup>th</sup>, 2025 and may be obtained via the Calaveras County Water District website (<https://ccwd.org/request-for-proposals-bids-rfp/>). To receive addenda and bid information updates, prospective bidders are requested to contact the District to be added to our registered plan holder's list.

For further information or questions concerning these documents should be directed to:

Calaveras County Water District  
120 Toma Court  
San Andreas, CA 95249  
Phone (209) 754-3181  
Attn: Haley Airola  
haleya@ccwd.org

A non-mandatory pre-bid meeting will be held on **February 5<sup>th</sup>, 2025 at 10:00am**, starting at Copperopolis Water Treatment Plant. Prior to submitting a bid, prospective bidders are required to inspect the site of work; vehicle access is restricted in some areas of the project.

Prospective Bidders shall hold a Class A General Engineering Contractor's license issued by the State of California and be skilled, experienced and regularly engaged in the type of work called for under this Contract. All bidders and subcontractors shall be registered with the California Department of Industrial Relations (DIR) pursuant to Labor Code Section 1725.5 to be qualified to bid on this project or to be listed as a subcontractor for this project pursuant to Public Contract Code Section 4104. This project is DIR requirements and accordingly must pay the most current prevailing wages for each worker classification.

Date of Initial Advertisement: **January 14<sup>th</sup>, 2025**

**SECTION 00 02 00  
INSTRUCTIONS TO BIDDERS**

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**ARTICLE 1 - DEFINED TERMS**

- 1.01 Terms used in these Instructions to Bidders 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.

**ARTICLE 2 - COPIES OF BIDDING DOCUMENTS**

- 2.01 Complete sets of the Bidding Documents in the number and for the sum, if any, stated in the Advertisement for Bids may be obtained from the Issuing Office. The cost of the Bidding Documents is non-refundable.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and 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 days of Owner's request, 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 and his subcontractors are required to have a valid, active license issued by the California, Contractors State License Board. The Bidder shall be a Class A, General Engineering Contractor. Bidders shall have experience with at least three (3) projects of similar size and complexity within the past seven (7) years.

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

#### 4.01 Subsurface and Physical Conditions

A. The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Bidding Documents.
2. Those drawings of physical conditions in or relating to existing surface and subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Bidding Documents.

B. Copies of reports and drawings referenced in Paragraph 4.01.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions has been identified and established in Paragraph 4.02 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions or information contained in such reports or shown or indicated in 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 Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

#### 4.03 Hazardous Environmental Condition

A. The Supplementary Conditions identify those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that Engineer has used in preparing the Bidding Documents.

B. Copies of reports and drawings referenced in Paragraph 4.03.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.06 of the General Conditions has been identified and established in Paragraph 4.06 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

- 4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which



was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work appear in Paragraph 4.06 of the General Conditions.

4.05 On request, Owner will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as 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. Bidder shall comply with all applicable Laws and Regulations relative to locating of excavation and utility.

4.06 Additional Owner Provided Information

A. Reference is made to the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. On request, 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.

B. Paragraph 9.12.B of the General Conditions states that if an Owner Safety program exists it will be noted in the Supplementary Conditions.

4.07 It is the 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 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 Bidder as to all Federal, State, and local Laws and Regulations that may affect cost, progress, and performance of the Work;

D. Carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in Paragraph 4.02 of the General Conditions, and (2) reports and drawings of Hazardous Environmental Conditions at the Site which have been identified in the Supplementary Conditions as provided in Paragraph 4.06 of the General Conditions;

E. Obtain and carefully study (or accept consequences of 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 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 Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;

H. Correlate the information known to 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 Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and
  - J. Determine that the Bidding Documents are generally sufficient to indicate and convey 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 Bidder that 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 Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

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

- 5.01 A non-mandatory pre-bid conference will be held on **February 5<sup>th</sup>, 2025**, at the Copperopolis Water Treatment Plant. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. Prior to submitting a bid, prospective bidders are required to inspect the site of work. Engineer will transmit to all prospective Bidders of record such Addenda as 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 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 Contractor.

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

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than five 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 Owner or Engineer.

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

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount not less than 5 percent of Bidder's maximum Bid price and in the form of a certified check or bank money order or a Bid Bond (EJCDC No. C-430, 2013 Edition) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.

- 8.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may annul the Notice of Award and the Bid security of that Bidder will be forfeited. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Agreement or 91 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.
- 8.03 Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within seven 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 "or-equal" materials and equipment as described in paragraph 6.05 of the General Conditions, or those substitute materials and equipment approved by Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function and quality to be met by any proposed substitute or "or-equal" item. Request for Engineer's clarification of materials and equipment considered "or-equal" prior to the Effective Date of Agreement must be received by the Engineer at least 10 days prior to the date for receipt of Bids. No item of material or equipment will be considered by Engineer as a substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids. Each such 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 Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any proposed substitute item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

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

- 12.01 Each bidder must submit bids identifying all subcontractors according to the Subcontractor Listing Law Section 4104 of the California Public Contract Code; nothing in this Article shall be deemed to supersede those requirements.
- 12.02 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to 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 days after Bid opening, submit to 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 Owner. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the

Notice of Award is given, request apparent Successful Bidder to submit a substitute, without an increase in the Bid.

- 12.03 If apparent Successful Bidder declines to make any such substitution, 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 Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06 of the General Conditions.
- 12.04 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.
- 12.05 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in SC 7.06.

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

- 13.01 The Bid Form is included with the Bidding Documents. Additional copies may be obtained from Engineer.
- 13.02 All blanks on the Bid Form shall be completed in ink and the Bid signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each [section, Bid item, alternative, adjustment unit price item, and unit price item] listed therein, or the words "No Bid," "No Change," or "Not Applicable" entered.
- 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 corporate 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 official 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 official address of the firm shall be shown.
- 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 venturer in the manner indicated on the Bid Form. The official address of the joint venture must be provided on the Bid Form.
- 13.08 All names shall be 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 postal and email addresses and telephone number for communications regarding the Bid shall be shown.
- 13.11 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state or locality where the Project is located or Bidder shall covenant in writing to obtain such qualification prior to award of

the Contract and attach such covenant to the Bid Form. Bidder's state contractor license number shall also be shown on the Bid Form.

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

##### 14.01 Unit Price

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Bid schedule.
- 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. 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 favor of the unit prices. The bid total will be used to determine whose bid is the lowest price, as provided in Section 19. 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.

##### 14.02 Allowances

- A. For cash allowances the Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with paragraph 11.02.B of the General Conditions.

#### **ARTICLE 15 - SUBMITTAL OF BID**

15.01 The Bid Form (Section 00410) is to be completed and submitted with all of the attachments outlined in Article 7 of the Bid Form (Section 00410).

15.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Advertisement for Bids 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." When using the mail or other delivery system, the Bidder is totally responsible for the mail or other delivery system delivering the Bid at the place and prior to the time indicated in the Advertisement for Bid. A mailed Bid shall be addressed to Owner at the address in Article 1.01 of the Bid Form.

#### **ARTICLE 16 - MODIFICATION AND 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 After the date and time for the opening of Bids, Bids may only be withdrawn as provided in Public Contract Code Section 510 et seq.

#### **ARTICLE 17 - OPENING OF BIDS**

17.01 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 alternates, if any, will be made available to Bidders after the opening of 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, but Owner may, at its sole discretion, release any Bid and return the Bid security prior to the end of this period.

## **ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT**

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to be non-responsible. 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 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 Bids, 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, 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 Owner may conduct such investigations as 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, Owner will award the Contract to the responsible Bidder whose Bid, conforming with all the material terms and conditions of the Instructions to Bidders, is lowest, price and other factors considered. If detailed in the Bid Form, factors such as discounts, transportation costs, and life cycle costs may be used to determine which bidder, if any, is to be offered the award.

## **ARTICLE 20 - CONTRACT SECURITY AND INSURANCE**

- 20.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it shall 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 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

## 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 – AGENCY REQUIREMENTS

26.01 Not Used

26.02 Payment and retainage will comply with the contract agreement section 6.02 “Progress Payments; Retainage.” Bidders are notified that this contract does not permit retainage to be placed in escrow nor to be invested for the benefit of the contractor.

26.03 Bidders are notified that this contract does not provide for substitution of securities for any monies withheld by the Owner to ensure performance under the contract.

26.04 Bidders are notified of the requirement for affirmative action to ensure equal employment opportunity (Executive Order No. 11246) as set forth in the Equal Opportunity Requirements found in paragraph 18.10 of the General Conditions.

## ARTICLE 24 – WAGE RATE REQUIREMENTS

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

24.02 Statutory Penalty for Failure to Pay Minimum Wages: In accordance with Section 1775 (a) through (c) 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 not more than two hundred dollars (\$200.00) for each calendar day or portion thereof, for each worker paid less than the prevailing wage rates as determined by the director for the work or craft in which the worker is employed for any public work done under the contract by the contractor or, except as provided in subdivision 1775 (b), by any subcontractor under the contractor.

24.03 Statutory Penalty for Unauthorized Overtime Work: In accordance with Section 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 respective contractor or subcontractor for each calendar day during which said worker is required or permitted to work more than 8 hours in any one calendar day and 40 hours in any one calendar week in violation of provisions of Sections 1810-1815 of the California Labor Code.

- 24.04 Apprenticeship Requirements: Contractor agrees to comply with Sections 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 apprentice hour for each five 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 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.
- 24.05 Payroll Records: Contractor shall keep accurate payroll records in format specified by the Division of Labor Standards Enforcement. 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. Copies of 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. Contractor and subcontractors shall furnish and submit electronic certified payroll records directly to the Labor Commissioner, and duplicate copies available to Owner.

## **ARTICLE 25 – REGISTRATION WITH DEPARTMENT OF INDUSTRIAL RELATIONS**

- 25.01 This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. 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.
- 25.02 This bid is subject to Labor Code Section 1771.1 (a) through (d) as follows:
- (a) A contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.
  - (b) Notice of the requirement described in subdivision (a) shall be included in all bid invitations and public works contracts, and a bid shall not be accepted nor any contract or subcontract entered into without proof of the contractor or subcontractor's current registration to perform public work pursuant to Section 1725.5.
  - (c) An inadvertent error in listing a subcontractor who is not registered pursuant to Section 1725.5 in a bid proposal shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive, provided that any of the following apply: (1) The subcontractor is registered prior to the bid opening, (2) Within 24 hours after the bid opening, the subcontractor is registered and has paid the penalty registration fee specified in subparagraph (E) of paragraph (2) of subdivision (a) of Section 1725.5., (3) The subcontractor is replaced by another registered subcontractor pursuant to Section 4107 of the Public Contract Code.



- (d) Failure by a subcontractor to be registered to perform public work as required by subdivision (a) shall be grounds under Section 4107 of the Public Contract Code for the contractor, with the consent of the awarding authority, to substitute a subcontractor who is registered to perform public work pursuant to Section 1725.5 in place of the unregistered subcontractor.

#### **ARTICLE 26 – SUBCONTRACTOR LISTING LAW**

- 26.01 In accordance with Section 4104 of the California Public Contract Code, each bidder, in his or her bid, shall set forth the name and the location of the place of business of each subcontractor who will perform work or labor or render service to the prime contractor in or about the construction of the work or improvement, or a subcontractor licensed by the State of California who, under subcontract to the prime contractor, specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of one-half of one percent of the prime contractor's total bid.
- 26.02 In accordance with Section 4107 of the California Public Contract Code, no contractor whose bid is accepted shall without consent of the owner either: (a) substitute a person as a subcontractor in place of the subcontractor listed in the original bid; or (b) permit a subcontract to be voluntarily assigned or transferred or allow it to be performed by anyone other than the original subcontractor listed in the original bid; or (c) sublet or subcontract any portion of the work in excess of one-half of one percent of the prime contractor's total bid as to which his or her original bid did not designate a subcontractor.
- 26.03 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 10 percent 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 day's notice of the time and place thereof.

END OF SECTION

**SECTION 00 04 10  
BID FORM**

TABLE OF ARTICLES

- Article 1 - Bid Recipient
- Article 2 - Bidder's Acknowledgments
- Article 3 - Bidder's Representations
- Article 4 - Bidder's Certification
- Article 5 - Basis of Bid
- Article 6 - Time of Completion
- Article 7 - Attachments to Bid
- Article 8 - Defined Terms
- Article 9 - Bid Submittal
- Bid Schedule
- Descriptions of Bid Items

**ARTICLE 1- BID RECIPIENT**

- 1.01 **This Bid is submitted to: Calaveras County Water District at the main office located at 120 Toma Court, San Andreas, California 95249, no later than 2pm local time, March 5<sup>th</sup>, 2025.**
- 1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with 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 this Bid and in accordance with the other terms and conditions of the Bidding Documents.

**ARTICLE 2- BIDDER'S ACKNOWLEDGEMENTS**

- 2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

**ARTICLE 3- BIDDER'S REPRESENTATIONS**

- 3.01 In submitting this Bid, Bidder represents that:
  - A. 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. 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. 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. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in SC-4.02, and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in SC-4.06 as containing reliable “technical data.”
- E. Bidder has considered the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder’s safety precautions and programs.
- F. Based on the information and observations referred to in Paragraph 3.01.E above, Bidder does not consider that any further examinations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of the Work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to 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. Bidder will submit written evidence of its authority to do business in the State or other jurisdiction where the Project is located not later than the date of its execution of the Agreement.

**ARTICLE 4- BIDDER’S CERTIFICATION**

4.01 Bidder further represents that:

- A. This Bid is genuine and not made in the interest of or on 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. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
  - 1. “Corrupt practice” means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.

2. “fraudulent practice” means an intentional misrepresentation of facts made to (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

#### **ARTICLE 5- BASIS OF BID**

- 5.01 Bidder will complete the Work in accordance with the Contract Documents for the price(s) provided in the attached bid schedule (at the end of this section).
- 5.02 Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions
- 5.03 Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities, determined as provided in the Contract Documents.
- 5.04 Bid Prices are for work that has been furnished and installed by the Contractor and is fully completed. The bid items as described and provided are for bidding and payment purposes and do not in any way limit the Contractor’s responsibility to perform all work that may be reasonably inferred from the plans, specifications and other bid documents to produce the intended result.
- 5.05 All specified cash allowances are included in the price(s) set forth above and have been computed in accordance with Paragraph 11.02 of the General Conditions.
- 5.06 If “additive” or “deductive” Bid Items are included in the Bid- clearly identify the method for applying the alternates and the basis for award of the contract.

#### **ARTICLE 6- TIME OF COMPLETION**

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

#### **ARTICLE 7- ATTACHMENTS TO THIS BID**

- 7.01 The following documents are attached to and made a condition of this Bid:
  - A. Non-Collusion Affidavit (**Section 00420**);
  - B. Required Bid security in the form of a Bid Bond (**Section 00430**) or Certified Check;
  - C. List of Subcontractors (**Section 00470**);

**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 (Section 00200), General Conditions (Section 00700 and Supplementary Conditions (Section 00800).

**ARTICLE 9- BID SUBMITTAL**

9.01 This Bid is submitted by: \_\_\_\_\_

Bidder's Business address: \_\_\_\_\_

\_\_\_\_\_

Phone: \_\_\_\_\_ Facsimile: \_\_\_\_\_

Submitted on \_\_\_\_\_, \_\_\_\_\_.

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

DIR Registration No. \_\_\_\_\_

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

If Bidder is:

**An Individual**

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

By: \_\_\_\_\_  
*(Individual's signature)*

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

**A Partnership**

Partnership Name: \_\_\_\_\_ (SEAL)

By: \_\_\_\_\_  
*(Signature of general partner – attach evidence of authority to sign)*

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

**A Corporation**

Corporation Name: \_\_\_\_\_ (SEAL)

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

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

By: \_\_\_\_\_  
*(Signature – attach evidence of authority to sign)*

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

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

Attest: \_\_\_\_\_  
*(Signature of Corporate Secretary)*

Date of Qualification to do business is \_\_\_\_\\_\_\_\_\\_\_\_\_.

**A Joint Venture**

Name of Joint Venturer: \_\_\_\_\_

First Joint Venturer Name: \_\_\_\_\_ (SEAL)

By: \_\_\_\_\_  
*(Signature of first joint venture partner – attach evidence of authority to sign)*

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

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

Second Joint Venturer Name: \_\_\_\_\_ (SEAL)

By: \_\_\_\_\_  
*(Signature of second joint venture partner – attach evidence of authority to sign)*

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

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

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

## **BID SCHEDULE**

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>	<u>QTY</u>	<u>UNIT PRICE</u>	<u>BID PRICE</u>
1	Mobilization/Demobilization	LS	1	\$ _____.	\$ _____.
2	Worker Protection and Safety/Shoring	LS	1	\$ _____.	\$ _____.
3	Implementation of Water Pollution Control Plan	LS	1		
4	Traffic Control	LS	1		
5	Tree Removal	EA	1		
6	Roadway Pavement Replacement	TON	432		
7	20" ID Ductile Iron Pipe Transmission Main	LS	1		
8	20" Gate Valves	EA	19		
9	Fire Hydrants and Appurtenances	EA	6		
10	Air/Vac Valves	EA	6		
11	6" Altitude Valve, B-Tank Piping and Appurtenance, and Bypass Piping.	LS	1		
12	10" Altitude Valve, C-Tank Piping and Appurtenance, and Bypass Piping.	LS	1		
13	1,650 GPM Booster Pumps and 250 HP Motors	EA	3		

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>	<u>QTY</u>	<u>UNIT PRICE</u>	<u>BID PRICE</u>
14	Welded Steel Piping and Appurtenances	LS	1		
15	Electrical Panels and Materials	LS	1		
<b>TOTAL BID AMOUNT ALL ITEMS (1 to 18) (NUMERICAL)</b>				\$	.

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**DOLLARS**

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**TOTAL BID AMOUNT (WRITTEN)**



## **DESCRIPTIONS OF BID ITEMS**

*Note: Bid items listed herein for bidding and payment purposes do not limit Contractor's responsibility to perform all work required under this contract, on drawings, in specifications, or reasonably inferred or interpreted to be necessary to complete the work. All bid items will have 5% retention in the progress payment held for final payment.*

### **BID ITEM NO.1 – MOBILIZATION / DEMOBILIZATION**

1. The work under this bid item shall include all contract administration, project mobilization, site development activities and demobilization as required to conduct and complete the Work, as identified in the Contract Documents. The total amount shall not exceed five percent (5%) of Total Base Bid Price as provided in the Bid Schedule. Item shall include, but not be limited to, the following:
  - a. Insurance premiums, bonds, permitting fees, security fencing, utilities, water pollution control plan, traffic control, potholing and other facilities at the jobsite, Contractor's overhead, and costs inclusive of administering the Contract, management and quality control procedures, and coordination as required to construct and complete the Project.
  - b. Supply, transportation, and/or movement of personnel, equipment, supplies and incidentals to the work site. Equipment and major materials listed in Contractor's proposal shall be staged on site in the types and quantities shown. Additional shipments of material or transportation of equipment, if required, shall be approved in writing by District in advance.
  - c. Cleaning of equipment prior to mobilizing to the jobsite.
  - d. Identification and protection of existing facilities/utilities.
  - e. Site preparation of construction zone, vehicle/visitor parking, staging, laydown, and stockpile areas.
  - f. All project demobilization, site cleanup, and removal of personnel, equipment, materials, supplies, temporary facilities, site delineators, and construction waste from the jobsite to satisfy the requirements of 01 70 00 - Execution and Closeout Requirements and other applicable elements of the Contract Documents.
  - g. The establishment of site access and staging areas/BMP's
  - h. The procurement and installation of all temporary construction facilities.
  - i. The installation of all temporary construction fencing.
  - j. The fabrication and installation of the Project Sign.
2. Work will be paid for on a lump sum basis. Contractor may apply for payment for up to one-third of the total lump sum amount with the Contractor's first application for payment and after completion of the Contractor's pre-construction obligations. Contractor may apply for payment for the remaining lump sum amount on a project percent complete basis.

### **BID ITEM NO.2 – WORKER PROTECTION AND SAFETY/SHORING**

1. The lump sum amount shall include detailed plan for worker safety and maintaining safety during construction complying with Labor Code Sections 6700-6708, all applicable safety orders and permits and protective equipment necessary for the protection and safety of all workers, other persons, equipment and facilities during the construction period as specified in the Contract Documents.
2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in Worker Protection and Safety/Shoring are being completed.

### **BID ITEM NO.3 – IMPLEMENTATION OF WATER POLLUTION CONTROL PLAN**

1. The lump sum amount shall include the implementation of water pollution control plan.
2. Work will be paid for on a lump sum basis. The lump sum price shall be full compensation for the preparation and implementation or submittal of these materials and requirements, and for furnishing and installing all labor, equipment, materials, tools, and incidentals to complete this item.

### **BID ITEM NO.4 – TRAFFIC CONTROL**

1. The work under this bid item shall include all temporary traffic control measures, devices, flaggers, changeable message signs, and any other costs associated with the traffic control plan covered in the Drawings and Contract Specifications.
2. Work will be paid for by each day of traffic control.

### **BID ITEM NO.5 – TREE REMOVAL**

1. The work under this bid item shall include the removal of existing trees as shown on the Contract Documents. This bid item shall also include the hauling and disposal of removed items.
2. Work will be paid for by each tree removed as identified on the contract documents.

**BID ITEM NO.6 – ROADWAY PAVEMENT REPLACEMENT**

1. The work under this bid item shall include all pavement patching including compaction, material processing and importing, aggregate base and crushed rock bases, asphaltic concrete paving, tack coat and sealants associated with replacing pavement in the roadway per County and Caltrans requirements.
2. The unit price shall be full compensation for the preparation and installation or submittal of these materials, and for all labor, equipment, tools, and incidentals to complete this item. This item shall be paid in accordance with the actual number of linear feet of pavement replaced.

**BID ITEM NO.7– 20” ID DUCTILE IRON PIPE TRANSMISSION MAIN**

1. The work under this bid item shall include furnishing and installing 12,000 LF of 20” ductile iron pipe including all taps, joints, excavation, trenching, backfill and compaction and tie-ins to the existing system as shown and specified in the Contract Documents.
2. Work will be paid for on a lump sum basis. The lump sum price shall be full compensation for the preparation and implementation or submittal of these materials and requirements, and for furnishing and installing all labor, equipment, materials, tools, and incidentals to complete this item.

**BID ITEM NO.8 – 20” GATE VALVES**

1. The work under this bid item shall include the furnishing and installation of (19) 20” gate valves as shown on the Contract Documents. This bid item shall also include the hauling and disposal of removed items.
2. Work will be paid for by each butterfly valve installed.

**BID ITEM NO.9 – FIRE HYDRANTS AND APPURTENANCES**

1. The work under this bid item shall include furnishing and installation of (6) fire hydrants including all valves, taps, joints, fittings, excavation, trenching, backfill and compaction as shown on the Contract Documents. This bid item shall also include the hauling and disposal of removed items.
2. Work will be paid for by each fire hydrant installed.

**BID ITEM NO.10 – AIR/VAC VALVES**

1. The work under this bid item shall include furnishing and installation of (6) air/vac valves including all enclosures, valves, taps, joints, fittings, excavation, trenching, backfill and compaction as shown on the Contract Documents. This bid item shall also include the hauling and disposal of removed items.
2. Work will be paid for by each air/vac valve installed.

**BID ITEM NO.11 – 6” ALTITUDE VALVE AND B-TANK PIPING AND APPURTENANCES**

1. The work under this bid item shall include furnishing and installing of the 6” altitude valve and B-Tank piping and appurtenances including all enclosures, valves, taps, joints, fittings, excavation, trenching, backfill and compaction as shown and specified in the Contract Documents.
2. Work will be paid for on a lump sum basis. The lump sum price shall be full compensation for the preparation and implementation or submittal of these materials and requirements, and for furnishing and installing all labor, equipment, materials, tools, and incidentals to complete this item.

**BID ITEM NO.12 – 10” ALTITUDE VALVE AND C-TANK PIPING AND APPURTENANCES**

1. The work under this bid item shall include furnishing and installing of the 10” altitude valve and C-Tank piping and appurtenances including all vaults, enclosures, valves, taps, joints, fittings, excavation, trenching, backfill and compaction as shown and specified in the Contract Documents.
2. Work will be paid for on a lump sum basis. The lump sum price shall be full compensation for the preparation and implementation or submittal of these materials and requirements, and for furnishing and installing all labor, equipment, materials, tools, and incidentals to complete this item.

**BID ITEM NO.13 – 1,650 GPM BOOSTER PUMPS AND 250 HP MOTORS**

1. The work under this bid item shall include furnishing required labor, materials, project equipment, construction equipment, safety equipment, test equipment, incidentals, and services to install (3) 1,650 GPM Booster Pumps and 250 HP Motors as shown on the Contract Documents. This bid item shall also include the hauling and disposal of removed items.
2. Work will be paid for by each pump and motor installed.

**BID ITEM NO.14 – WELDED STEEL PIPING AND APPURTENANCES**

1. The work under this bid item shall include furnishing and installing of all welded steel pipe and appurtenances valves, taps, joints, and fittings as shown and specified in the Contract Documents.
2. Work will be paid for on a lump sum basis. The lump sum price shall be full compensation for the preparation and implementation or submittal of these materials and requirements, and for furnishing and installing all labor, equipment, materials, tools, and incidentals to complete this item.

**BID ITEM NO.15– ELECTRICAL PANELS AND MATERIALS**

1. The work under this bid item includes furnishing all required labor, materials, project equipment, electrical panels, tools, construction equipment, safety equipment, transportation, test equipment, incidentals, and services to provide complete and operational electrical modifications on the Electrical Drawings and Contract Specifications.
2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in Electrical Modifications are being completed.

**SECTION 00 04 20  
NON-COLLUSION AFFIDAVIT**

NON-COLLUSION DECLARATION TO BE EXECUTED  
BY  
BIDDER AND SUBMITTED WITH BID  
(Public Contract Code Section 7106)

State of California  
County of Calaveras

The undersigned declares:

I am the \_\_\_\_\_ of \_\_\_\_\_, the party making the foregoing bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed:

By \_\_\_\_\_

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

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

(SEAL)

**SECTION 00 04 30  
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*):

BID

Bid Due Date:

Description (*Project Name and Include Location*):

BOND

Bond Number:

Date (*Not earlier than Bid due date*):

Penal sum

\_\_\_\_\_ \$ \_\_\_\_\_  
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

**BIDDER**

**SURETY**

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

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

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

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

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

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

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

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

*Note: Above addresses are to be used for giving any required notice. Provide execution by any additional parties, such as joint venturers, if necessary.*

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
  - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
  - 3.2 All Bids are rejected by Owner, or
  - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and 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. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after 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 in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and 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. 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 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.

**SECTION 00 04 70  
LIST OF SUBCONTRACTORS**

*Note: In accordance with Section 4104 of the California Public Contracts Code, each Bidder shall complete the attached form and submit with their bid a complete list of all subcontractors performing work in an amount in excess of one-half of one percent of their total bid.*

BIDDER: \_\_\_\_\_

<b>Work to be Performed</b>	<b>Percent of Total Contract Price</b>	<b>Subcontractor's Name, Location of Place of Business, Contractors License, and DIR Registration Number</b>

(ADD ADDITIONAL SHEETS IF NECESSARY)

**SECTION 00 05 00  
AGREEMENT BETWEEN  
OWNER AND CONTRACTOR**

THIS AGREEMENT is by and between CALAVERAS COUNTY WATER DISTRICT (“Owner”) and \_\_\_\_\_ (“Contractor”).

Owner and Contractor hereby agree as follows:

**ARTICLE 1 – WORK**

- 1.01 Contractor shall complete all Work as designated on the Bid Form and described for the bid items and as otherwise specified or indicated in the Contract Documents. The Work is generally described as follows:
- A. Construction of approximately 10,700 LF of 20” ductile iron transmission main, connecting the Copper Cove Water Treatment Plant (WTP) booster pump station (BPS) (located at Kiva Place) to the C-Tanks. The pipeline includes connections to an existing 20” ductile iron transmission main at two locations.
  - B. Installation of three (3) high-head pumps at the BPS as indicated on the Drawings and specifications.
  - C. Installation of Electrical, Instrumentation, and Controls associated with the high-head pumps as indication on the Drawings and specifications.

**ARTICLE 2 – THE PROJECT**

- 2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows:

COPPER COVE  
C-TANK BOOSTER PUMP STATION MODIFICATIONS AND TRANSMISSION LINE  
CIP #11122

**ARTICLE 3 – ENGINEER**

- 3.01 The part of the Project that pertains to the Work has been designed for the Calaveras County Water District by Peterson Brustad Inc., 80 Blue Ravine Road, Suite 280, Folsom CA 95630.
- 3.02 The Owner has designated Peterson Brustad Inc. (as “Engineer”) to act as Owner’s representative, assuming all duties and responsibilities, and having rights and authority assigned to Engineer in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents. The Owner may assign some construction phase tasks to Coleman Engineering, Inc. to act on Engineer’s behalf.

**ARTICLE 4 – CONTRACT TIMES**

- 4.01 *Time of the Essence*
- A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.
- 4.02 *Contract Times: Days*
- A. After the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, the Work will be substantially completed within 260 calendar days, and all work completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 260 calendar days after the date when the Contract Times commence to run.
- 4.03 *Liquidated Damages*
- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved



within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner \$1,500 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.
2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$1,500 for each day that expires after such time until the Work is completed and ready for final payment.
3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

## ARTICLE 5 – CONTRACT PRICE

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:
- A. For all Work, at the prices stated in Contractor’s Bid, attached hereto as an exhibit with an initial contract amount of \$ \_\_\_\_\_.
  - B. As provided in Paragraph 13.03 of the General Conditions, estimated quantities for unit price work are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer and the final contract amount adjusted accordingly.

## ARTICLE 6 – PAYMENT PROCEDURES

### 6.01 *Submittal and Processing of Payments*

- A. Applications for Payment shall be submitted by the Contractor in accordance with Article 15 of the General Conditions and is to be processed by Engineer as provided for in the General Conditions.

### 6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor’s Applications for Payment on or about the 15<sup>th</sup> or 30<sup>th</sup> day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
  1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract
    - a. 95% percent of Work completed (with the balance being retainage).
    - b. 95% percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 95% percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 100% percent of Engineer’s estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

**ARTICLE 7 – INTEREST**

- 7.01 All amounts not paid when due shall bear interest at a rate in accordance with applicable law.

**ARTICLE 8 – CONTRACTOR’S REPRESENTATIONS**

- 8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:

- A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
- B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, 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. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
- E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor’s safety precautions and programs.
- F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no 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.
- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- J. Contractor’s entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

**ARTICLE 9 – CONTRACT DOCUMENTS**

9.01 *Contents*

- A. The Contract Documents consist of the following:

CIP 11122  
Copper Cove  
C-Tank BPS and T-Main Line

00 05 00 - 3

Agreement

1. This Agreement (00500).
  2. Project Manual / Divisions 0 through 16:
    - a. Contractor's Bid Form (00410) and Bid Bond (00430).
    - b. List of Subcontractors (00470)
    - c. Performance (00610), Payment (00615) and Maintenance (00650) Bonds
    - d. General Conditions (00700) and Supplementary Conditions (00800)
    - e. All Other Specifications and Content of the Project Manual
    - f. Appendices:
      - Attachment A - County Public Works Utility Encroachment Permit
      - Attachment B - Construction Stormwater Pollution Prevention Plan (SWPPP)
  3. Project Drawings: As issued and advertised for Bids.
  4. Addenda (numbers \_\_\_ to \_\_\_, inclusive), as issued during the bid period and prior to the date of the public bid opening and as acknowledged/enumerated by the Contractor on the Bid Form.
  5. Notice to Proceed, Work Change Directives, Change Orders, or Field Orders, not attached hereto, which may be delivered or issued on or after the Effective Date of the Contract.
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above). There are no Contract Documents other than those listed above in this Article 9, and the Contract Documents may only be amended, modified, or supplemented as provided for in the General Conditions.

## 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. Unless expressly agreed to elsewhere in the Contract, 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, money that may become due and money that is 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. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its 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 Owner and 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 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:

1. “corrupt practice” means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;
2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

10.06 *Other Provisions*

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are based on EJCDC® C-700, Standard General Conditions for the Construction Contract, published by the Engineers Joint Contract Documents Committee®, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or “track changes” (redline/strikeout), or in the Supplementary Conditions.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on \_\_\_\_\_ (which is the Effective Date of the Contract).

OWNER:

CONTRACTOR:

\_\_\_\_\_

\_\_\_\_\_

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

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

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

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

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

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

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

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

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

Address for giving notices:

Address for giving notices:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

License No.: \_\_\_\_\_

*(where applicable)*

*(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)*

**SECTION 00 05 10  
NOTICE OF AWARD**

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

Project: Copper Cove, C-Tank Booster Pump Station Modifications and Transmission Line	
Owner: Calaveras County Water District	Owner's Contract No.: CIP #11122
Contract:	Engineer's Project No.:
Bidder:	
Bidder's Address: <i>[send Notice of Award Certified Mail, Return Receipt Requested]</i>	

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 \_\_\_\_\_

*[Indicate total Work, alternates, or sections of Work awarded.]*

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

*[Insert appropriate data if unit prices are used. Change language for cost-plus contracts.]*

\_\_\_\_\_ copies of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

\_\_\_\_\_ sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within [15] days of the date you receive this Notice of Award.

1. Deliver to the Owner [\_\_\_\_\_] fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified in the Instructions to Bidders (Article 20), General Conditions (Paragraph 5.01), and Supplementary Conditions (Paragraph SC-5.01).
3. Other conditions precedent:

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

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

\_\_\_\_\_  
Owner

By: \_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Title

**SECTION 00 05 50  
NOTICE TO PROCEED**

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

Project: Copper Cove, C-Tank Booster Pump Station Modifications and Transmission Line	
Owner: Calaveras County Water District	Owner's Contract No.: CIP #11122
Contract:	Engineer's Project No.:
Contractor:	
Contractor's Address: <i>[send Certified Mail, Return Receipt Requested]</i>	

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. In accordance with Article 4 of the Agreement, the date of Substantial Completion is \_\_\_\_\_, and the date of readiness for final payment is \_\_\_\_\_ [(or) the number of days to achieve Substantial Completion is \_\_\_\_\_, and the number of days to achieve readiness for final payment is \_\_\_\_\_].

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds and loss payees) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

\_\_\_\_\_ *[add other requirements].*

	Owner
	Given by:
	Authorized Signature
	Title
	Date

**SECTION 00 06 10  
PERFORMANCE BOND**

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

Calaveras County Water District  
120 Toma Court  
San Andreas, CA 95249

County of Calaveras  
891 Mountain Ranch Road  
San Andreas, CA 95249

**CONSTRUCTION CONTRACT**

Effective Date of the Agreement:  
Amount:  
Description *(name and location)*:

**BOND**

Bond Number:  
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:  
Amount:  
Modifications to this Bond Form:  None  See Paragraph 16

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Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

**CONTRACTOR AS PRINCIPAL**

**SURETY**

\_\_\_\_\_  
Contractor's Name and Corporate Seal *(seal)*

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

**By:** \_\_\_\_\_  
Signature

**By:** \_\_\_\_\_  
Signature *(attach power of attorney)*

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

**Attest:** \_\_\_\_\_  
Signature

**Attest:** \_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

**Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.**



1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. 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:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven 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 5.4, and the Owner refuses the payment 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.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of

the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 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 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction 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, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. 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 years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two 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 periods of limitations 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 address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location

where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

#### 14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for 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 Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

**SECTION 00 06 15  
PAYMENT BOND**

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

Calaveras County Water District  
120 Toma Court  
San Andreas, CA 95249

**CONSTRUCTION CONTRACT**

Effective Date of the Agreement:  
Amount:  
Description *(name and location)*:

**BOND**

Bond Number:  
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:  
Amount:  
Modifications to this Bond Form:     None     See Paragraph 18

---

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

**CONTRACTOR AS PRINCIPAL**

**SURETY**

\_\_\_\_\_ *(seal)*  
Contractor's Name and Corporate Seal

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

**By:** \_\_\_\_\_  
Signature

**By:** \_\_\_\_\_  
Signature *(attach power of attorney)*

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

**Attest:** \_\_\_\_\_  
Signature

**Attest:** \_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

**Notes:** (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
  - 5.1 Claimants who do not have a direct contract with the Contractor,
    - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
      - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
    - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
  6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
  7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
    - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
    - 7.2 Pay or arrange for payment of any undisputed amounts.
    - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
  8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
  9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction

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 Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work including, but not limited to, costs to repair or replace Contractor's defective work, and any amounts owed to Owner, including amounts owed for damages Owner incurred, or for liquidated damages.

10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, 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.
13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be

deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

## 16. Definitions

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has the right to assert a stop notice or bond claim as provided in the California Civil Code. The intent of this Bond shall be to include

without limitation in the terms of “labor, materials, or equipment” that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction 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.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

**SECTION 00 06 25  
CERTIFICATE OF SUBSTANTIAL COMPLETION**

Owner:	CALAVERAS COUNTY WATER DISTRICT	Owner's Contract No.: CIP #11122
Contractor:	_____	Contractor's Project No.:
Engineer:	Peterson Brustad, Inc.	Engineer's Project No.:
Project:	Copper Cove, C-Tank Booster Pump Station and Transmission Main Line	Contract Ref.:

**This [preliminary] [final] Certificate of Substantial Completion applies to:**

- All Work  The following specified portions of the Work:

**Date of Substantial Completion**

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. 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.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.]*

Amendments to Owner's responsibilities:  None  
 As follows

Amendments to Contractor's responsibilities:  None  
 As follows:

The following documents are attached to and made a part of this Certificate: *[Refer to attached Punch List]*

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract.

<b>EXECUTED BY ENGINEER:</b>	<b>RECEIVED:</b>	<b>RECEIVED:</b>
By: _____ (Authorized Signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

**SECTION 00 06 50  
MAINTENANCE BOND**

The CALAVERAS COUNTY WATER DISTRICT, State of California, on \_\_\_\_\_, 2025, awarded to \_\_\_\_\_ hereinafter designated as the "Principal", a Construction Agreement for the construction of the project

**COPPER COVE  
C-TANK BOOSTER PUMP STATION MODIFICATIONS AND TRANSMISSION LINE  
CCWD CIP #11122**

The Principal and \_\_\_\_\_ as Surety, are held and firmly bound unto **CALAVERAS COUNTY WATER DISTRICT**, in the amount of \_\_\_\_\_ Dollars (\$\_\_\_\_\_), which is equivalent to ten percent (10%) of the Construction Agreement amount, lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

The condition of this obligation is such that if the above bonded Principal, his or its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by, and well and truly keep and faithfully perform the covenants, conditions and agreements in the said Construction Agreement and any alterations made as therein provided, on his or their part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning and shall indemnify and save harmless, the CALAVERAS COUNTY WATER DISTRICT, its officers and agents as therein stipulated, then this obligation shall become null and void; otherwise, it shall be and remain in full force and virtue, and Principal and Surety, in the event suit is brought on this bond, will pay to the CALAVERAS COUNTY WATER DISTRICT such reasonable attorney's fees as shall be fixed by the court.

As a condition precedent to satisfactory completion of the said Construction Agreement, the above obligation in said amount shall hold good for a period of two (2) years after completion and acceptance of the said work, during which time if the above bonded Principal, his or its heirs, executors, administrators, successors or assigns shall fail to make full, complete, and satisfactory repair and replacements or totally protect the CALAVERAS COUNTY WATER DISTRICT from loss or damage made evident during said period of two (2) years from the date of acceptance of said work, and resulting from or caused by defective materials or faulty workmanship in the execution of the work done, the above obligation in the said sum shall remain in full force and effect. However, anything in this paragraph to the contrary notwithstanding, the obligation of the Surety thereunder shall continue so long as any obligation of the Principal remains.

The said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Construction Agreement or to the work to be performed thereunder or the specifications accompanying the same shall, in any way, affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Construction Agreement or to the work or specifications. Said Surety hereby waives the provisions of Sections 2819 and 2845 of the Civil Code of the State of California.



The above parties have executed this instrument under their seals on \_\_\_\_\_, \_\_\_\_\_, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

(SEAL)

\_\_\_\_\_  
Principal

\_\_\_\_\_  
Signature for Principal

\_\_\_\_\_  
Title of Signature

(SEAL)

\_\_\_\_\_  
Surety

\_\_\_\_\_  
Signature for Surety

\_\_\_\_\_  
Title of Signature

(SEAL AND NOTARIAL ACKNOWLEDGMENT OF SURETY)

**SECTION 00 07 00  
STANDARD GENERAL CONDITIONS OF THE  
CONSTRUCTION CONTRACT**

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## ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

### 1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term’s singular and plural forms, will have the meaning indicated in the definitions below. 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. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
  3. *Application for Payment*—The form acceptable to Engineer which is to be used by 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.
  4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
  5. *Bidder*—An individual or entity that submits a Bid to Owner.
  6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
  7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
  8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
  9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
  10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer’s decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer’s decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer has declined to address. A demand for money or services by a third party is not a Claim.
  11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute,

law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or “RPR” includes any assistants or field staff of Resident Project Representative.
33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals and the performance of related construction activities.
35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of



Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.

45. *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 but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *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; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

## 1.02 *Terminology*

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated 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 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 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 information in the Contract Documents and with the design concept of the 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 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 Article 10 or any other provision of the Contract Documents.
- C. *Day*:
  1. The word “day” means a calendar day of 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 Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).

- 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. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- F. Unless stated otherwise in the Contract Documents, words or phrases that 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. *Bonds:* When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance:* When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance:* After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

### *2.02 Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

### *2.03 Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:
  1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
  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 performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, 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 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
  1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
  2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
  3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

**ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, 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.

- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

### 3.02 *Reference Standards*

#### A. Standards Specifications, Codes, Laws and Regulations

1. Reference in the Contract Documents to standard specifications, manuals, reference standards, 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, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract 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, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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 part of the Contract Documents prepared by or for Engineer.

### 3.03 *Reporting and Resolving Discrepancies*

#### A. *Reporting Discrepancies:*

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

#### B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:

- a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); 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 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers 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 Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
  - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

**ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK**

4.01 *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 Contract 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 Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. 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 such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. 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 Owner. Contractor shall report to 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.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
  - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
  - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
  - 1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
  - 2. abnormal weather conditions;
  - 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
  - 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.

- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.
- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

**ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS**

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and 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. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

- A. *Limitation on Use of Site and Other Areas:*
  - 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor’s operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
  - 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all 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 Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor’s performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent 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 Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas 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 of Structures*: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
  - 1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
  - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
  - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor*: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:
  - 1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
  - 2. is of such a nature as to require a change in the Drawings or Specifications; 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;then 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 7.15), notify Owner and Engineer in writing about such condition.



Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
  - 1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
    - a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
    - 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 Paragraph 13.03; and,
    - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
  - 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
    - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
    - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
    - c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
  - 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
  - 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

#### 5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and

data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
  2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
    - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
    - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
    - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
    - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then 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 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.
- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
    - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
    - 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 Paragraph 13.03;
    - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and

- d. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
  1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
  2. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors 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. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, 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 (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.H shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, 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 failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

## **ARTICLE 6 – BONDS AND INSURANCE**

### *6.01 Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates

of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual’s authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner’s termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

#### 6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party’s full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party’s obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, 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.

- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation*: Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
  - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
  - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
  - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).
  - 4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered*: Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
  - 1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
  - 2. claims for damages insured by reasonably available personal injury liability coverage.
  - 3. 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 therefrom.
- C. *Commercial General Liability—Form and Content*: Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
  - 1. Products and completed operations coverage:
    - a. Such insurance shall be maintained for three years after final payment.
    - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
  - 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
  - 3. Broad form property damage coverage.
  - 4. Severability of interest.
  - 5. Underground, explosion, and collapse coverage.
  - 6. Personal injury coverage.

7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
  8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability*: Contractor shall purchase and maintain automobile liability insurance against 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. The automobile liability policy shall be written on an occurrence basis.
  - E. *Umbrella or excess liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
  - F. *Contractor's pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.
  - G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
  - H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
  - I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:
    1. include at least the specific coverages provided in this Article.
    2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
    3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
    4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
    5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by 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.

- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

- A. *Builder's Risk:* Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
  - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
  - 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
  - 3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
  - 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).
  - 5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
  - 6. extend to cover damage or loss to insured property while in transit.



7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
  8. allow for the waiver of the insurer's subrogation rights, as set forth below.
  9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
  10. not include a co-insurance clause.
  11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
  12. include performance/hot testing and start-up.
  13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

#### 6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, 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 insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, 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 Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, 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 Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, 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 Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by 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 Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.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 Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, 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 builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

**ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES**

7.01 *Supervision and Superintendence*

- A. 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. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. 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, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, 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, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work 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 Owner. If required by Engineer, 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.

7.04 *"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 Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item 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 is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
  - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, 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 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
      - 4) it is not objectionable to Owner.
    - b. 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.
- B. *Contractor's Expense:* Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
  2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
  3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
    - a. 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
      - 3) be suited to the same use as that specified.
    - b. will state:
      - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
      - 2) whether 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 Owner for other work on the Project) to adapt the design to the proposed substitute item, and
      - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
    - c. will identify:
      - 1) all variations of the proposed substitute item from that specified, and

- 2) available engineering, sales, maintenance, repair, and replacement services.
- d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.
- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.

- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. 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 the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be fully responsible to 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 Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.
- O. 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 Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
  - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

- A. 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 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 Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors 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 specified in the Contract Documents, but

not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, 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.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.10 *Laws and Regulations*

- A. 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 Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, 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 such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

#### 7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. 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, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. 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. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by 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 Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of 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 Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
- G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

#### 7.13 *Safety Representative*

- A. 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.

#### 7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.



7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if 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 Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

1. Before submitting a Shop Drawing or Sample, Contractor shall have:
  - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
  - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
  - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
  - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- 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 Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples:*

- a. Contractor shall submit the number of Samples required in the Specifications.
- b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.

3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- D. *Engineer's Review:*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. 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. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
  3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
  4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.
  5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
  6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
  7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.
  8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.
- E. *Resubmittal Procedures:*
1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
  2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
  3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. 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 Contractor is responsible; or
  - 2. normal wear and tear under normal usage.
- C. 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 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 Engineer or any payment related thereto by Owner;
  - 4. use or occupancy of the Work or any part thereof by Owner;
  - 5. any review and approval of a Shop Drawing or Sample submittal;
  - 6. the issuance of a notice of acceptability by Engineer;
  - 7. any inspection, test, or approval by others; or
  - 8. any correction of defective Work by Owner.
- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, 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 therefrom but only to the extent caused by any negligent act or omission of 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 Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.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 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 Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, 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
  - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. 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 Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- 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 specify all performance and design criteria that such services must satisfy. 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, 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 Engineer.
- 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, 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. 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 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

**ARTICLE 8 – OTHER WORK AT THE SITE**

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. 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. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

#### 8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
  - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
  - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
  - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

#### 8.03 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all 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 damage, delay, disruption, or interference.

## **ARTICLE 9 – OWNER'S RESPONSIBILITIES**

### 9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

### 9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

### 9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

### 9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

### 9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

### 9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

### 9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

### 9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

### 9.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor 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 Contractor to comply with Laws and

Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

**ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION**

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as 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 Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for 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, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, 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 Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. 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.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. 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, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.07 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by 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 Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. 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 Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. 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 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.



## ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

### 11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
1. *Change Orders:*
    - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
    - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
  2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.
  3. *Field Orders:* Engineer may authorize minor changes in the Work if the changes 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. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

### 11.02 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

### 11.03 *Unauthorized Changes in the Work*

- A. 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, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. 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, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
  - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
  - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).
- C. *Contractor's Fee*: When applicable, 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 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
    - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
    - 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 Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
    - d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
    - e. the amount of credit to be allowed by Contractor to 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 Contractor's fee by an amount equal to five percent of such net decrease; and
    - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

#### 11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.
1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
  2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
  3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

#### 11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. 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;
  2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
  3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
  4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety 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), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

**ARTICLE 12 – CLAIMS**

12.01 *Claims*

- A. *Claims Process:* The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
  - 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
  - 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
  - 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
  - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
  - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.
  - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval:* If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim:* If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days

of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

## **ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK**

### 13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
  2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. 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, and 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 Owner.
  2. 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 Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
  3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of 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 Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
  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 Contractor's employees incurred in discharge of duties connected with the Work.
  - b. 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 Contractor.
  - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by 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 Contractor is liable, as imposed by Laws and Regulations.
  - e. Deposits lost for causes other than negligence of 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 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 6.05), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of 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 communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
  - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in 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 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
4. Costs due to the negligence of 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 Paragraph 13.01.B.
- D. *Contractor's Fee*: When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.
- E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

#### 13.02 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*: Contractor agrees that:
  1. the cash allowances include the cost to 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
  2. 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*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

#### 13.03 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 comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
  1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;

2. there is no corresponding adjustment with respect to any other item of Work; and
3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

**ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- 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, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
  1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
  2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
  3. by manufacturers of equipment furnished under the Contract Documents;
  4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
  5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.



#### 14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

#### 14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

#### 14.05 *Uncovering Work*

- A. Engineer has the authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
  - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages 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 pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. 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, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or 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, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. 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 Contractor's defective Work.
- D. 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 Owner of Owner's rights and remedies under this Paragraph 14.07.

**ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD**

15.01 *Progress Payments*

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments:*
  1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by 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 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, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge 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.

C. *Review of Applications:*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of 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, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
  - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
  - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
  - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on 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 Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
  - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or

- e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
- 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
- 6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
  - a. the Work is defective, requiring correction or replacement;
  - b. the Contract Price has been reduced by Change Orders;
  - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
  - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
  - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due:*

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner:*

- 1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
  - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
  - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
  - c. Contractor has failed to provide and maintain required bonds or insurance;
  - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
  - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
  - f. the Work is defective, requiring correction or replacement;
  - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
  - h. the Contract Price has been reduced by Change Orders;
  - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
  - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

- k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
    - l. there are other items entitling Owner to a set off against the amount recommended.
  2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
  3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly

Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

#### 15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
  - 1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
  - 2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
  - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 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 6.05 regarding builder's risk or other property insurance.

#### 15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

#### 15.06 *Final Payment*

- A. *Application for Payment:*
  - 1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.
  - 2. The final Application for Payment shall be accompanied (except as previously delivered) by:
    - a. all documentation called for in the Contract Documents;
    - b. consent of the surety, if any, to final payment;
    - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
    - d. a list of all disputes that Contractor believes are unsettled; and

- e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. *Engineer's Review of Application and Acceptance:*
1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.
- C. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.
- D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one 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 Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such other adjacent areas;
  2. correct such defective Work;
  3. if the defective Work has been rejected by 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 to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. 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 repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

## **ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION**

### **16.01 *Owner May Suspend Work***

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

### **16.02 *Owner May Terminate for Cause***

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
1. 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);
  2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
  3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
  4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:



1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
  2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

#### 16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, 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; and
  3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

#### 16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure

within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

## **ARTICLE 17 – FINAL RESOLUTION OF DISPUTES**

### *17.01 Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
  - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
  - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
  - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
  - 2. agree with the other party to submit the dispute to another dispute resolution process; or
  - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

## **ARTICLE 18 – MISCELLANEOUS**

### *18.01 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, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
  - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

### *18.02 Computation of Times*

- A. When any period of time is referred to in the Contract 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.

### *18.03 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. 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.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

**SECTION 00 08 00  
SUPPLEMENTARY CONDITIONS**

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC No. C-700 (2013 Edition). All provisions which are not so amended or supplemented remain in full force and effect. The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof. The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

**SC-1.01.A.8 Add the following language to the end of Paragraph 1.01.A.8:**

The Change Order form to be used on this Project is EJCDC No. C-941 (Section 00840). Agency approval is required before Change Orders are effective.

**SC-1.01.A.48 Add the following language at the end of the last sentence of Paragraph 1.01.A.48:**

A Work Change Directive cannot change Contract Price or Contract Times without a subsequent Change Order.

**SC-1.01.A.49 Add the following new Paragraph after Paragraph 1.01.A.48:**

Abnormal Weather Conditions- Conditions of extreme or unusual weather for a given region, elevation, or season as determined by Engineer. Extreme or unusual weather that is typical for a given region, elevation or season should not be considered Abnormal Weather Conditions.

**SC-2.01 Delete Paragraphs 2.01 B. and C. in their entirety and insert the following in their place:**

*B. Evidence of Contractor's Insurance:* When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies of insurance (including all endorsements, and identification of applicable self-insured retentions and deductibles) required to be provided by Contractor in Article 6. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

*C. Evidence of Owner's Insurance:* After receipt from Contractor of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor copies of the policies of insurance to be provided by Owner under Article 6 (if any). Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

**SC-2.02.A Amend the first sentence of Paragraph 2.02.A to read as follows:**

Owner shall furnish to Contractor three copies of the Contract Documents (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF).

**SC-2.03 A.2 Add for preliminary schedule of submittals:**

The Contractor shall provide a preliminary submittal log and list of shop drawings for all equipment and materials to be furnished on the project; and any other submittals as may be specifically called for by the contract documents.

**SC-4.01.A Amend the last Paragraph of 4.01.A by striking out the following words:**

In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

**SC-4.04.A Add the following requirement for “look ahead” schedules:**

3. Not less than frequent than every two (2) weeks, the Contractor shall provide an updated three (3) week “look ahead” schedule that details in advance the activities scheduled to occur on the project in the subsequent three (3) week period; this schedule shall allow reasonable time for coordinating construction activities with required public and agency notifications, scheduling Owner’s personnel requirements, calling in advance for special inspection dates, and scheduling surveyors, technicians and other professionals necessary to monitor and facilitate the work. The Owner may hold progress payments if Contractor refuses to provide necessary “look ahead” schedules; these schedules are not necessary if Owner and Contractor agree no work will be occurring within a specific period.

**SC-5.03. Add the following new paragraphs immediately after Paragraph 5.03.B**

- C. In the preparation of Drawings and Specifications, Engineer relied upon the following reports of exploration and tests of subsurface conditions at the Site:
  1. Geotechnical Study (Refer to Appendix)
- D. In the preparation of Drawings and Specifications, Engineer relied upon the following drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilities) which are at or contiguous to the Site:
  1. There are no separate figures or drawings except as included in reports as referenced above.
- E. Copies of reports and drawings itemized in SC-5.03.C and SC-5.03.D that are not included with Bidding Documents may be examined at the office of the Calaveras County Water District, 120 Toma Court, San Andreas, CA 95249 / Phone: (209) 754-3543 during regular business hours (8:00 AM to 4:00 PM). These reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which the Contractor may rely as identified and established above are incorporated therein by reference. Contractor is not entitled to rely upon other information and data utilized by Engineer in the preparation of the Drawings and Specifications.

**SC-5.06. Delete Paragraphs 5.06.A and 5.06.B in their entirety and replace with following:**

- A. No reports or explorations or tests of Hazardous Environmental Conditions at or contiguous to the Site are known to the Owner or Engineer.

**SC-6.03. Add the following new paragraph immediately after Paragraph 6.03.J:**

- K. The limits of liability for insurance required by paragraph 6.03 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 coverages under paragraphs 6.03.A.1 and A.2 of the General Conditions:

a. State:	Statutory
b. Employer’s Liability	\$2,000,000
  2. Contractor’s *Commercial General Liability* under paragraphs 6.03.B and 6.03.C of the General Conditions:

a. General Aggregate	\$2,000,000
b. Products – Completed Operations Aggregate	\$2,000,000
c. Personal and Advertising Injury	\$2,000,000
d. Each Occurrence (Bodily Injury & Property Damage)	\$2,000,000
e. Excess or Umbrella Liability	
1) General Aggregate	\$2,000,000
2) Each Occurrence	\$2,000,000

3. *Automobile Liability* under paragraph 6.03.D 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) coverages where applicable.
5. Contractual Liability coverage required by paragraph 6.03.C.2 of the General Conditions shall be provided as part of the *Commercial General Liability* coverage.
6. The Owner and Engineer (including all their designated officers, employees, representatives and agents) are to be included as additional insureds including but not limited to:
  - a. Calaveras County Water District
  - b. County of Calaveras / Encroachment Permit
  - c. Peterson Brustad, Inc / Civil Engineering
  - d. HELIX Environmental Planning, Inc. / Environmental Scientists
  - e. Psomas / Survey
  - f. Condor Earth / Geotechnical Engineer (Clearwell Tank site only)
  - g. Tully Consulting Group / SWPPP
  - h. Resident Engineer/Resident Project Representative (as designated by Owner).

**SC-6.06 Delete paragraph 6.06B. and 6.06C. in its entirety.**

**SC-7.03-A Add the following requirement at end of paragraph 7.03-A.**

For construction water on this project, the Contractor shall rent a fire hydrant meter(s) from the District and meter all construction water use. The Contractor is responsible for securing hydrant meter(s) and preventing any loss or damage to them. While all construction water is to be metered by the Contractor, the rental charges will be reimbursed by Owner and there will be no charges for project construction water use. Contractor will be responsible for replacing lost or damaged meters.

**SC-7.04.A Amend the third sentence of the paragraph by striking out the following words:**

Unless the specification or description contains or is followed by words reading that no like, equivalent, or “or-equal” item is permitted.

**SC-7.04.A.1 Amend the last sentence of Paragraph a.3 by striking out “and:” and adding a period at the end of Paragraph a.3.**

**SC-7.04.A.1 Delete paragraph 7.04.A.1.a.4 in its entirety.**

**SC-7.06.A Amend Paragraph 7.06.A by adding the following text to the end of the Paragraph:**

The Contractor shall not award work valued at more than fifty percent of the Contract Price to Subcontractor(s), without prior written approval of the Owner.

**SC-7.06.B Delete Paragraph 7.06.B in its entirety.**

**SC-7.08 Amend Paragraph 7.0 8 by adding the following text to the end of the Paragraph:**

For encroachments on County roads, the Contractor shall obtain permits except the District will pay direct governmental charges and inspection fees. In submitting a bid, the Contractor shall fully assess encroachments and traffic control needs and include associated costs in the bid items.

**SC-7.11.A Amend Record Documents as follows:**

The Contractor shall maintain in a safe place at the Site one printed record copy (or in electronic format on a laptop computer or tablet device) of all Drawings, Specifications, Addenda, Change Orders, Work Change

Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and neatly and accurately annotated in red ink to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference in the field. Owner may require that copies of markups and annotations on drawings be submitted along with monthly progress payment requests to allow Owner to incorporate changes in to the record drawings. Upon completion of the Work, Contractor shall deliver copies of all remaining record documents to Engineer that are not previously submitted.

**SC-7.18 Replace Paragraph 7.18 in entirety with the following text:**

*Indemnification*

To the fullest extent permitted by law, Contractor shall indemnify, defend, and hold harmless Owner, and any of their agents and consultants, and each of their directors, officers, agents, and employees (“Indemnitees”) for any actual or alleged damage or losses relating to or arising out of Contractor’s performance under this Contract or in any way relating to the Work. Contractor’s defense and indemnity obligation shall include, but not be limited to, Contractor indemnifying, defending, and holding Indemnitees harmless from all actual or alleged liability, claims, damages, losses, expenses, and other costs, including costs of defense and attorneys’ and expert fees, arising out of or resulting from or in connection with the performance of the Work, both on and off the project site. However, Contractor shall not be liable for any such claims, damages, losses, expenses, liability and other costs that are caused by the sole negligence, willful misconduct, or active negligence of Indemnitees.

In any and all claims against the Indemnitees by any employee of Contractor, any Subcontractor, any supplier, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligations under this Agreement shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor, or any Subcontractor, or any Supplier or other person under Worker’s Compensation acts, disability benefit acts, or other employee acts.

Additionally, Contractor shall defend, indemnify, and hold Indemnitees harmless from and against: (1) any and all claims, liabilities, loss, damage, costs, or expenses, including reasonable attorneys' fees, awards, and judgments, arising by reason of any claims, liens, stop notices, or bond claims for labor, materials, or equipment used or furnished to be used in connection with the Work, or union trust fund payments arising from or relating to the Work, and (2) all incidental or consequential damages resulting to Owner from such claims, liens, stop notices or bond claims. Contractor shall cause the effect of any such claim, suit, stop notice, or lien to be removed from the Project within ten days after written demand to do so is made by Owner. If Contractor fails to do so, Owner may use whatever means it deems appropriate to cause the suit, stop notice or lien to be removed or dismissed. All resulting cost and expense incurred by Owner shall be immediately due and payable to Owner by Contractor.

**SC-7.20 Add the following new Paragraph after Paragraph 7.19.**

Contractor shall either provide electronic transmittal or provide three (3) printed copies of each submittal; one (1) copy to be returned with Engineer’s comments. Submittals shall be organized, securely bound, accompanied by a transmittal, and systematically numbered and titled adding postscript letters “A”, “B” or “C” for each subsequent resubmittal. Shop drawings containing unrelated items are not acceptable unless taken together comprise a manufacturer’s package or closely related scope of supply. Contractor may fax or email information with approval of Engineer. Engineer will complete review and return comments for each submittal or resubmittal within seven (7) to fourteen (14) days and up to thirty (30) days if more complex (e.g. electrical equipment, process equipment, structural systems). Engineer will return comments marked with one course of action to be carried out by Contractor as follows:

- A. No Exceptions Taken: Shop drawing is approved to be furnished as submitted
- B. Furnish As Noted: Shop drawing is approved and resubmittal is not required given that the Contractor makes corrections as noted by Engineer’s comments.
- C. Revise & Resubmit: Shop drawing is not approved by the Engineer; Contractor shall resubmit the shop drawing after revising information according to Engineer’s comments.

- D. Rejected/Resubmit: Shop drawing rejected because Engineer finds it materially differs from specifications and contract requirements; Contractor is to verify requirements and resubmit shop drawing accordingly.

**SC-10.03. Add the following language at the end of paragraph 10.03:**

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-11.06.A Amend the first sentence of Paragraph 11.06.A. to read as follows:**

*Procedures:* Contractor shall submit each Change Proposal to the Engineer prior to commencing any work for which Contractor believes it is entitled to an adjustment in Contract Time or Contract Price. If the need for an adjustment in Contract Time or Contract Price arises after the scope of work has commenced then Contractor shall notify Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision.

**SC-11.07.C Add the following new Paragraph after Paragraph 11.07.B:**

All Contract Change Orders must be concurred in by Agency before they are effective.

**SC-13.02.C Delete Paragraph 13.02.C in its entirety.**

**SC-15.01.B Replace Paragraph 15.01.B in entirety with the following text:**

*B. Applications for Payments*

1. Applications for Payment shall indicate the percentage of completion of each portion of the Work as of the end of the period covered by the application for payment.
2. Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

Take that portion of the Contract Price properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Price allocated to that portion of the Work in the schedule of values, less retainage of five percent ( 5% );

Add that portion of the Contract Price properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less five percent (5%) retainage;

Subtract the aggregate of previous payments made by the Owner.

3. Each Application for payment shall be in such form and contain such information and substantiation of the portion of the Contract Price allocable to the portion of the Work covered thereby as herein required and as the Owner may reasonably require, and shall, include, without limitation, the following:

(a) A lien waiver in compliance with the requirements of California Civil Code Section 8132 from Contractor and from each Subcontractor and vendor of any tier for the Work and materials that are subject of the Application for Payment and that matches invoice amount. The lien waiver may be conditioned upon receipt of the payment applied for less applicable retention.

(b) An unconditional lien waiver in compliance with the requirements of California Civil Code Section 8134 from Contractor and from each Subcontractor and vendor of any tier covering Work and materials which covers all previous Applications for Payment.



(c) Contractor's certification that the Work covered by the Application for Payment has been completed in accordance with the Contract Documents and all applicable laws.

(d) A detailed, current lien release log, listing all lien releases (both conditional and unconditional) provided to date by Contractor, Subcontractors and Vendors listing the individual amounts by pay period and the total received by each.

(e) A detailed, current change order log that includes all potential, approved and voided change orders.

(f) An updated overall Project schedule for review and approval by the Owner. The update should include all activities with percent completes through the current pay period. Any logic changes should be clearly identified with a detailed explanation and list of reasons for each change.

4. The Contractor warrants and guarantees that title to all Work, materials and equipment covered by an application for payment, whether incorporated in the Project or not, will pass to the Owner upon receipt of such payment by the Contractor free and clear of all liens, claims, security interests or encumbrances, hereinafter referred to as "liens."

5. The Owner's progress payment, occupancy or use of the Project, whether in whole or in part, shall not be deemed an acceptance of any Work not conforming to the requirements of the Contract Documents.

**SC-15.01.D.1 Delete Paragraph 15.01.D.1 in its entirety and insert the following in its place:**

The Application for Payment with Engineer's recommendation will be presented to the Owner and Agency for consideration. If both the Owner and Agency find the Application for Payment acceptable, the recommended amount less any reduction under the provisions of Paragraph 15.01.E will become due thirty (30) days after the Application for Payment is presented to the Owner, and the Owner will make payment to the Contractor.

**SC-15.02.A Amend Paragraph 15.02.A by striking out the following text:**

"no later than seven days after the time of payment by Owner" and insert "no later than the time of payment by Owner."

**SC-15.06.A.3 Delete the language in Paragraph 15.06A.3. in its entirety and replace the paragraph with the following language:**

Before issuance of final payment, Contractor must provide to the Owner satisfactory evidence that all payrolls, materials bills and other indebtedness connected with the Work have been paid or otherwise satisfied.

**SC-19 Add Article 19 titled "FEDERAL REQUIREMENTS"**

**SC 19.03 Conflict of Interest**

A. 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. Owner's officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when: (i) the employee, officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest in Contractor. Owner's officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from Contractor or subcontractors.

**SC 19.04 Gratuities**

A. If Owner finds after a notice and hearing that Contractor, or any of Contractor's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of Owner or 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, Owner may, by written notice to Contractor, terminate this Contract. Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which Owner bases such findings shall be an issue and may reviewed in proceedings under the dispute resolution provisions of this Contract.

B. In the event this Contract is terminated as provided in paragraph 19.04.A, Owner may pursue the same remedies against Contractor as it could pursue in the event of a breach of this Contract by Contractor. As a penalty, in addition to any other damages to which it may be entitled by law, Owner may pursue exemplary damages in an amount (as determined by Owner) which shall not be less than three nor more than ten times the costs Contractor incurs in providing any such gratuities to any such officer or employee.

#### **SC-19.05      Audit and Access to Records**

A. Owner, Agency, the Comptroller General of the United States, or any of their duly authorized representatives shall have access to any books, documents, papers, and records of the Engineer which are pertinent to the Agreement, for the purpose of making audits, examinations, excerpts, and transcriptions. Engineer shall maintain all required records for three years after final payment is made and all other pending matters are closed.

#### **SC- 19.06      Small, Minority and Women’s Businesses**

A. For projects that receive funding from USDA Rural Development or other Federal sources. If Contractor intends to let any subcontracts for a portion of the work, 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 for 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) Contractor is encouraged to procure goods and services from labor surplus area firms.

#### **SC-19.07      Anti-Kickback**

A. Contractor shall comply with the Copeland Anti-Kickback Act (18 U.S.C. 874 and 40 U.S.C. 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 and Grants of the United States.”) The Act provides that 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. Owner shall report all suspected or reported violations to Agency.

#### **SC-19.08      Clean Air and Pollution Control Acts**

A. If this Contract exceeds \$100,000, Compliance with all applicable standards, orders, or requirements issued under section 306 of the Clean Air Act (42 U.S.C. 1857(h) and 42 U.S.C. 7401 et.seq.), section 508 of the Clean Water Act (33 U.S.C. 1368) and Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR part 15) is required. Contractor will report violations to the Agency and the Regional Office of the EPA.

#### **SC-19.09      State Energy Policy**

A. Contractor shall comply with the Energy Policy and Conservation Act (P.L. 94-163) and utilize mandatory standards and policies relating to energy efficiency, contained in any applicable State Energy Conservation Plan.

#### **SC-19.10      Equal Opportunity Requirements**

- A. This contract does not mandate specific equal opportunity goals or quotas.

#### **SC-19.11 Restrictions on Lobbying**

A. Contractor and each subcontractor shall comply with Restrictions on Lobbying (Public Law 101-121, Section 319) 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, 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 31 U.S.C. 1352. 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 Owner.

#### **SC-19.12 Environmental Requirements**

When constructing a project involving trenching and/or other related earth excavations, Contractor shall comply with the following environmental constraints:

- A. Wetlands - When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert wetlands.
- B. Floodplains - When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert 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.
- C. Historic Preservation - Any excavation by Contractor that uncovers an historical or archaeological artifact shall be immediately reported to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further direction issued by Agency after consultation with the State Historic Preservation Officer (SHPO).
- D. Endangered Species - Contractor shall comply with the Endangered Species Act, which provides for 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 Contractor, Contractor will immediately report this evidence to Owner and a representative of Agency. Construction shall be temporarily halted pending notification process and further directions issued by Agency after consultation with the U.S. Fish and Wildlife Service.
- E. Mitigation Measures - If the project had an Environmental Report, Environmental Assessment, or Environmental Impact Statement to meet Federal NEPA or State CEQA environmental requirements, compliance with the mitigation measures, if any, in that document are hereby included as a condition of this contract.
- F. The contractor is required to comply with the environmental permits and documents listed below.
  - 1. Initial Study/Mitigated Negative Declaration and adopted Mitigation, Monitoring and Reporting Plan (adopted Mitigation, Monitoring and Reporting Plan included in Appendix).
  - 2. Construction General Permit 2022-0057-DWQ for Storm Water Discharges Associated with Construction and Land Disturbance  
[https://www.waterboards.ca.gov/water\\_issues/programs/stormwater/construction/docs/2022-0057-dwq-with-attachments/cgp2022\\_order.pdf](https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction/docs/2022-0057-dwq-with-attachments/cgp2022_order.pdf)

3. Statewide Low Risk General Order 2003-0003-DWQ for Discharges to Land (e.g. construction dewatering of excavations) with a Low Threat to Water Quality or Low Risk Waiver R5-2013-0145 [www.waterboards.ca.gov/board\\_decisions/adopted\\_orders/water\\_quality/2003/wqo/wqo2003-0003.pdf](http://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2003/wqo/wqo2003-0003.pdf)

4. Central Valley Regional Water Quality Control Board, Low or Limited Threat General NPDES Permit [https://www.waterboards.ca.gov/centralvalley/board\\_decisions/adopted\\_orders/general\\_orders/r5-2022-0006-01.pdf](https://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2022-0006-01.pdf)

**SC-20 Add the following new paragraph: “ARTICLE 20 - PROJECT SIGN”**

**SC-20.01** Contractor will place a temporary construction project sign at a location designated by the Engineer. This sign measuring 4' x 8', will be made of 3/4" exterior grade plywood and adhere to the format and details given in Section 00810. The sign will be prepared by a professional sign maker.

**SC-21 Add Article 21 titled “CALIFORNIA STATE REQUIREMENTS”**

**SC-21.01** This project is a “public works” project as defined in California Labor Code Section 1720 through 1743. In accordance with California Labor Code Article 1725.5, Contractor and all subcontractors are required to be registered with the California Department of Industrial Relations (DIR) in order to bid or be listed on a bid and/or work on a public works project.

**SC-21.02** Specific contract clauses mandated by Department of Industrial Relations (DIR):

- A. Every Contractor [*and subcontractor*] will be required to secure the payment of workers compensation to his or her employees conforming to Labor Code Section 1860.
- B. The Contractor shall post the applicable prevailing wage rate on the project site according to Labor Code Section 1771.4.

**SC-21.03** 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.

**SC-21.04** Prevailing Wages: Notice is hereby given that, pursuant to Section 1773 of the Labor Code of the State of California, the Owner has obtained from the Director of the Department of Industrial Relations the general prevailing rate of per diem wages and the general prevailing rate for holidays and overtime work for each craft, classification, or type of worker required to execute the Contract. A copy of said prevailing rate of per diem wages is on file in the principal office of the Owner, to which reference is hereby made for further particulars. Said prevailing rate of per diem wages will be made available to any interested party upon request, and a copy thereof shall be posted at each job site.

**SC-21.05** Statutory Penalty for Failure to Pay Minimum Wages: In accordance with Section 1775 (a) through (c) 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 not more than two hundred dollars (\$200.00) for each calendar day or portion thereof, for each worker paid less than the prevailing wage rates as determined by the director for the work or craft in which the worker is employed for any public work done under the contract by the contractor or, except as provided in subdivision 1775 (b), by any subcontractor under the contractor.

**SC-21.06** Statutory Penalty for Unauthorized Overtime Work: In accordance with Section 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 respective contractor or subcontractor for each calendar day during which said worker is required or permitted to work more than 8 hours in any one calendar day and 40 hours in any one calendar week in violation of provisions of Sections 1810-1815 of the Labor Code.

- SC-21.06** Apprenticeship Requirements: Contractor agrees to comply with Sections 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 apprentice hour for each five 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 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.
- SC-21.07** Payroll Records: Contractor shall keep accurate payroll records in format specified by the Division of Labor Standards Enforcement. 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. Copies of 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. Contractor and subcontractors shall furnish and submit electronic certified payroll records directly to the Labor Commissioner, and duplicate copies available to Owner.
- SC-21.08** Contractor shall be responsible for marking all excavations and notifying Underground Service Alert (USA) North at least 48-hours before digging, and follow all other provisions of California Government Code Sections 4216 through 4216.9. Contractor shall maintain an active USA North ticket number for the entire duration of the excavation. The definition of “approximate location of subsurface installations” under government code Section 4216, is amended herein as “a strip of land not more than ~~24 inches~~ 36-inches on either side of the exterior surface of the subsurface installation and/or related trench/excavations limits.”
- SC-21.09** 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 relocating 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.
- SC-21.10** This project is subject to provisions of Assembly Bill 626 regarding resolution of change orders as set forth in Public Contract Code §9204.

**SECTION 00 08 10  
PROJECT SIGN**

For the duration of the construction project, the Contractor shall furnish and install at the job site for public view a temporary project sign on 3/4" APA rated A-B or A-C grade, exterior plywood panel with design shown below. The Contractor shall provide a submittal of the draft/proof for District approval. The District will be allowed the opportunity to revise and change the exact wording, text and logos before fabricating the sign. The sign background shall be painted white on both faces and colored logos and text shall appear on the smooth (A grade) face. Paints and other materials used for sign construction, text and logos shall be weather resistant and not sustain fading, cracking, chipping or other abrupt damage by normal exposure to rain, snow, sun UV exposure, etc. The sign shall be located as directed by the District and, if within highway right-of-way, only in locations authorized by Caltrans. The sign shall be supported and mounted on two 4x4 or 4x6 lumber posts 12-ft in length securely anchored and embedded into the ground. Upon completion of the project and notification by the District staff, the Contractor shall remove the project sign and wood posts and restore the ground surface to a good, prior condition.



**SECTION 00 08 20  
PAY REQUEST FORM**

**1.0 PURPOSE AND INTENDED USE OF THE DOCUMENT**

The Application for Payment is used to facilitate periodic progress payments to the Contractor for Work completed and for stored materials and equipment. This worksheet will be provided by Owner in Microsoft Excel format and Contractor shall complete the form when submitting monthly progress payments.

**2.0 APPLICATION FOR PAYMENT OVERVIEW**

This document was prepared in Microsoft Excel due to the number of calculations involved in the preparation of the Application for Payment. The application consists of a Summary worksheet, and 3 supporting worksheets: Lump Sum worksheet, Unit Price worksheet, and Stored Materials worksheet.

- 2.1 *Summary Worksheet* — calculates the amount to be paid to the Contractor at the end of each Application for Payment period. This calculation imports numbers from the supporting worksheets to determine the value of the Work completed and Stored Materials, calculate retainage, and deduct amounts previously paid to determine the amount the Contractor should be paid for the current application period. Application periods are typically one month; however, these periods may be extended when Contractor's efforts do not result in the billable completion of Work or storage of materials and equipment during the payment period.
- 2.2 *Lump Sum Worksheet* — calculates the total value for completed Work for which compensation is paid on a Lump Sum basis. The schedule of values included in this worksheet reflects a breakdown of lump sum Work items to which Contractor and Engineer have agreed, pursuant to Article 2 of the General Conditions. Costs for Stored Materials associated with lump sum items are included on this worksheet to calculate the total value for completed lump sum Work and associated Stored Materials. This total is exported to the Summary worksheet. Separate totals for Work Completed and for materials currently stored are also exported to the Summary worksheet for use in calculating the amount of retainage to be held for each.
- 2.3 *Unit Price Worksheet* — calculates the total value for completed Work for which compensation is paid on a Unit Price basis. The schedule of values included in this spreadsheet is typically a tabulation of Unit Price items from the Agreement. Costs for Stored Materials associated with unit price items are included in this worksheet to calculate the total value for completed Unit Price Work and associated Stored Materials. This total is exported to the Summary worksheet. Separate totals for Work Completed and for Materials Currently Stored are also exported to the Summary worksheet for use in calculating the amount of retainage to be held for each.
- 2.4 *Stored Materials Worksheet* — calculates the total value for materials and equipment that have been purchased and are being stored until they are incorporated into the Work. This worksheet adds materials and equipment to the worksheet as they are brought to the site and stored; such Stored Materials are then deducted from the Stored Materials worksheet total as they are incorporated into the Work, providing a running net value for the materials and equipment remaining in storage. The values of Stored Materials must be manually added to the Lump Sum or Unit Price line items. These do not automatically update when changes are made. The amount of materials remaining in storage is eligible for payment but must be tracked separately from Work completed since different retainage rates may apply to Work completed and Stored Materials.

### **3.0 INSTRUCTIONS FOR FILLING OUT THE PAYMENT APPLICATION FORM**

- 3.1 Project-specific information is to be entered in the top portion (header) of the Summary worksheet. This same information will automatically be copied to the other worksheets to complete the headers on all other worksheets.
- 3.2 Outside of the header, data can be entered in non-shaded cells when the sheet is protected. Cells shaded light blue contain equations that will automatically transfer data from other cells or make calculations to complete the worksheet. Altering any of these cells can result in errors in the Application for Payment. It is recommended that the worksheets be protected at all times unless alterations are deliberately being made to the Application for Payment form other than to enter data. See Paragraph 4.0 below for information on Protection of Worksheets.
- 3.3 Enter information regarding each item in the Lump Sum and/or Unit Price worksheets. For Lump Sum projects, each item should represent an item in the schedule of values prepared by the Contractor and approved by the Engineer/Owner, breaking down the Lump Sum amount into measurable components. For Unit Price contracts, use numbers from the Agreement as the schedule of values. Specific information on the data to be entered into each column may be seen by clicking on the header description for that column. Similar comments may be seen for cells in the "Totals" row that indicates how the number is calculated and where this number is exported to another part of the spreadsheet. See the Commentary for additional information.
- 3.4 The equations in the Summary worksheet use numbers imported from both the Lump Sum and Unit Price worksheets. Projects will typically either use the Lump Sum or the Unit Price worksheet, but some projects may use both. If one of the worksheets is not used, it should be hidden and not deleted. If it is deleted, Users will need to correct the equations in the Summary worksheet by unprotecting the worksheet and editing the equations. To hide a worksheet, right click on the worksheet tab at the bottom of the worksheet and select "Hide." To unhide a worksheet, right click on any worksheet tab and select "Unhide," and then select the worksheet to unhide and click "Okay." This same process may be used to hide these Guidelines for Use.

### **4.0 PROTECTION OF WORKSHEETS**

- 4.1 The cells in this Workbook that create the forms or contain equations have been coded to "lock" the cells that should not be altered. It is recommended that the Workbook be Protected (cells locked) at all times unless it is necessary to add or delete rows. Directions for adding and deleting rows are provided in the next section. Passwords can be used to lock the Protect / Unprotect settings on spreadsheets, however the worksheets in this workbook do not require a password.
- 4.2 To unprotect a worksheet, click on the "Review" menu tab at the top of Excel, then click "Unprotect Sheet." To protect a worksheet, click on the "Review" menu tab at the top of Excel, then click "Protect Sheet." This will open a dialog box in which the User is allowed to select protection options. It is recommended that only the top two checkboxes for "Select Locked Cells" and "Select Unlocked Cells" be checked. This will reset the protection for the Worksheet.



## **5.0 ADDING AND DELETING ROWS**

- 5.1 A limited number of blank rows are provided in the Lump Sum, Unit Price, and Stored Material worksheets. Additional rows may be added to these worksheets by the User. The first step in this process is to unprotect the worksheet as previously discussed. After the sheet is unprotected, move with caution to prevent inadvertently deleting any cells that contain equations. To insert a row, right click in the row heading at the left of the spreadsheet and select "Insert." A new row will be inserted at the location where the cursor was placed in the row heading. If more than one new row is desired, left click and drag the cursor to include the desired number of rows, right click in the selected row headings and then select "Insert." It is important that the line immediately above the "Totals" row not be included in the rows selected. Doing so will require that equations in the "Totals" row be adjusted. When rows are inserted, Excel automatically adjusts the equations to include the new rows, unless the row directly above the "Totals" row is also selected.
- 5.2 After new rows are inserted, it is important to copy a line from one of the original rows so correct formatting and equations are copied into each new row. To do this, select the row to be copied by clicking the cell in Column A and dragging the cursor to the last column in the table. Then select "Copy" from the menu or type CTRL+C to copy the cells. Excel will show that this row has been copied by showing a moving dashed line around the cells that are to be copied. Then select the new rows into which the information is to be copied as before and select Paste from the menu or type CTRL+V.
- 5.3 To delete an unused row, right click in the row heading on the left of the spreadsheet for the row to be deleted and select "Delete." The selected row will be deleted. If more than one row is to be deleted, left click and drag the cursor to the desired number of rows to be deleted and then right click to open the menu and select "Delete." Unlike the admonition on adding new rows, it is okay to delete the row just above the "Totals" row.
- 5.4 After rows have been added or deleted, it is important reset the worksheet protection.

## **6.0 SAVING FILES**

This file is provided as a Microsoft ® Excel Open XML workbook template (.xltx) to prevent this file from being inadvertently changed. When an application for payment is created for a specific project it should be saved as an Excel workbook (.xlsx) file. To do this, select Save As (F12), type in a new file name and select Excel Workbook (.xlsx) from the drop down Save As Type menu.

## **7.0 LICENSE AGREEMENT**

This document is subject to the terms and conditions of the License Agreement, 2018 EJCDC® Construction Series Documents. A copy of the License Agreement was furnished at the time of purchase of this document, and is available for review at [www.ejcdc.org](http://www.ejcdc.org) and the websites of EJCDC's sponsoring organizations.

**- END OF SECTION -**

**SECTION 00 08 30  
WORK CHANGE DIRECTIVE**

**Work Change Directive No.**

Date of Issuance: \_\_\_\_\_ Effective Date: \_\_\_\_\_  
Owner: Calaveras County Water District Owner's Contract No.: CIP #11122  
Contractor: \_\_\_\_\_ Contractor's Project No.: \_\_\_\_\_  
Engineer: Peterson Brustad, Inc. Engineer's Project No.: \_\_\_\_\_  
Project: C-Tank Booster Pump Station Modifications and Transmission Line Contract Name: \_\_\_\_\_

Contractor is directed to proceed promptly with the following change(s):  
Description:

Attachments: *[List documents supporting change]*

**Purpose for Work Change Directive:**

Directive to proceed promptly with the Work described herein, prior to agreeing to changes on Contract Price and Contract Time, is issued due to: *[check one or both of the following]*

- Non-agreement on pricing of proposed change.
- Necessity to proceed for schedule or other Project reasons.

**Estimated Change in Contract Price and Contract Times (non-binding, preliminary):**

Contract Price \$ \_\_\_\_\_ [increase] [decrease].  
Contract Time \_\_\_\_\_ days [increase] [decrease].

**Basis of estimated change in Contract Price:**

- Lump Sum  Unit Price
- Cost of the Work  Other

RECOMMENDED:	AUTHORIZED:	RECEIVED:
By: _____ Engineer (Authorized Signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable)

By: \_\_\_\_\_ Date: \_\_\_\_\_  
Title: \_\_\_\_\_

**SECTION 00 8 40  
CHANGE ORDER FORM**

**Change Order No.** \_\_\_\_\_

Date of Issuance:	Effective Date:
Owner: Calaveras County Water District	Owner's Contract No.: CIP #11122
Contractor:	Contractor's Project No.:
Engineer: Peterson Brustad, Inc.	Engineer's Project No.:
Project: C-Tank Booster Pump Station Modifications and Transmission Lines	Contract Name:

The Contract is modified as follows upon execution of this Change Order:

Description:

Attachments: *[List documents supporting change]*

<b>CHANGE IN CONTRACT PRICE</b>	<b>CHANGE IN CONTRACT TIMES</b> <i>[note changes in Milestones if applicable]</i>
Original Contract Price: \$ _____	Original Contract Times: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: \$ _____	[Increase] [Decrease] from previously approved Change Orders No. to No. ___: Substantial Completion: _____ Ready for Final Payment: _____ days
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] of this Change Order: \$ _____	[Increase] [Decrease] of this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for Final Payment: _____ days or dates

<b>RECOMMENDED:</b>	<b>ACCEPTED:</b>	<b>ACCEPTED:</b>
By: _____ Engineer (if required)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

Approved by Funding Agency

By: \_\_\_\_\_ Date: \_\_\_\_\_  
Title: \_\_\_\_\_

**SECTION 01 10 00  
SUMMARY**

**PART 1 - GENERAL**

**1.01 WORK UNDER CONTRACT**

- A. Furnish all labor, materials, equipment, and means to construct the project titled "C-Tank Booster Pump Station Modifications and Transmission Line" as shown on the Contract Drawings and described herein. Pricing shall be per the Contractor's submitted Bid Form.
- B. The Work to be performed under this Contract shall consist of furnishing all tools, equipment, materials, supplies, and manufactured articles and furnishing all labor, transportation, and services including fuel, power, water, and essential communications, and performing all Work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents.
- C. The Contractor shall perform all work necessary to construct and deliver to Calaveras County Water District (District) a complete Project conforming to these Contract Documents. Details not shown or provided in the Contract Drawings and Specifications, such as shop drawings, but required for a complete and operational Project, shall be provided by the Contractor for District approval.

**1.02 SUMMARY**

- A. The Project consists of the following work:
  - 1. Construction of approximately 12,000 LF of 20" ductile iron transmission main, connecting the Copper Cove Water Treatment Plant (WTP) booster pump station (BPS) (located at Kiva Place) to the C-Tanks (located at 2479 Charmstone Way). The pipeline includes connections to an existing 20" ductile iron transmission main at two locations.
  - 2. Installation of three (3) high-head pumps and piping at the BPS as indicated on the Drawings and specifications.
  - 3. Installation of Electrical, Instrumentation, and Controls associated with the high-head pumps as indication on the Drawings and specifications.

**1.03 PROJECT LOCATION**

- A. The Project is located at the Calaveras County Water District's Copper Cove Water Treatment Plant, 5130 Kiva Pl, Copperopolis, California 95228 and at the Copper Cove C Tank Site.

**1.04 WORK COVERED BY CONTRACT DOCUMENTS**

- A. The Work defined by the Contract Documents includes furnishing all labor, materials, equipment, services, testing and start-up, permits, temporary controls and construction facilities, and all general conditions, general requirements and incidentals required to complete the Work in its entirety as described in the Contract Documents. The Work includes demolition, site preparation, and modifications of existing facilities as outlined in Bid Items 1 through 9 as outlined in Section 01 20 00 - Price and Payment Procedures.

**1.05 SUPPLEMENTAL WORK REQUIREMENTS**

- A. Additional requirements that are brought to the Contractor's attention are:
  - 1. The District is not responsible for any local agency or utility permits required for temporary facilities during construction such as field office trailers and temporary electrical service for construction operations. Obtaining all such permits and the costs associated with such permits are the responsibility of the Contractor and shall be included in the Contractor's Bid Price.
  - 2. The 1972 amendments to the Federal Water Pollution Control Act established the National Pollutant Discharge Elimination System (NPDES) permit program to control discharges of pollutants from point sources. The 1987 amendments to the Clean Water Act (CWA) created a new section of the CWA devoted to storm water permitting (Section 402(p)). The EPA has delegated permitting authority to the State Water Resources Control Board

(SWRCB). The SWRCB issues both general and individual permits. Construction activities are regulated under the NPDES General Permit for Storm Water Discharges Associated with Construction Activity (General Permit). The appropriate Regional Water Quality Control Board (RWQCB) enforces the General Permit. This Project does not require a General Permit, NOI, or a Water Pollution Control Program (WPCP). The Engineer to provide a Stormwater Pollution Prevention Plan (SWPPP) to Contractor. The SWPPP is included in the Appendix.

3. Contractor shall provide a fuel storage and refueling plan for supplying fuel to equipment and portable generators. Material Safety Data Sheets for all substances used shall be maintained on the job site as required by the Hazard Communication Law, General Industry Safety Orders, Sec. 5194. Hazardous waste products shall be placed in proper containers and transported from the job site to an authorized Hazardous Waste Collection Site. Trucks and equipment shall be refueled as required from deliveries by a fuel truck. No fuel staging on site shall be allowed.
4. The Contractor shall maintain a secure project site 24 hours per day, every day beginning on the first day of construction and ending at Final Completion. The Contractor shall make adequate provisions for protection of the Work against fire, theft, vandalism and for the protection of public against exposure to injury. It will be necessary for the Contractor to remove the existing site fencing for construction of the new improvements. The Contractor's operations shall not reduce the current level of protection and security. When the existing fences are removed, an equivalent temporary means of perimeter protection shall be provided until new wall construction is complete. If in the opinion of the District, the Contractor is not taking adequate steps to secure the site, the Design-Builder will require that additional protective measures are immediately taken. The District shall not have any liability for loss of, and damage to, materials, tools, and equipment of the Contractor or of those employed by them, by contract or otherwise.
5. Other work such as Contractor obtained permits, material procurement, submittals, and Contractor-initiated survey and layout (beyond the survey mapping and control provided by District).
6. Site clean-up and demobilization to include removal of all temporary erosion controls, water bypass, site delineators, temporary facilities, equipment, material and construction waste from the project site.

#### **1.06 WORK BY OTHERS**

- A. The District and others may perform activities within Project area while the Work is in progress. Schedule the Work with the District and others to minimize mutual interference. Cooperate with others to minimize interference and delays. When cooperation fails, submit recommendations and perform Work in coordination with work of others as directed.

#### **1.07 UTILITY COORDINATION**

- A. Contractor is responsible to coordinate the field verification and location of all existing utilities, either known or unknown, with the respective utility owner. Contractor shall contact Underground Service Alert (USA) and obtain a ticket number in advance of commencing construction operations.

#### **1.08 LANDS FOR CONSTRUCTION PURPOSES**

- A. Contractor shall be solely responsible for making any other arrangements for the use of lands by the Contractor, whether inclusive or exclusive of the areas designated for Contractor's use. This shall not be construed as a guarantee that all uses and lands will be available for the Contractor's proposed use.
- B. The Contractor shall at no time restrict entrance or egress of adjacent Property Owner or District Personnel.
- C. The Contractor shall be responsible for providing all off-site lands and staging areas required for construction at its expense and in accordance with all Federal, State, and local ordinances

and codes.

- D. The Contractor shall be responsible for maintaining safe conditions and emergency exiting for the District's and Contractor's personnel and adjacent Property Owners in all areas affected by the Contractor's work.

#### **1.09 DOCUMENTING EXISTING CONDITIONS**

- A. Prior to commencement of the Work, the Contractor shall tour the site with the District and document existing conditions.
- B. The Contractor shall examine and document photographically and in writing the condition of existing structures, equipment, improvements, and landscape planting on or adjacent to the site and video tape the project work site including offsite water, sewer, storm drain, telephone and electrical service alignment and access. This record shall serve as a basis for determination of subsequent damage due to the Contractor's operations and shall be signed by all parties making the tour.
- C. Record existing conditions by making a minimum of 24 color photographs on digital electronic file and video as required. Contractor shall provide a copy of the digital electronic file to the District within 5 working days of site tour.

#### **1.10 CONNECTIONS TO EXISTING FACILITIES**

- A. The District intends to continue operation of any existing utilities during all of the construction period. The Contractor shall plan and schedule its work to minimize impacting the District's continued operations and shall, at all times, maintain safe access for the District's operating personnel and equipment.
- B. Contractor shall make all necessary connections to existing facilities, including structures and utilities. In each case, Contractor shall receive permission from the District prior to undertaking connections. Contractor shall protect facilities against deleterious substances and damage.
- C. Connections to existing facilities which are in service shall be thoroughly planned in advance, and all required equipment, materials, and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously (around the clock) if necessary to complete connections in the minimum time.
- D. Obtain District approval at least seven (7) days prior to the shutdown of service or operation of any existing utility.
- E. Schedule utility service or operations shutdowns for periods of minimum use and at the District's convenience. Have all required material, equipment and workers on site prior to beginning any work involving a possible shutdown. Perform work as required to reduce shutdown time to the minimum. In some cases, this may require increased numbers of workers and/or premium time night or weekend work. The Contractor's bid shall include the cost associated with additional workers and/or premium time night or weekend work.

#### **1.11 UNFAVORABLE CONSTRUCTION CONDITIONS**

- A. During unfavorable weather, wet ground, or other unsuitable construction conditions, Contractor shall confine his operations to work which will not be affected adversely by such conditions. No portion of the Work shall be constructed under conditions which would affect adversely the quality or efficiency thereof, unless special means or precautions are taken by Contractor to perform the Work in a proper and satisfactory manner.

#### **1.12 WORK SEQUENCE**

- A. Construction Plan: Before start of construction, submit 3 copies of construction plan regarding access to Work, use of Site, sequence of work, and utility outages for acceptance by District. After acceptance of plan, construction operations shall comply with accepted plan unless deviations are accepted by District in writing. Construction plan shall be in accordance with Section 01 14 00 - Work Restrictions.

- B. Work shall be performed according to the schedule at the end of this paragraph. The Contractor is encouraged to expand upon, suggest modification and adjust the schedule to improve construction sequencing. Any revisions to the following schedule shall require District review and approval. Some sequencing may be subject to change as dictated by plant operations staff due to unforeseeable weather and water demand changes. Work shall tentatively be performed as follows:
1. Construction of 20" ductile pipe transmission main from the WTP booster pump station to the C-Tanks.
    - a. Throughout transmission main construction remove existing trees, debris, and asphalt as needed. Repair roadways to previous condition.
    - b. Remove the blind flange from existing 20" DIP wye at station 1+04.6 at the WTP.
    - c. Construct new 20" DIP transmission main from station 1+04.6 to C--Tank site.
    - d. Install altitude valve with vault and bypass.
    - e. Tie-in to existing C-Tank site piping requires isolation of the C-Tanks from the system. C-Tanks may only be taken offline during winter months.
  2. Install three (3) new high-head pumps at the WTP booster pump station. Maintain at least two (2) booster pumps in service at all times pumping to B-Tanks.
    - a. Install new high-head pump in empty pump can #3.
    - b. Install electrical equipment and wiring, then perform startup and testing for Pump #3.
    - c. Take existing Pump #1 offline and remove Pump #1.
    - d. Install new high-head pump in pump can #1.
    - e. Install electrical equipment and wiring, then perform startup and testing for Pump #1.
    - f. Take existing Pump #2 offline and remove Pump #2.
    - g. Install new high-head pump in pump can #2.
    - h. Install electrical equipment and wiring, then perform startup and testing for Pump #2.
  3. Steps #1 and #2 above can be done simultaneously.
  4. Disinfect the new 20" DIP transmission main and prepare for start up in conjunction with the District to begin filling C-Tank directly from the WTP booster pump station.
  5. Install 6" altitude valve within the existing B-Tank Site vault.
    - a. Close valve 17 to isolate the B-Tank Inlet line.
    - b. Install new DIP and 6" altitude valve up to valve 23.
    - c. Close valve 18 to isolate the B-Tank to C-Tank transmission line.
    - d. Tie-in existing B-Tank to C-Tank transmission line to new B-Tank inlet line.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION - NOT USED**

**END OF SECTION 01 10 00**

**SECTION 01 14 00  
WORK RESTRICTIONS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. The Copper Cove Water Treatment Plant is a critical source of drinking water for the District. The existing facilities are operating under the terms of a Drinking Water Permit issued by the State of California Water Resources Control Board, Division of Drinking Water. This permit specifies the water quality limits that the District must meet prior to delivering treated water to consumers. The Contractor is to conduct work such that the District's ability to meet its customer demands for treated drinking water shall not be impaired or reduced in terms of the required quantity and quality of treated water. The Contractor's work must never prevent the District from complying with the drinking water requirements established by State and Federal regulations.
- B. The existing facility where Contractor's work is to be done will be occupied by the District throughout the construction period. The Contractor shall provide all necessary access to the District's personnel as required to operate/maintain the facilities safely and efficiently. At all times during the Contract duration, the Contractor is to provide the District's personnel and representatives safe and immediate access to all process control equipment. Additionally, the Contractor is to provide for unimpeded access for all delivery vehicles transporting materials, chemicals, and equipment to the facility for the District's operations.

**1.02 SUBMITTALS**

- A. Specification Section 01 33 00 - Submittal Procedures.
- B. The Contractor shall submit to the Construction Manager a detailed outage or bypass plan. The detailed plan shall meet the restrictions and conditions found in the Contract Documents. A System Outage Request (SOR) shall accompany each outage or bypass plan. The outage plans shall be coordinated with the construction schedule and shall meet the Contractor's planned method; the length of time required to complete said operation; any necessary temporary power, controls, instrumentation, or alarms required to maintain control, monitoring and alarms; and the manpower, plant, and equipment which the Contractor shall provide to ensure proper operation of affected facilities. In addition, the outage plan shall describe the Contractor's contingency plan that shall be initiated if its temporary facilities fail, or it becomes apparent that the time constraints described in the approved SOR cannot be met. The contingency plan shall conform to all specified outage requirements. All costs for preparing and implementing both the outage and contingency plans shall be borne by the Contractor.
- C. The Contractor shall attend a meeting with the Construction Manager and District 1 day before the scheduled outage to review the SOR. Any changes to the SOR must be approved by the Construction Manager and the District prior to the outage.

**1.03 INTERRUPTION OF FACILITY OPERATIONS**

- A. The Work shall be bid, scheduled, and constructed in such a manner as to result in the least possible disruption to the operations and staff of the existing facility. The Contractor must fully understand all possible reductions on facility production and/or water quality as they plan the Work.
- B. The Contractor shall note that not all valves and gates that may be used to isolate lines and facilities will completely seal. The Contractor shall allow for leakage in planning its work and may, with the District's concurrence, test certain valves and gates before work involving isolation is begun. Shutdown and isolation of existing facilities by closing existing valves/gates and operating electrical control panels, or as specifically provided for in the Contract Documents, will be performed by District personnel.



- C. Prior to any shutdown or flow diversion all materials, fittings, supports, equipment, and tools shall be on the site and all necessary skilled labor scheduled prior to starting any connection work. The Contractor shall provide staff following shutdowns to monitor and ensure the proper operation of systems.
- D. The Contractor shall program work so that service will be restored in the minimum possible time and shall cooperate with the District in reducing shutdowns of the utility to a minimum. No utility shall be disconnected without prior written approval from the utility owner and Construction Manager.
- E. Contractor shall provide written notice to the District 7 days before the proposed shutdown. Facility shutdowns will be for a maximum of 8 hours. Contractor must allow 48 hours between the end of one shutdown and the start of another shutdown. Contractors SOR for facility shutdown shall at a minimum include the following:
  - 1. Date, start time, and end time of proposed shutdown.
  - 2. What work will be performed and where on site this will occur.
  - 3. Detailed workplan on how the facilities will be removed and replaced within the allotted shutdown time.
  - 4. Time, date, and onsite location for meeting 1 day before proposed shutdown.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION - NOT USED**

**END OF SECTION 01 14 00**

**SECTION 01 30 00  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Coordination and Project conditions.
- B. Preconstruction meeting.
- C. Progress meetings.
- D. Closeout meeting.

**1.02 COORDINATION AND PROJECT CONDITIONS**

- A. Coordinate scheduling, submittals, and Work to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Contract Drawings. Follow routing shown for pipes, ducts, and conduit as closely as practical; place runs parallel with lines of building. Use spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
  - 1. Coordination Drawings: Prepare as required to coordinate all portions of Work. Show relationship and integration of different construction elements that require coordination during fabrication or installation to fit in space provided or to function as intended. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are important.
- C. Coordination Meetings: In addition to other meetings specified in this Section, hold coordination meetings with personnel and Subcontractors to ensure coordination of Work.

**1.03 PRECONSTRUCTION MEETING**

- A. Engineer will schedule and preside over meeting after Notice to Proceed.
- B. Attendance Required: Engineer, Owner, and Contractor.
- C. Minimum Agenda:
  - 1. Submission of executed bonds and insurance certificates.
  - 2. Distribution of Contract Documents.
  - 3. Submission of schedule of values and Progress Schedule.
  - 4. Designation of personnel representing parties in Contract and Engineer.
  - 5. Communication procedures.
  - 6. Procedures and processing of requests for interpretations, field decisions, field orders, submittals, substitutions, Applications for Payments, proposal request, Change Orders, and Contract closeout procedures.
  - 7. Scheduling.
  - 8. Critical Work sequencing.
- D. Engineer: Record minutes and distribute copies to participants within two (2) days after meeting, to District, Engineer, and Contractor, and those affected by decisions made.

**1.04 PROGRESS MEETINGS**

- A. Schedule and administer meetings throughout progress of the Work at maximum weekly intervals.
- B. Construction Manager will arrange meetings, prepare agenda with copies for participants, and preside over meetings.
- C. Attendance Required: Engineer, Owner, Job superintendent, Construction manager, and major Subcontractors as appropriate to agenda topics for each meeting.
- D. Minimum Agenda:

1. Review minutes of previous meetings.
  2. Review of Work progress.
  3. Field observations, problems, and decisions.
  4. Identification of problems impeding planned progress.
  5. Review of submittal schedule and status of submittals.
  6. Review of off-Site fabrication and delivery schedules.
  7. Maintenance of Progress Schedule.
  8. Corrective measures to regain projected schedules.
  9. Planned progress during succeeding work period.
  10. Coordination of projected progress.
  11. Maintenance of quality and work standards.
  12. Effect of proposed changes on Progress Schedule and coordination.
  13. Other business relating to Work.
- E. Construction Manager: Record minutes and distribute copies to participants within 2 days after meeting to Engineer and District, and those affected by decisions made.

#### **1.05 CLOSEOUT MEETING**

- A. Schedule Project closeout meeting with sufficient time to prepare for requesting Substantial Completion. Preside over meeting and be responsible for minutes.
- B. Attendance Required: Engineer, Owner, Construction manager, and Contractor.
- C. Notify Engineer 5 days in advance of meeting date.
- D. Minimum Agenda:
  1. Start-up of facilities and systems.
  2. Operations and maintenance manuals.
  3. Testing, adjusting, and balancing.
  4. System demonstration and observation.
  5. Operation and maintenance instructions for District's personnel.
  6. Contractor's inspection of Work.
  7. Contractor's preparation of an initial "punch list."
  8. Procedure to request Engineer inspection to determine date of Substantial Completion.
  9. Completion time for correcting deficiencies.
  10. Inspections by authorities having jurisdiction.
  11. Certificate of Occupancy and transfer of insurance responsibilities.
  12. Partial release of retainage.
  13. Final cleaning.
  14. Preparation for final inspection.
  15. Closeout Submittals:
    - a. Project record documents.
    - b. Operating and maintenance documents.
    - c. Operating and maintenance materials.
    - d. Affidavits.
  16. Final Application for Payment.
  17. Contractor's demobilization of Site.
  18. Maintenance.
- E. Construction Manager: Record minutes and distribute copies to participants within 2 days after meeting to District, Engineer, and Contractor, and those affected by decisions made.

#### **PART 2 - PRODUCTS - NOT USED**

#### **PART 3 - EXECUTION-NOT USED**

**END OF SECTION 01 30 00**

**SECTION 01 31 26**  
**WEB BASED CONSTRUCTION DOCUMENT MANAGEMENT**

**PART 1 WEB DATABASE**

**1.01 SUMMARY**

- A. The project team will use and maintain a web-based database as the primary means of communication related to the Project's correspondence, submittals, requests for information (RFIs), advisory notices, and non-compliance issues. Correspondence from the Contractor shall be sent to the Construction Manager via the District's web-based database Program.
- B. The Construction Manager and Contractor shall utilize the District's web-based database system for electronic submittal of all data and documents (unless specified otherwise by the Construction Manager) throughout the duration of the Contract. The web-based database will be a web-based electronic media site that is hosted by the District. The web-based database will be made available to all Contractor's project personnel. The joint use of this system is to facilitate; electronic exchange of information, automation of key processes, and overall management of the Contract. The web-based database shall be the primary means of project information submission and management. When required by the Construction Manager, paper documents will also be required. In the event of discrepancy between the electronic version and paper documents, the paper documents will govern.

**1.02 USER ACCESS LIMITATIONS**

- A. The Construction Manager will control the Contractor's access to the web-based database by allowing access and assigning user profiles to accepted Contractor personnel. User profiles will define levels of access into the system; determine assigned function-based authorizations (determines what can be seen) and user privileges (determines what they can do).

**1.03 AUTOMATED SYSTEM NOTIFICATION AND AUDIT LOG TRACKING**

- A. Review comments made (or lack thereof) by the Construction Manager and Engineer on Contractor submitted documentation shall not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for managing, tracking, and documenting the Work to comply with the requirements of the Contract Documents. The Construction Manager's acceptance via automated system notifications or audit logs extends only to the face value of the submitted documentation and does not constitute validation of the Contractor's submitted information.

**1.04 CONTRACTOR RESPONSIBILITY**

- A. The Contractor shall be responsible for the validity of their information placed in the web-based database and for the abilities of their personnel. Accepted users shall be knowledgeable in the use of computers, including Internet Browsers, email programs, CAD drawing applications, and Adobe Portable Document Format (PDF) document distribution program. Adobe PDF documents will be created through electronic conversion rather than optically scanned whenever possible.

**1.05 USER ACCESS ADMINISTRATION**

- A. Provide a list of Contractor's key web-based database personnel for the Construction Manager's acceptance. The Construction Manager is responsible for adding and removing users from the system. The Construction Manager reserves the right to perform a security check on all potential users.

**1.06 TRAINING**

- A. The Construction Manager has arranged for the following training to be provided to the Contractor. The Construction Manager will provide a one-hour training class to the Contractor within ten (10) days of NTP at a time mutually agreeable to Contractor and Construction Manager. Thereafter the Construction Manager will provide up to one hour of additional training via telephone during the project per month of the project life.

## **PART 2 EQUIPMENT**

### **2.01 SUMMARY**

- A. In order to process correspondence, submittals, and RFIs, the Contractor must provide and have in place for its own use the required basic components outlined below.

### **2.02 HARDWARE**

- A. A computer with internet access and sufficient capabilities to perform all project duties; a scanner at least large enough to scan 11" x 17" sheets with sufficient resolution to maintain clarity and legibility of the document at its native size; and a color printer of sufficient size and capacity to accept incoming correspondence as described in this section.

### **2.03 SOFTWARE**

- A. Adobe Acrobat 9 or higher; Microsoft's Internet Explorer v7 or higher; Microsoft Office 2003 or higher, including but not limited to Microsoft Word and Microsoft Excel.

### **2.04 FACILITIES**

- A. The Contractor shall make its own arrangements to provide high-speed (minimum speed: download 256Mbps / upload 10Mbps) internet connection for its own use as soon as practicable.

## **PART 3 EXECUTION**

### **3.01 SUMMARY**

- A. Items to be uploaded to the web-based database by the Construction Manager include but are not limited to: RFI responses, Submittal comments, Clarification letters, Design Clarifications, Field Orders, et al. These items will be emailed as attachments in PDF file format. These attachments may include files that need to be viewed and/or printed in color. Formal letters, stop notices, Field Orders, Progress Payment Requests, and Contract Change Orders will always include a wet-signed hard copy.

### **3.02 PROCORE UTILIZATION**

- A. All project related correspondence (RFIs, submittals, etc.) originated by the Contractor or Subcontractor, Supplier, et al. shall be directed to the Construction Manager, unless otherwise indicated in the Specifications.

### **3.03 SUBMITTALS**

- A. The use of the electronic communication does not waive the requirement for the provision of hard copies of all formal correspondence and submittals. The hard copies of all documents must match the electronic copies of all correspondence and submittals.
- B. Submittals shall be in accordance with Section 01 33 00, Submittal Procedures. The provisions of Section 01 33 00 shall apply both to electronic copies and hard copies of submittals.
- C. In addition to above, the web-based database shall be utilized in connection with submittal preparation and information management required by but not limited to Sections:
  1. Section 01 32 16 – Construction Progress Schedules and Reports.
  2. Section 01 33 00 – Submittal Procedures.
  3. Section 01 78 23 – Operation and Maintenance Data
- D. The web-based database will be utilized by all other Sections not listed above and as required by the Construction Manager.

### **3.04 TERMINATION IN USE**

- A. The District may request a termination of the use of the web-based database for the electronic submission of data, and alternatively the use of paper documents submitted in accordance with the Contract Documents by providing notification in writing with ten (10) days notice that it intends to discontinue use of the web-based database.

### **3.05 LABELING FORMAT**

- A. The subject line of each email, and the file name of any attached files shall begin with the file labeling scheme:
  - 1. RFI\_XXX.Y\_(Contractor Name)\_(Subject).
  - 2. Letter\_XXX\_(Contractor Name)\_(Subject).
  - 3. Transmittal\_XXX\_(Contractor Name)\_(Subject).
  - 4. PCO\_XXX.Y\_(Contractor Name)\_(Subject).
  - 5. Submittal\_XX XX XX-YY-Z\_(Contractor Name)\_(Subject).
- B. The first section of the label indicates the type of correspondence (i.e RFI). "XXX" indicates a unique number, sequentially assigned for the given piece of correspondence. "Y" is a sequential letter assigned for revised or resubmitted documents, i.e. A, B, or C being the 1st, 2nd, and 3rd revision or resubmittal, respectively. "(Contractor Name)" indicates to the database that the correspondence is from the Contractor. The Contractor will indicate the subject at the end of the numbering scheme. For submittals, XX XX XX denotes the Specification Number, YY denotes the sequential number of submittals in that Specification Section, and "ZZ" indicates whether the submittal is an original or a resubmittal, as described in Section 01 33 00, Submittal Procedures. Each piece of correspondence shall be sent in a separate email. O&M submittal numbering shall be as specified in Section 01 78 23, Operation and Maintenance Data

### **3.06 SUBMITTALS**

- A. If a submittal package has multiple items that are not directly related, each item shall be considered a separate submittal and shall be sent separately. For example, "Concrete Mix Design," and "Concrete Curing Compound" shall be submitted as separate items to the Construction Manager.

### **3.07 ORIGINAL DOCUMENTS**

- A. Where possible, the Contractor will obtain the electronic document from its original source to maintain the integrity, legibility, and searchability of the document.

### **3.08 ORGANIZATION**

- A. The information included in the attachments shall be organized in a logical and thoughtful manner. Where the information originated in a tabbed format (a binder, for example), the scanned and/or converted PDF file shall be electronically bookmarked accordingly using the "bookmark" function of Adobe Acrobat 9 Std.

### **3.09 PRINTING**

- A. Except where otherwise indicated, the Contractor will receive no hard copies of the above outlined correspondence. The Contractor will be required to print for its use, in color if necessary, any record copies, field copies, subcontractor copies, etc., if such copies are desired.

### **3.10 PROJECT FORMS**

- A. The Contractor may use its own correspondence forms to be attached to correspondence emails as long as the Contractor's forms comply with this and all submittal sections.

**END OF SECTION 01 31 26**

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**SECTION 01 32 16**  
**CONSTRUCTION PROGRESS SCHEDULE**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Submittals.
- B. Quality assurance.
- C. Bar chart schedules.
- D. Review and evaluation.
- E. Updating schedules.

**1.02 SUBMITTALS**

- A. Within 7 days after date of District-Contractor Agreement, submit proposed preliminary critical path method bar chart schedule defining planned operations for the entire project.

**1.03 BAR CHART SCHEDULES**

- A. Prepare bar chart Schedule in Microsoft Project using critical path method (CPM) and demonstrate completion of the project within the construction duration specified in the Contract Agreement – Contract Times.
- B. The activity time schedule shall indicate the chronological sequence in which the Contractor proposes to carry out each aspect of the work, defined areas of work (phase number), the calendar dates on which the Contractor will begin the discrete elements of the work, and the contemplated completion dates for said salient elements. These discrete elements for this project shall include, but are not limited to:
  - 1. Work sequences, constraints, and milestones
  - 2. Subcontract work
  - 3. Procurement and delivery of materials
  - 4. Posting of “No Parking” signs
  - 5. Scheduling of equipment
  - 6. Excavation of trenches
  - 7. Placement of pipe and appurtenances
  - 8. Installment of pumps
  - 9. Electrical work
  - 10. Planned water main outages
  - 11. Project closeout and cleanup
- C. The Contractor shall contact the Engineer at least 48 hours in advance of any change in the work schedule. If the Contractor desires to make a major change in his method or operations after commencing construction, or if the activity time schedule fails to reflect the actual progress of the work, the Contractor shall submit a revised schedule to the Engineer in advance of beginning revised operations. If the Contractor’s schedule is rejected by the Engineer, the Contractor will have 3 days to make revisions and resubmit a revised schedule. Failure to comply may result in the suspension of all work.
- D. Identification of the following:
  - 1. Horizontal time frame by year, month, and week.
  - 2. Duration, early start, and completion for each activity and subactivity.
  - 3. Critical activities and Project float.
  - 4. Subschedules to further define critical portions of Work.

**1.04 REVIEW AND EVALUATION**

- A. After review, revise schedules incorporating results of review, and resubmit within 5 days.



**1.05 UPDATING SCHEDULES**

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity. Update schedules to depict current status of Work.

**1.06 3-WEEK LOOK AHEAD SCHEDULE**

- A. On the last working day of every week the Contractor shall submit to the Engineer the Contractor's Plan of Activities for the next three weeks. The Plan of Activities shall describe the activity and location of the activity and include the activity number as provided in the CPM Schedule.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION - NOT USED**

**END OF SECTION 01 32 16**

**SECTION 01 33 00  
SUBMITTAL PROCEDURES**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Definitions.
- B. Submittal procedures.
- C. Construction progress schedules.
- D. Proposed product list.
- E. Product data.
- F. Use of electronic CAD files of Project Drawings.
- G. Shop Drawings.
- H. Samples.
- I. Other submittals.
- J. Design data.
- K. Test reports.
- L. Certificates.
- M. Manufacturer's instructions.
- N. Construction photographs.
- O. Contractor review.
- P. Manufacturer's field reports.
- Q. Erection Drawings.

**1.02 DEFINITIONS**

- A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action.
- B. Informational Submittals: Written and graphic information and physical Samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements.

**1.03 SUBMITTAL PROCEDURES**

- A. Transmit each submittal with Engineer-accepted form.
- B. Assign each submittal a unique number. Clearly note the submittal numbers on the transmittal. Number each submittal with the identifying specification section, followed by a sequential number that represents the Contractor's assigned number of 01, 02, et cetera. Resubmittals shall be numbered by adding a dot (.) and 01, 02, 03, et cetera to the original submittal number, depending on the number of times the submittal has been resubmitted. For example: if Submittal 01 33 00-01 requires a resubmittal, the first resubmittal will bear the designation "01 33 00-01.01" and the second resubmittal will bear the designation "01 33 00-01.02" and so on.
- C. Identify: Project, Contractor, Subcontractor and supplier, pertinent Drawing and detail number, and Specification Section number appropriate to submittal.
- D. Apply Contractor's stamp, signed or initialed, certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is according to requirements of the Work and Contract Documents.
- E. Schedule submittals to expedite Project, and submit electronic submittals via email as PDF electronic files. Coordinate submission of related items.

- F. For each submittal for review, allow 15 days excluding delivery time to and from Contractor.
- G. Identify variations in Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.
- H. Allow space on submittals for Contractor and Engineer review stamps.
- I. When revised for resubmission, identify changes made since previous submission.
- J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- K. Submittals not requested will not be recognized nor processed.
- L. Incomplete Submittals: Engineer will not review. Complete submittals for each item are required. Delays resulting from incomplete submittals are not the responsibility of Engineer.

#### **1.04 CONSTRUCTION PROGRESS SCHEDULES**

- A. Comply with Section 01 32 16 - Construction Progress Schedule.

#### **1.05 PROPOSED PRODUCT LIST**

- A. Within 15 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, indicate manufacturer, trade name, model or catalog designation, and reference standards.

#### **1.06 PRODUCT DATA**

- A. Product Data: Action Submittal: Submit to Engineer for review for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Submit electronic submittals via email as PDF electronic files.
- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

#### **1.07 ELECTRONIC CAD FILES OF PROJECT DRAWINGS**

- A. Electronic CAD Files of Project Drawings: May only be used to expedite production of Shop Drawings for the Project. Use for other Projects or purposes is not allowed.
- B. Electronic CAD Files of Project Drawings: Distributed only under the following conditions:
  1. Use of files is solely at receiver's risk. Engineer does not warrant accuracy of files. Receiving files in electronic form does not relieve receiver of responsibilities for measurements, dimensions, and quantities set forth in Contract Documents. In the event of ambiguity, discrepancy, or conflict between information on electronic media and that in Contract Documents, notify Engineer of discrepancy and use information in hard-copy Drawings and Specifications.
  2. CAD files do not necessarily represent the latest Contract Documents, existing conditions, and as-built conditions. Receiver is responsible for determining and complying with these conditions and for incorporating addenda and modifications.
  3. User is responsible for removing information not normally provided on Shop Drawings and removing references to Contract Documents. Shop Drawings submitted with information associated with other trades or with references to Contract Documents will not be reviewed and will be immediately returned.
  4. Receiver shall not hold Engineer responsible for data or file clean-up required to make files usable, nor for error or malfunction in translation, interpretation, or use of this

electronic information.

5. Receiver shall understand that even though Engineer has computer virus scanning software to detect presence of computer viruses, there is no guarantee that computer viruses are not present in files or in electronic media.
6. Receiver shall not hold Engineer responsible for such viruses or their consequences, and shall hold Engineer harmless against costs, losses, or damage caused by presence of computer virus in files or media.

#### **1.08 SHOP DRAWINGS**

- A. Shop Drawings: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. When required by individual Specification Sections, provide Shop Drawings signed and sealed by a professional Engineer responsible for designing components shown on Shop Drawings.
  1. Include signed and sealed calculations to support design.
  2. Submit Shop Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
  3. Make revisions and provide additional information when required by authorities having jurisdiction.
- D. Submit electronic submittals via email as PDF electronic files.
- E. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

#### **1.09 SAMPLES**

- A. Samples: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Samples for Selection as Specified in Product Sections:
  1. Submit to Engineer for aesthetic, color, and finish selection.
  2. Submit Samples of finishes, textures, and patterns for Engineer selection.
- C. Submit Samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate Sample submittals for interfacing work.
- D. Include identification on each Sample, with full Project information.
- E. Submit number of Samples specified in individual Specification Sections; Engineer will retain 1 Sample.
- F. Reviewed Samples that may be used in the Work are indicated in individual Specification Sections.
- G. Samples will not be used for testing purposes unless specifically stated in Specification Section.
- H. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

#### **1.10 OTHER SUBMITTALS**

- A. Closeout Submittals: Comply with Section 01 70 00 - Execution and Closeout Requirements.

#### **1.11 DESIGN DATA**

- A. Informational Submittal: Submit data for Engineer's knowledge as Contract administrator or for District.
- B. Submit information for assessing conformance with information given and design concept expressed in Contract Documents.

### **1.12 TEST REPORTS**

- A. Informational Submittal: Submit reports for Engineer's knowledge as Contract administrator or for District.
- B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

### **1.13 CERTIFICATES**

- A. Informational Submittal: Submit certification by manufacturer, installation/application Subcontractor, or Contractor to Engineer, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product but must be acceptable to Engineer.

### **1.14 MANUFACTURER'S INSTRUCTIONS**

- A. Informational Submittal: Submit manufacturer's installation instructions for Engineer's knowledge as Contract administrator or for District.
- B. Submit printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing to Engineer in quantities specified for Product Data.
- C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

### **1.15 CONSTRUCTION PHOTOGRAPHS**

- A. Submit pre-construction photographs and videos of job site.
- B. Provide photographs and videos of job site and construction throughout progress of Work.
- C. Submit photographs with applications for payment for Work completed.
- D. Digital Images: Deliver complete set of digital image electronic files on USB-Drive/CD-ROM to District with Project record documents. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as sensor, uncropped.
  - 1. Digital Images: Uncompressed TIFF format, produced by digital camera with minimum sensor size of 10.0 megapixels, and image resolution of not less than 1024 x 768 pixels.
  - 2. Date and Time: Include date and time in filename for each image.

### **1.16 CONTRACTOR REVIEW**

- A. Review for compliance with Contract Documents and approve submittals before transmitting to District.
- B. Contractor: Responsible for:
  - 1. Determination and verification of materials including manufacturer's catalog numbers.
  - 2. Determination and verification of field measurements and field construction criteria.
  - 3. Checking and coordinating information in submittal with requirements of Work and of Contract Documents.
  - 4. Determination of accuracy and completeness of dimensions and quantities.
  - 5. Confirmation and coordination of dimensions and field conditions at Site.
  - 6. Construction means, techniques, sequences, and procedures.
  - 7. Safety precautions.
  - 8. Coordination and performance of Work of all trades.
- C. Stamp, sign or initial, and date each submittal to certify compliance with requirements of Contract Documents.
- D. Do not fabricate products or begin Work for which submittals are required until approved submittals have been received from Engineer.

- E. Informational Submittal: Submit reports for Engineer's knowledge as Contract administrator or for District.
- F. Submit reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

**1.17 ENGINEER REVIEW**

- A. Do not make "mass submittals" to Engineer. "Mass submittals" are defined as six or more submittals or items in one day or 15 or more submittals or items in one week. If "mass submittals" are received, Engineer's review time stated above will be extended as necessary to perform proper review. Engineer will review "mass submittals" based on priority determined by Engineer after consultation with District and Contractor.
- B. Informational submittals and other similar data are for Engineer's information, do not require Engineer's responsive action, and will not be reviewed or returned with comment.
- C. Submittals made by Contractor that are not required by Contract Documents may be returned without action.
- D. Submittal approval does not authorize changes to Contract requirements unless accompanied by Change Order, field order, or work change directive.
- E. The contractor shall provide complete submittals, and avoid providing excessive addenda to submittals after submitting to the Engineer.
  - 1. District may withhold monies due to Contractor to cover additional costs beyond the second submittal review.
  - 2. If the Contractor determines they have sent an incomplete submittal, they will notify the Engineer, and resubmit once completed.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION - NOT USED**

**END OF SECTION 01 33 00**

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**SECTION 01 40 00  
QUALITY REQUIREMENTS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Quality control.
- B. Tolerances.
- C. References.
- D. Labeling.
- E. Testing and inspection services.
- F. Manufacturers' field services.
- G.

**1.02 QUALITY CONTROL**

- A. Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- C. Perform Work using persons qualified to produce required and specified quality.
- D. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

**1.03 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' recommended tolerances and tolerance requirements in reference standards. When such tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

**1.04 REFERENCES**

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current as of except where specific date is established by code.
- C. Obtain copies of standards and maintain on Site when required by product Specification Sections.
- D. When requirements of indicated reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- E. Neither contractual relationships, duties, or responsibilities of parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference in reference documents.

**1.05 LABELING**

- A. Attach label from agency approved by authorities having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.



- B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label:
  1. Model number.
  2. Serial number.
  3. Performance characteristics.
- C. Manufacturer's Nameplates, Trademarks, Logos, and Other Identifying Marks on Products: Not allowed on surfaces exposed to view in public areas, interior or exterior.

**1.06 TESTING AND INSPECTION SERVICES**

- A. District will employ and pay for specified services of an independent firm to perform testing and inspection.
- B. The Contractor may employ their own firm to perform testing for quality assurance at the Contractor's expense.
  1. The Contractor shall include the cost for such testing in the bid item for which testing is required.
  2. Where discrepancies exist between the Contractor's and the District's firm, the District's testing shall govern acceptance of work.
- C. Testing and inspections may include, but are not limited to:
  1. Compaction testing.
  2. Welding
  3. Coating
  4. Electrical work

**1.07 MANUFACTURER'S FIELD SERVICES**

- A. When specified in individual Specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe Site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, commissioning, and performance testing as applicable, and to initiate instructions when necessary.
- B. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.
- C. Refer to Section 01 33 00 - Submittal Procedures, "Manufacturer's Field Reports" Article.

**COVID-19 SAFETY REQUIREMENTS**

- A. Contractor must wear a mask or face covering if required by local ordinances when working/interacting with customers and comply with current COVID-19 guidelines. The current COVID-19 state and county guidelines can be found at:
  1. State: <https://covid19.ca.gov/industry-guidance/>
  2. County: <https://covid19.calaverasgov.us/>

**1.02 PROJECT SURVEY REQUIREMENTS**

- A. As part of the bid price for the construction of the improvements the Contractor shall provide and be responsible for the layout of all work specified in the Contract Documents. The Contractor shall provide all necessary surveys, construction staking, and positioning for the construction of all components at the proper alignment, elevations, grades, and positions, as indicated to the Contract Drawings and as required for the proper operation and function.
- B. The Contractor shall stake the work limits and right-of-way prior to the start of sitework.
- C. The Contractor shall lay out all work, including structures and pipelines, and shall be solely responsible for executing the Work in accordance with the lines and grades indicated.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION - NOT USED**

**END OF SECTION 01 40 00**

**SECTION 01 50 00**  
**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary Utilities:
  - 1. Temporary electricity.
  - 2. Temporary lighting for construction purposes.
  - 3. Temporary heating.
  - 4. Temporary cooling.
  - 5. Temporary ventilation.
  - 6. Communication services.
  - 7. Temporary water service.
  - 8. Temporary sanitary facilities.
- B. Construction Facilities:
  - 1. Field offices and sheds.
  - 2. Vehicular access.
  - 3. Parking.
  - 4. Progress cleaning and waste removal.
  - 5. Traffic regulation.
  - 6. Fire-prevention facilities.
- C. Temporary Controls:
  - 1. Security.
  - 2. Water control.
  - 3. Dust control.
  - 4. Erosion and sediment control.
  - 5. Noise control.
  - 6. Pest and rodent control.
  - 7. Pollution control.
- D. Removal of utilities, facilities, and controls.

**1.02 REFERENCES**

- A. ASTM International:
  - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 2. ASTM E90 E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
  - 3. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

**1.03 TEMPORARY FACILITIES UNDER CONSTRUCTION MANAGEMENT AGREEMENT**

- A. Contractor: Coordinate provisions with District Construction Manager and provide the following items as necessary for execution of the Work including associated costs:
  - 1. Construction aids.
  - 2. Temporary fire protection, dust control, erosion and sediment control, water control, noise control, and other necessary temporary controls.
  - 3. Temporary barriers, barricades, and similar devices as necessary for safety and protection of construction personnel and public.
  - 4. Temporary tree and plant protection.
  - 5. Temporary heating before building enclosure.

6. Electrical service required. in addition to temporary service and distribution provided by District.
7. Temporary telephone and internet service.

#### **1.04 TEMPORARY ELECTRICITY**

- A. District will pay cost of energy used. Exercise measures to conserve energy. Use District's existing power service. Where use of power affects operations of the water treatment plant, the Contractor shall furnish at the Contractor's expense, means of providing electricity necessary for completion of the Work.
- B. Provide temporary electric feeder from existing building electrical service at location as directed by District. Do not disrupt District's use of service.

#### **1.05 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES**

- A. Contractor shall be responsible for furnishing lighting for the duration of construction.

#### **1.06 TEMPORARY HEATING**

- A. Contractor shall be responsible for providing temporary heating during construction, as needed.

#### **1.07 TEMPORARY COOLING**

- A. Contractor shall be responsible for providing temporary cooling during construction, as needed.

#### **1.08 TEMPORARY VENTILATION**

- A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

#### **1.09 COMMUNICATION SERVICES**

- A. Contractor shall be responsible for furnishing and maintaining Contractor's telephone and internet services.

#### **1.10 TEMPORARY WATER SERVICE**

- A. Contractor will be required to pull construction water from a temporary fire hydrant water meter in the proximity of the project. There will be no charge for consumptive water use, but Contractor will be required to provide a deposit for temporary meter and will be responsible for its daily use and any physical damage. Exercise measures to conserve energy. Use District's existing water system, extended and supplemented with temporary devices as needed to maintain specified conditions for construction operations.
- B. Extend branch piping with outlets located so that water is available by hoses with threaded connections. Provide temporary pipe insulation and heat tape to prevent freezing.

#### **1.11 TEMPORARY SANITARY FACILITIES**

- A. Contractor shall be responsible for furnishing and maintaining temporary sanitary facilities.

#### **1.12 FIELD OFFICES AND SHEDS**

- A. Mandatory field offices shall be located at Copper Cove WTP site at location designated by District.

#### **1.13 VEHICULAR ACCESS**

- A. Use existing on-Site roads for construction traffic.
- B. Contractor shall not restrict vehicular access to the District.

#### **1.14 PARKING**

- A. Contractor shall coordinate parking with the District so as to not interfere with Water Treatment Plant or C Tank Site operations.

### **1.15 PROGRESS CLEANING AND WASTE REMOVAL**

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain Site in clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, before enclosing spaces.
- C. Broom and vacuum clean interior areas before starting surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from Site daily and dispose of off-Site. Comply with Section 01 74 19 - Construction Waste Management and Disposal.

### **1.16 TRAFFIC REGULATION**

- A. Signs, Signals, and Devices:
  - 1. Post-Mounted and Wall-Mounted Traffic Control and Informational Signs: As approved by authorities having jurisdiction.
- B. Traffic Signs and Signals:
  - 1. Provide signs at approaches to Site and on Site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction.
- C. Removal:
  - 1. Remove equipment and devices when no longer needed.
  - 2. Repair damage caused by installation.

### **1.17 FIRE-PREVENTION FACILITIES**

- A. Prohibit smoking within buildings. Designate area on Site where smoking is permitted. Provide approved ashtrays in designated smoking areas.
- B. Cut down grasses on the construction site.
- C. Establish fire watch for cutting, welding, and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.
- D. Hot Work - For the purpose of this section "Hot Work" means any riveting, welding, flame cutting or toher fire-or spark-producing operation, as well as any Work involving burning, welding, grinding, or similar operations having the potential to cause sparks or overheating.
  - 1. Any Work performed by the Contractor that involves Hot Work requires the Contractor to have a Fire Prevention and Hot Work Procedures plan in place prior to performing the Work. The Contractor's plan shall be consistent with Cal/OSHA requirements. The plan shall address potential fire hazards, potential ignition sources and their control, and the types of fire protection equipment to be used to control a fire. The Contractor shall include its Fire Prevention and Hot Work Procedures plan in their submitted Safety Plan.
  - 2. All Work performed under an issued Hot Work permit will require the Contractor to assign a specific person to ensure that errant sparks do not cause a fire or explosion. This person will be responsible for observing the Work and Work area, will be trained and equipped to respond to any start of small fires, and can call for help in an emergency should a fire start. This person shall also remain at the site for the entire duration of time that Hot Work is being performed, shall not be assigned to any other duties, and shall be required to remain at the Work location for at least thirty (30) minutes beyond the completion of Hot Work.
  - 3. Hot Work permits that have been issued will be cancelled under any of the following conditions:
    - a. The operation has been completed.
    - b. An unsafe condition develops during the operation causing stoppage of the work.
    - c. An inactive period of more than two (2) hours elapses.

- d. The end of the work shift.

#### **1.18 SECURITY**

- A. Security Program:
  - 1. Protect Work on existing premises and District's operations from theft, vandalism, and unauthorized entry.
  - 2. Initiate program in coordination with District at Project mobilization.
  - 3. Maintain program throughout construction period until District's acceptance precludes need for Contractor's security.

#### **1.19 WATER CONTROL**

- A. Grade Site to drain. Maintain excavations free of water. Provide, operate, and maintain necessary pumping equipment.
- B. Protect Site from puddles or running water. Provide water barriers as required to protect Site from soil erosion.

#### **1.20 DUST CONTROL**

- A. Execute Work by methods that minimize raising dust from construction operations.
- B. Provide positive means to prevent airborne dust from dispersing into atmosphere and into District-occupied areas. The off-site migration of dust and particulates past District's property line is not permissible under County ordinances.

#### **1.21 EROSION AND SEDIMENT CONTROL**

- A. Plan and execute construction by methods to control surface drainage from cuts and fills from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize surface area of bare soil exposed at one time.
- C. Provide temporary measures including berms, dikes, drains, and other devices to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts and clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation. Promptly apply corrective measures.

#### **1.22 NOISE CONTROL**

- A. Provide methods, means, and facilities to minimize noise produced by construction operations.
- B. Daytime and overnight construction noise levels may not exceed limits established by County ordinances.

#### **1.23 PEST AND RODENT CONTROL**

- A. Provide methods, means, and facilities to prevent pests and insects from damaging the Work and entering facility.
- B. Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

#### **1.24 POLLUTION CONTROL**

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances and pollutants produced by construction operations.

#### **1.25 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities, and materials before Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary Work.

- C. Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION - NOT USED**

**END OF SECTION 01 50 00**

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**SECTION 01 70 00  
EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Closeout procedures.
- B. Project record documents.
- C. Product warranties and product bonds.
- D. Examination.
- E. Execution.
- F. Final cleaning.
- G. Restoration

**1.02 CLOSEOUT PROCEDURES**

- A. Prerequisites to Substantial Completion: Complete following items before requesting Certification of Substantial Completion, either for entire Work or for portions of Work:
  - 1. Submit maintenance manuals, Project record documents, digital images of construction photographs, and other similar final record data in compliance with this Section.
  - 2. Conduct inspection to establish basis for request that Work is substantially complete. Create comprehensive list (initial punch list) indicating items to be completed or corrected, value of incomplete or nonconforming Work, reason for being incomplete, and date of anticipated completion for each item. Include copy of list with request for Certificate of Substantial Completion.
  - 3. Deliver tools, spare parts, extra stocks of material, and similar physical items to District.
  - 4. Discontinue or change over and remove temporary facilities and services from Project Site, along with construction tools, mockups, and similar elements.
  - 5. Perform final cleaning according to this Section.
- B. Substantial Completion Inspection:
  - 1. When Contractor considers Work to be substantially complete, submit to Engineer:
    - a. Written certificate that Work, or designated portion, is substantially complete.
    - b. List of items to be completed or corrected (initial punch list).
  - 2. Within 7 days after receipt of request for Substantial Completion, Engineer and District will make inspection to determine whether Work or designated portion is substantially complete.
  - 3. Should Engineer determine that Work is not substantially complete:
    - a. Engineer will promptly notify Contractor in writing, stating reasons for its opinion.
    - b. Contractor shall remedy deficiencies in Work and send second written request for Substantial Completion to Engineer.
    - c. Engineer will reinspect Work.
    - d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer inspection.
  - 4. When Engineer finds that Work is substantially complete, Engineer will:
    - a. Prepare Certificate of Substantial Completion, accompanied by Contractor's list of items to be completed or corrected as verified and amended by Engineer and District (final punch list).
    - b. Submit Certificate to District and Contractor for their written acceptance of responsibilities assigned to them in Certificate.
  - 5. After Work is substantially complete, Contractor shall:
    - a. Allow District occupancy of Project under provisions stated in Certificate of Substantial Completion.
    - b. Complete Work listed for completion or correction within time period stipulated.



- C. Prerequisites for Final Completion: Complete following items before requesting final acceptance and final payment.
  - 1. When Contractor considers Work to be complete, submit written certification that:
    - a. Contract Documents have been reviewed.
    - b. Work has been examined for compliance with Contract Documents.
    - c. Work has been completed according to Contract Documents.
    - d. Work is completed and ready for final inspection.
  - 2. Submittals: Submit following:
    - a. Final punch list indicating all items have been completed or corrected.
    - b. Final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
    - c. Specified warranties, workmanship/maintenance bonds, maintenance agreements, and other similar documents.
    - d. Accounting statement for final changes to Contract Sum.
    - e. Contractor's affidavit of payment of debts and claims.
    - f. Contractor affidavit of release of liens.
    - g. Consent of surety to final payment.
  - 3. Perform final cleaning for Contractor-soiled areas according to this Section.
- D. Final Completion Inspection:
  - 1. Within 7 days after receipt of request for final inspection, Engineer will make inspection to determine whether Work or designated portion is complete.
  - 2. Should Engineer consider Work to be incomplete or defective:
    - a. Engineer will promptly notify Contractor in writing, listing incomplete or defective Work.
    - b. Contractor shall remedy stated deficiencies and send second written request to Engineer that Work is complete.
    - c. Engineer will reinspect Work.
    - d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer's inspection.

### 1.03 PROJECT RECORD DOCUMENTS

- A. Maintain on Site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed Shop Drawings, product data, and Samples.
  - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by District.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record, at each product Section, description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates used.
  - 3. Changes made by Addenda and modifications.
- F. Record Drawings: Legibly mark each item to record actual construction as follows:
  - 1. Include Contract modifications such as Addenda, supplementary instructions, change directives, field orders, minor changes in the Work, and change orders.

2. Include locations of concealed elements of the Work.
  3. Identify depth of buried utility lines and provide dimensions showing distances from permanent facility components that are parallel to utilities.
  4. Dimension ends, corners, and junctions of buried utilities to permanent facility components using triangulation.
  5. Identify and locate existing buried or concealed items encountered during Project.
  6. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  7. Field changes of dimension and detail.
  8. Details not on original Contract Drawings.
- G. Submit marked-up paper copy documents to Engineer with claim for final Application for Payment.
- H. Submit PDF electronic files of marked-up documents to Engineer with claim for final Application for Payment. Submit PDF electronic files of marked-up documents to Engineer with claim for final Application for Payment.

#### **1.04 PRODUCT WARRANTIES AND PRODUCT BONDS**

- A. Obtain warranties and bonds executed by responsible Subcontractors, suppliers, and manufacturers within 10 days after completion of applicable item of Work.
- B. Execute and assemble transferable warranty documents and bonds from Subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.
- E. Include table of contents and assemble in PDF electronic file.
- F. Submit prior to final Application for Payment.
- G. Time of Submittals:
  1. For equipment or component parts of equipment put into service during construction with District's permission, submit documents within 10 days after acceptance.
  2. Make other submittals within 10 days after date of Substantial Completion, prior to final Application for Payment.
  3. For items of Work for which acceptance is delayed beyond Substantial Completion, submit within 10 days after acceptance, listing date of acceptance as beginning of warranty or bond period.

#### **PART 2 - PRODUCTS - NOT USED**

#### **PART 3 - EXECUTION**

##### **3.01 EXAMINATION**

- A. Verify that existing Site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual Specification Sections.
- D. Verify that utility services are available with correct characteristics and in correct locations.

##### **3.02 EXECUTION**

- A. Comply with manufacturer's installation instructions, performing each step in sequence. Maintain one set of manufacturer's installation instructions at Project Site during installation and until completion of construction.

### **3.03 FINAL CLEANING**

- A. Execute final cleaning prior to final Project assessment.
  - 1. Employ experienced personnel or professional cleaning firm.
- B. Clean Site: sweep paved areas, rake clean landscaped surfaces.
- C. Remove waste and surplus materials, rubbish, and construction facilities from Site.
- D. Flush pipe as thoroughly as available water sources will permit.
- E. When pipe contains dirt that cannot be removed by flushing, swab pipe interiors with solution containing not less than 500 parts per million of chlorine until clean.
- F. Disinfect pipe per Section 33 01 10.58 - Disinfection of Water Utility Piping Systems and in accordance with AWWA C651. Maintain an air gap or isolation plates, until after disinfection and passing bacteriological tests and prior to connecting to the active system.
- G. Flush pipes with potable water until chlorine residual is less than 0.6 parts per million before pipes are put into service.

### **3.04 RESTORATION**

- A. The Contractor shall restore and/or replace paving, curbing, sidewalks, gutters, shrubbery, fences, sod, and other disturbed surfaces and structures to a condition equal to that before the Work began and to the satisfaction of the Engineer and shall furnish all labor and materials incidental thereto.

**END OF SECTION 01 70 00**

**SECTION 01 74 19  
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Construction waste management plan.
  - 2. Temporary discharge permit.

**1.02 PLAN REQUIREMENTS**

- A. Develop and implement construction waste management plan as approved by Engineer.
- B. Intent:
  - 1. Divert construction, demolition, and land-clearing debris from landfill disposal.
  - 2. Redirect recyclable material back to manufacturing process.
  - 3. Generate cost savings or increase minimal additional cost to Project for waste disposal.

**1.03 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures contains requirements for submittals.
- B. Construction Waste Management Plan: Submit construction waste management plan describing methods and procedures for implementation and monitoring compliance including the following:
  - 1. Transportation company hauling construction waste to waste processing facilities.
  - 2. Recycling and adaptive reuse processing facilities and waste type each facility will accept.
  - 3. Construction waste materials anticipated for recycling and adaptive reuse.
  - 4. On-Site sorting and Site storage methods.
- C. Temporary discharge permit, as needed for construction.

**1.04 CONSTRUCTION WASTE MANAGEMENT PLAN**

- A. Implement construction waste management plan at start of construction.
- B. Review construction waste management plan at preconstruction meeting and progress meetings specified in Section 01 30 00 - Administrative Requirements.
- C. Distribute approved construction waste management plan to Subcontractors and others affected by plan requirements.
- D. Oversee plan implementation, instruct construction personnel for plan compliance, and document plan results.
- E. Purchase products to prevent waste by:
  - 1. Ensuring correct quantity of each material is delivered to Site.
  - 2. Choosing products with minimal or no packaging.
  - 3. Requiring suppliers to use returnable pallets or containers.
  - 4. Requiring suppliers to take or buy back rejected or unused items.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION**

**3.01 CONSTRUCTION WASTE COLLECTION**

- A. All existing material and equipment to be removed as indicated on the Contract Documents or as directed by the Engineer shall become the property of the Contractor and shall be properly disposed of at the Contractor's expense.
- B. Collect construction waste materials in marked bins or containers and arrange for transportation to recycling centers or adaptive salvage and reuse processing facilities.

- C. Maintain recycling and adaptive reuse storage and collection area in orderly arrangement with materials separated to eliminate co-mingling of materials required to be delivered separately to waste processing facility.

**3.02 CONSTRUCTION WASTE DISPOSAL**

- A. Deliver construction waste to waste processing facilities. Obtain receipt for deliveries.
- B. Dispose of construction waste not capable of being recycled or adaptively reused by delivery to landfill, incinerator, or other legal disposal facility. Obtain receipt for deliveries.

**END OF SECTION 01 74 19**

**SECTION 01 75 00  
SYSTEM START-UP**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Procedures and actions, required of the Contractor, which are necessary to achieve and demonstrate Substantial Completion.
  - 2. Requirements for Substantial Completion Submittals.
  - 3. Phased construction requirements.

**1.02 DEFINITIONS**

- A. Project Classified System (PCS): A defined part of the Project, consisting of an arrangement of items, such as equipment, structures, components, piping, wiring, materials, or incidentals, so related or connected to form an identifiable, unified, functional, operational, safe, and independent system.
- B. Pre-Demonstration Period: The period of time, of unspecified duration after initial construction and installation activities during which Contractor, with assistance from manufacturer's representatives, performs in the following sequence:
  - 1. Finishing type construction work to ensure the Project or each PCS has reached a state of Substantial Completion.
  - 2. Equipment start-up.
  - 3. Personnel training.
- C. Demonstration Period: A period of time, of specified duration, following the Pre-Demonstration Period, during which the Contractor initiates process flow through the Project Classified System and starts up and operates the Project Classified System without exceeding specified downtime limitations, to prove the functional integrity of the mechanical and electrical equipment and components and the control interfaces of the respective equipment and components comprising the Project Classified System as evidence of Substantial Completion.

**1.03 SUBMITTALS**

- A. Submit in the chronological order listed below prior to the completion of the Pre-Demonstration Period.
  - 1. Master operation and maintenance training schedule:
    - a. Submit 18 days (minimum) prior to first training session for District's personnel.
    - b. Schedule to include:
      - 1) Target date and time for District witnessing of each system initial start-up.
      - 2) Target date and time for Operation and Maintenance training for each system, both field and classroom.
      - 3) Target date for initiation of Demonstration Period.
    - c. Submit for review and approval by District.
    - d. Include holidays observed by District.
    - e. Attend a schedule planning and coordination meeting 30 calendar days prior to first anticipated training session.
      - 1) Provide a status report and schedule-to-complete for requirements prerequisite to manufacturer's training.
      - 2) Identify initial target dates for individual manufacturer's training sessions.
    - f. District reserves the right to insist on a minimum 7 days notice of rescheduled training session not conducted on master schedule target date for any reason.
    - g. Schedule to be resubmitted until approved.
  - 2. Substantial Completion Submittal:
    - a. File Contractor's Notice of Substantial Completion and Request for Inspection.

- b. Approved Operation and Maintenance manuals received by Engineer minimum 1 week prior to scheduled training.
- c. Written request for District to witness each system pre-demonstration start-up. Request to be received by District minimum 1 week before scheduled training of District's personnel on that system.
- d. Equipment installation and pre-demonstration start-up certifications.
- e. Letter verifying completion of all pre-demonstration start-up activities including receipt of all specified items from manufacturers or suppliers as final item prior to initiation of Demonstration Period.

#### **1.04 SEQUENCING AND SCHEDULING**

- A. Contractor shall meet with District and Engineer to discuss sequencing and scheduling at least one week prior to start-up.

#### **1.05 COST OF START-UP**

- A. Contractor to pay all costs associated with System start-up.

### **PART 2 - PRODUCTS - NOT USED**

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

- A. Facility Start-up Divided into Two Periods:
  - 1. Pre-Demonstration Period including:
    - a. Completion of construction work to bring Project to a state of Substantial Completion.
    - b. Start-up of Equipment.
    - c. Completion of the filing of all required submittals.
    - d. Filing of Contractor's Notice of Substantial Completion and Request for Inspection.
  - 2. Demonstration Period including:
    - a. Demonstration of functional integrity of facility or PCS.

#### **3.02 PRE-DEMONSTRATION PERIOD**

- A. Completion of Construction Work:
  - 1. Complete the work to bring the PCS to a state of substantial completion.
- B. Equipment Start-up:
  - 1. Requirements for individual items of equipment are included within various Divisions of these Specifications.
  - 2. Prepare the equipment so it will operate properly and safely and be ready to demonstrate functional integrity during the Demonstration Period.
  - 3. Perform Equipment Start-up to extent possible without introducing product flow.
  - 4. Test pumps and similar equipment requiring a fluid, using clean water supplied at Contractor's expense.
  - 5. Dispose of water used for Equipment Start-up.
  - 6. Introduce product flow to complete Equipment Start-up for the following equipment:
    - a. Other equipment as necessary to complete start-up procedures
  - 7. Procedures include but are not necessarily limited to the following:
    - a. Test or check and correct deficiencies of:
      - 1) Power, control, and monitoring circuits for continuity prior to connection to power source.
      - 2) Voltage of all circuits.
      - 3) Phase sequence.
      - 4) Vacuum and pressure of all closed systems.
      - 5) Lubrication.
      - 6) Valve orientation and position status for manual operating mode.

- 7) All equipment: Proper connections, alignment, calibration and adjustment.
  - b. Calibrate all safety equipment.
  - c. Manually rotate or move moving parts to assure freedom of movement.
  - d. "Bump" start electric motors to verify proper rotation.
  - e. Perform other tests, checks, and activities required to make the equipment ready for Demonstration Period.
8. Obtain certifications, without restrictions or qualifications, and deliver to Engineer:
- a. Manufacturer's equipment installation check letters.
  - b. Instrumentation Supplier's Instrumentation Installation Certificate.
- C. Complete the filing of all required submittals:
- 1. Shop Drawings.
  - 2. Operation and Maintenance Manuals.
  - 3. Training material.
- D. Filing of Contractor's Notice of Substantial Completion and Request for Inspection of Project or PCS:
- 1. Notify Engineer when the following have been completed:
    - a. Construction work (brought to state of Substantial Completion).
    - b. Equipment Start-up.
    - c. Submittal of required documents.
  - 2. Engineer will review required submittals for completeness within 5 calendar days of Contractor's notice. If complete, Engineer will complete inspection of the Work, within 10 calendar days of Contractor's notice.
  - 3. Engineer will inform Contractor in writing of the status of the Work reviewed, within 14 calendar days of Contractor's notice.
    - a. Work determined not meeting state of Substantial Completion:
      - 1) Contractor: Correct deficiencies noted or submit plan of action for correction within 5 days of Engineer's determination.
      - 2) Engineer: Re-inspect work within 5 days of Contractor's notice of correction of deficiencies.
      - 3) Reinspection costs incurred by Engineer will be billed to District who will deduct them from final payment due Contractor.
    - b. Work determined to be in state of tentative Substantial Completion: Engineer to prepare tentative "Engineer's Certificate of Substantial Completion."
    - c. Engineer's Certificate of Substantial Completion:
      - 1) Certificate tentatively issued subject to successful Demonstration of functional integrity.
      - 2) Issued for Project as a whole or for one or more PCS.
      - 3) Issued subject to completion or correction of items cited in the certificate (punch list).
      - 4) Issued with responsibilities of District and Contractor cited.
      - 5) Executed by Engineer.
      - 6) Accepted by District.
      - 7) Accepted by Contractor.
    - d. Upon successful completion of Demonstration Period, Engineer will endorse certificate attesting to the successful demonstration, and citing the hour and date of ending the successful Demonstration Period of functional integrity as the effective date of Substantial Completion.

### **3.03 DEMONSTRATION PERIOD**

#### **A. General:**

- 1. Demonstrate the functional integrity of the mechanical, electrical, and control interfaces of the respective equipment and components comprising the facility PCS as evidence of



Substantial Completion.

2. Duration of Demonstration Period: 72 consecutive hours.
3. If, during the Demonstration Period, the aggregate amount of time used for repair, alteration, or unscheduled adjustments to any equipment or systems that renders the affected equipment or system inoperative exceed 10 percent of the Demonstration Period, the demonstration of functional integrity will be deemed to have failed. In the event of failure, a new Demonstration Period will recommence after correction of the cause of failure. The new Demonstration Period shall have the same requirements and duration as the Demonstration Period previously conducted.
4. Conduct the demonstration of functional integrity under full operational conditions.
5. District will provide operational personnel to provide process decisions affecting plant performance. District's assistance will be available only for process decisions. Contractor will perform all other functions including but not limited to equipment operation and maintenance until successful completion of the Demonstration Period.
6. District reserves the right to simulate operational variables, equipment failures, routine maintenance scenarios, etc., to verify the functional integrity of automatic and manual backup systems and alternate operating modes.
7. Time of beginning and ending any Demonstration Period shall be agreed upon by Contractor, District, and Engineer in advance of initiating Demonstration Period.
8. Throughout the Demonstration Period, provide knowledgeable personnel to answer District's questions, provide final field instruction on select systems and to respond to any system problems or failures which may occur.
9. Provide all labor, supervision, utilities, chemicals, maintenance, equipment, vehicles, and any other item necessary to operate and demonstrate all systems being demonstrated.

**END OF SECTION 01 75 00**

**SECTION 01 78 23  
OPERATION AND MAINTENANCE MANUALS**

**PART 1 - GENERAL**

**1.01 GENERAL**

- A. Operation and maintenance information shall be supplied for all equipment. Operation and maintenance manuals shall include the following:
  - 1. Equipment function, normal operating characteristics, and limiting conditions.
  - 2. Assembly, installation, alignment, adjustment, and checking instructions.
  - 3. Operating instructions for startup, routine and normal operation, regulation and control, shutdown, and emergency conditions.
  - 4. Lubrication and maintenance instructions.
  - 5. Guide to troubleshooting.
  - 6. Parts lists and predicted life of parts subject to wear.
  - 7. Outline, cross section, and assembly drawings; engineering data; and wiring diagrams.
  - 8. Test data and performance curves, where applicable.
  - 9. List of vendors for service and replacement parts purchase.
- B. The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered, or which may be required by Contractor.
- C. 3 preliminary copies of operation and maintenance manuals shall be submitted to the District at the Startup Preparation Meeting no less than 90 days prior to the Contractor's proposed Demonstration Period start date. Preliminary copies shall be in hardcopy format.
- D. 4 final hardcopies and 4 electronic copies of operation and maintenance manuals shall be delivered to District no more than 30 days after review comments are received.
- E. Shipment of equipment will not be considered complete until all required manuals and data have been received.

**1.02 HARDCOPY OPERATION AND MAINTENANCE MANUALS**

- A. Hardcopies for preliminary and final manuals shall be bound in three-ring binders bearing suitable identification. All manuals and other data shall be printed on heavy, first quality 8-1/2 x 11-inch paper, with standard three-hole punching. Drawings and diagrams shall be reduced to 8-1/2 x 11 inches or 11 x 17 inches. Where reduction is not practicable, larger drawings shall be folded separately and placed in envelopes, which are bound into the manuals. Each envelope shall be suitably identified on the outside. Each volume containing data for three or more items of equipment shall include a table of contents and index tabs. The final hardcopy of each manual shall be prepared and delivered in substantial, permanent, three-ring or three-post binders with a table of contents and suitable index tabs.

**1.03 ELECTRONIC OPERATION AND MAINTENANCE MANUALS**

- A. Each electronic copy shall be delivered on a unique USB-Drive CD-ROM in Adobe Acrobat's Portable Document Format (PDF). The PDF file(s) shall be fully indexed using the Table of Contents, searchable with thumbnails generated.
- B. File names shall use the "eight dot three" convention (XXXXXX\_YY.pdf), where X is the six digit number corresponding to the specification section, and YY is a two digit number set in sequential order when there is more than one PDF document (more than one O&M manual) per specification section. The initial filename for the O&M submittal will be provided with the request for final O&M manuals.
- C. Scanned images must be at a readable resolution. For most documents, they should be scanned at 300 dots per inch (dpi). Optical Character Recognition (OCR) capture must be performed on these images. OCR settings shall be performed with the "original image with hidden text" option in Adobe Acrobat Exchange.

- D. One PDF document (PDF file) shall be created for each equipment service manual. The entire manual shall be converted to a single .PDF file via scanning or other method of conversion. Drawings or other graphics shall also be converted to .PDF format and included into the single PDF document. Pages that must be viewed in landscape format shall be rotated to the appropriate position for easy reading on screen.
- E. The PDF documents shall have a bookmark created in the navigation frame for each major entry (“Section” or “Chapter”) in the Table of Contents. Thumbnails shall be generated for each page or graphic in the PDF file.
- F. The opening view for each PDF document shall be as follows:
  - 1. Initial View: Bookmarks and Page
  - 2. Magnification: Fit In Window
  - 3. The file shall open to the cover page of the manual, with bookmarks to the left, and the first bookmark shall be linked to the Table of Contents.

#### **1.04 LABELING**

- A. A. As a minimum, the following information shall be included on all final O&M manual materials, including USB-drives CD-ROM disks, jewel cases, and hardcopy manuals:
  - 1. Manufacturer’s name.
  - 2. Equipment name and/or O&M title spelled out in complete words.
  - 3. “Operations and Maintenance Manual”
  - 4. Specification Section Number. Example: “Section 460713”
  - 5. Project Name. “C-Tank Booster Pump Station Modifications and Transmission Line”
  - 6. Capital Improvement Project Number. “CIP No. XXXXXX”
  - 7. File Name and Date. Example: “460713\_01.pdf”

#### **PART 2 - PRODUCTS - NOT USED**

#### **PART 3 - EXECUTION - NOT USED**

**END OF SECTION 01 78 23**

**SECTION 02 41 00  
DEMOLITION**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Selective demolition of built site elements.
- B. Selective demolition of building elements for alteration purposes.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 10 00 - Summary: Description of items to be salvaged or removed for re-use by Contractor.
- C. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- D. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
- E. Section 01 74 19 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

**1.03 DEFINITIONS**

- A. Demolition: Dismantle, raze, destroy or wreck any building or structure or any part thereof.
- B. Remove: Detach or dismantle items from existing construction and dispose of them off site, unless items are indicated to be salvaged or reinstalled.
- C. Remove and Salvage: Detach or dismantle items from existing construction in a manner to prevent damage. Clean, package, label and deliver salvaged items to District in ready-for-reuse condition.
- D. Remove and Reinstall: Detach or dismantle items from existing construction in a manner to prevent damage. Clean and prepare for reuse and reinstall where indicated.
- E. Existing to Remain: Designation for existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

**1.04 REFERENCE STANDARDS**

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

**1.05 SUBMITTALS**

- A. See Section 01 33 00 - Submittal Procedures for submittal procedures.
- B. Site Plan: Indicate:
  - 1. Vegetation to be protected.
  - 2. Areas for temporary construction and field offices.
  - 3. Areas for temporary and permanent placement of removed materials.
- C. Demolition Plan: Submit demolition plan.
  - 1. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
  - 2. Summary of safety procedures.
- D. Demolition firm qualifications.
- E. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

**PART 2 - PRODUCTS -- NOT USED**

**PART 3 - EXECUTION**

**3.01 DEMOLITION**

- A. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 20 00.

**3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with requirements in Section 01 70 00 - Execution and Closeout Requirements.
- B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - 2. Comply with applicable requirements of NFPA 241.
  - 3. Use of explosives is not permitted.
  - 4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  - 5. Provide, erect, and maintain temporary barriers and security devices.
  - 6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
  - 7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
  - 8. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
  - 9. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
  - 10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.
- C. Do not begin removal until receipt of notification to proceed from District.
- D. Do not begin removal until built elements to be salvaged or relocated have been removed.
- E. Do not begin removal until vegetation to be relocated has been removed and vegetation to remain has been protected from damage.
- F. Protect existing structures and other elements to remain in place and not removed.
  - 1. Provide bracing and shoring.
  - 2. Prevent movement or settlement of adjacent structures.
  - 3. Stop work immediately if adjacent structures appear to be in danger.
- G. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- H. Hazardous Materials:
  - 1. If hazardous materials are discovered during removal operations, stop work and notify Engineer and District; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.
- I. Perform demolition in a manner that maximizes salvage and recycling of materials.
  - 1. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
  - 2. Dismantle existing construction and separate materials.
  - 3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.
- J. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

CIP 11122

Copper Cove

C-Tank BPS and T-Main Line

02 41 00 - 2

Demolition

### 3.03 EXISTING UTILITIES

- A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to District.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to District.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone. Identify and mark, in same manner as other utilities to remain, utilities to be reconnected.

### 3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Existing construction and utilities indicated on Contract Drawings are based on casual field observation and existing record documents only.
  - 1. Verify construction and utility arrangements are as indicated.
  - 2. Report discrepancies to Engineer before disturbing existing installation.
  - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from areas that remain occupied.
  - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 in locations indicated on Contract Drawings.
- C. Maintain weatherproof exterior building enclosure, except for interruptions required for replacement or modifications; prevent water and humidity damage.
- D. Remove existing work as indicated and required to accomplish new work.
  - 1. Remove items indicated on Contract Drawings.
- E. Services including, but not limited to, HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
  - 1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
  - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
  - 3. See Section 01 10 00 - Summary for limitations on outages and required notifications.
  - 4. Verify that abandoned services serve only abandoned facilities before removal.
  - 5. Remove abandoned pipe, ducts, conduits, and equipment. Remove back to source of supply where possible, otherwise cap stub and tag with identification.
- F. Protect existing work to remain.
  - 1. Prevent movement of structure. Provide shoring and bracing as required.
  - 2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
  - 3. Repair adjacent construction and finishes damaged during removal work.
  - 4. Patch to match new work.

**3.05 DEBRIS AND WASTE REMOVAL**

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION 02 41 00**

**SECTION 03 41 00  
PRECAST CONCRETE STRUCTURES**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Scope:
  - 1. Precast altitude valve vault.

**1.02 SUBMITTALS**

- A. Shop Drawings:
  - 1. Fabrication and/or layout drawings:
    - a. Include detailed diagrams of vault showing typical components and dimensions.
    - b. Indicate knockout elevations for all piping entering each structure.
- B. Supplier's concrete mix data sheet showing contents and proportions of cement, aggregate, water, and any admixtures.
- C. Reinforcing steel schedule.

**PART 2 - PRODUCTS**

**2.01 ACCEPTABLE MANUFACTURERS**

- A. Precast vault:
  - 1. Christy Concrete Products
  - 2. Oldcastle Infrastructure
  - 3. Jensen Precast
  - 4. Vault Access Solutions (VAS)
  - 5. Or approved equal

**2.02 VAULTS AND GRATES:**

- A. Size as shown on plans.
- B. Traffic rated grate and frame, AASHTO H20 loading.
- C. Conform to requirements of ASTM C858.
- D. Reinforcement shall be deformed reinforcement in accordance with ASTM A615 or ASTM A185 for welded wire fabric.

**PART 3 - EXECUTION**

**3.01 STRUCTURE CONSTRUCTION**

- A. General:
- B. Place precast structures on 6 inches compacted Class 2 aggregate base.
- C. Build each structure to dimensions shown on plans and at such elevation that pipe sections built into wall of structure will be true extensions of line of pipe.
- D. Seal all pipe penetrations in structures. Form pipe openings smooth and well shaped. After installation, seal cracks with non shrink grout. After grout cures, wire brush smooth and apply two coats emulsified fibered asphalt compound to minimum wet thickness of 1/8 inch to ensure complete seal.
- E. Set and adjust frame and cover final 6-inch (minimum) to 18-inch (maximum) to match finished pavement or finished grade elevation using precast adjuster rings.
- F. All exterior concrete surfaces to be buried and in contact with soil shall have a minimum 30 mils of bituminous mastic or approved equal coating.

**END OF SECTION 03 41 00**



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**SECTION 09 96 00  
HIGH-PERFORMANCE COATINGS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Scope of work:
  - 1. Contractor shall furnish all equipment, tools, labor, and materials necessary to:
    - a. Repair of shop-painted surfaces damaged during shipment, handling, or installation.
    - b. Field priming of all new surfaces that are not shop-primed.
    - c. Field finishing of all shop-primed surfaces.
    - d. Field finishing of all field-primed surfaces.
    - e. Field prime and finishing of all above grade piping.
- B. Section Includes: High-performance coatings and special preparation of surfaces.

**1.02 REFERENCE STANDARDS**

- A. American National Standards Institute (ANSI):
  - 1. Z53.1, Safety Color Code for Marking Physical Hazards
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM D3960, VOC Content Determination.
- C. National Bureau of Standards (NBS):
  - 1. Certified Coating Thickness Calibration Standards.
- D. National Fire protection Association (NFPA):
  - 1. 101, Life Safety Code.
- E. The Society for Protective Coatings (SSPC):
  - 1. SSPC-SP 1, Solvent Cleaning.
  - 2. SSPC-SP 2, Hand Tool Cleaning.
  - 3. SSPC-SP 3, Power Tool Cleaning.
  - 4. SSPC-SP 6, Commercial Blast Cleaning.
  - 5. SSPC-SP 7, Brush-off Blast Cleaning
  - 6. SSPC-SP 10 , Near-White Blast Cleaning.
- F. American Water Works Association (AWWA):
  - 1. AWWA C210, Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings.
  - 2. C222, Polyurethane Coatings for Interior and Exterior of Steel Water Pipe and Fittings.
- G. National Sanitation Foundation (NSF):
  - 1. Standard No. 61.

**1.03 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures.
  - 1. Product Data:
    - a. Provide VOC (g/l) emittance concentrations for all paint types submitted and certification of compliance with the local Air Quality Management District.
    - b. Complete Manufacturer's Product Data, Certificates, and Test Data.
    - c. Label each paint submittal with paint type and the intended use for that specific paint type.
    - d. Manufacturer's surface preparation instructions.
    - e. Material Safety Data Sheets (MSDS) for all solvents, thinners and mineral spirits.
  - 2. Color Samples:
    - a. Furnish 3 color chips for color selection by District.
    - b. Engineer will prepare color schedule after submittals. Contractor will provide colors in accordance with Schedule. Selections by District may exceed manufacturer's

standard range of colors.

3. Maintenance Data: Provide manufacturer's recommended maintenance data on each type of paint or coating system.
4. Proposed containment strategy for full containment.

#### **1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Container Labeling: Include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- B. Inspection:
  1. Accept materials on Site in manufacturer's sealed and labeled containers.
  2. Inspect for damage and to verify acceptability.
- C. Store materials in ventilated area and otherwise according to manufacturer instructions.
- D. Protection:
  1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
  2. Provide additional protection according to manufacturer instructions.

#### **1.05 JOB CONDITIONS**

- A. Environmental Requirements:
  1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be applied.
  2. Do not apply finish in areas where dust is being generated.
  3. Air and surface temperature within those recommended by manufacturer for coating being applied.
  4. Provide adequate ventilation and safety measures for employees and other authorized personnel.
- B. Dust Containment during Blasting and Painting:
  1. Provide full containment for all blasting and painting applications.
  2. Purpose: Contain paint and sand particle dust due to potential for lead and proximity of neighboring residences and businesses.
  3. Enclosure system for outdoor application:
    - a. Provide temporary enclosure system for containment of sand blasting and paint dust particulates.
    - b. 10 mil polyethylene sheeting, or equivalent.
    - c. Maintain containment until dust particulates cleaned up and removed from area.
  4. Personal protection:
    - a. Provide disposable clothing, personal air samplers and respirators as required for all personnel.
    - b. Provide personal shower and hand washing facilities.
  5. Signage: Provide temporary signage, "CAUTION, Respirators and Protective Clothing Required".
  6. Manufacturer: Eagle Industries, or equal.

#### **1.06 TANK COATINGS ANNIVERSARY INSPECTION**

- A. General:
  1. Painted surfaces will be inspected approximately 11 months after the painting work has been completed and accepted by the District. The purpose of the 11-month inspection is to determine whether any repair work is required. The Contractor shall initiate the scheduling of such inspection and shall provide all required access equipment. The District shall confirm the date of the inspection via a written acceptance of the Contractor's proposed schedule.

2. Should the 11-month inspection occur during the mandatory summer production period, the inspection window may be extended to within the first 30 days of the next winter shutdown period. This extension does not relieve the Contractor from providing any necessary paint repairs.
  3. The inspection shall be performed by the Contractor and the District and/or the Engineer employed by the District.
  4. Should an inspection date not be established and repair work not completed within 12 months after original painting work has been completed and accepted by the District, the painting warranty shall be extended until inspection and repair of all painting work has been completed.
- B. 11-Month Inspection Report:
1. Within 30 days of the inspection, the District shall prepare and deliver to the Contractor an inspection report detailing the results of the 11-month inspection. The report shall indicate the number and type of failures observed and the percentage of surface area where failure occurred. The inspection report shall include color photographs depicting each type of failure and suggested repair procedure.
- C. Repairs:
1. Provide written confirmation of the suggested repair procedure from the coating manufacturer. Perform all indicated repairs in accordance with the provisions of this Section with 60 days of receipt of the 11-month Inspection Report at no cost to the District.

## **PART 2 PRODUCTS**

### **2.01 GENERAL:**

- A. Use product of single manufacturer for coating systems for each type of surface.
- B. Use paint compatible with shop coating or primer for field coating of shop-painted or primed surfaces.
- C. Use only mercury-free, fume-proof paint for intermediate and finish coats.
- D. Use only lead-free paint or paint that does not cause discoloration.
- E. Provide tie coats where recommended by manufacturer.
- F. Use only paint which complies with VOC limits defined by the local air quality management district regulations.
- G. Provide surface preparation for each paint type and surface type in accordance with manufacturer's recommendations.
- H. All materials that may come into contact with potable water must meet the requirements of NSF 61.
- I. Paint of same type and color to be from the same manufacturing 'lot' or 'run' number to ensure color continuity.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence or quality of work and that cannot be put into acceptable condition through preparatory work as included in Preparation of Surfaces.
- B. Do not proceed with surface preparation or coating application until conditions are suitable.
- C. Inspector will inspect and approve surface preparation of all areas prior to painting.
- D. Painter to maintain onsite necessary devices for measuring air temperature, humidity, dew point, wet bulb, and surface temperature.
- E. Test all coated surfaces for pinholes and holidays after application of the final coat.

1. Perform test in the presence of the Inspector.
2. Perform test after coating has cured as recommended by the manufacturer.
3. As directed by the Inspector, use either a low voltage wet sponge holiday detector or a high voltage holiday detector.
  - a. Low voltage wet sponge holiday detector, for coatings to 20 mils dry film thickness, shall be equal to K-D Bird Dog or Tinker-Razor M-1. Add a non sudsing wetting agent, such as Eastman Kodak Photo-Flo to the water used to saturate the sponge.
  - b. High voltage holiday detector, for coating more than 20 mils dry film thickness, shall be equal to Tinker-Razor AP-W or D. E. Sterns Model 14/20. Use in accordance with the coating manufacturer's recommendations except use a voltage of 125 volts per mil of coating.
4. Retest after coating repairs.

### 3.02 PREPARATION

- A. Ferrous Metal Surfaces: Unless otherwise indicated, per SSPC Painting Manual, Vol. 2, "Systems and Specifications:"
  1. Complete fabrication, welding or burning prior to beginning surface preparation:
  2. Chip or grind off flux, spatter, slag or other laminations left from welding.
  3. Remove mill scale.
  4. Grind smooth rough welds and other sharp projections.
  5. Steel: Structural, pipe, and equipment:
  6. Non-submerged: SSPC-SP 10.
  7. Submerged or partially submerged: SSPC-SP 10.
  8. High temperature surfaces subject to heat in excess of 600 Degrees F: SSPC-SP 10.
  9. Mill-coated steel pipe:
  10. Exterior non-submerged: SSPC-SP 10.
  11. Exterior submerged: SSPC-SP 10.
  12. Galvanized steel: SSPC-SP 1 for dry surfaces; SSPC-SP 7 for damp surfaces.
  13. Steel pipe receiving fusion bonded epoxy: SSPC-SP 10.
  14. Stainless steel: Solvent clean.
- B. Hardware:
  1. Remove any visible dirt, corrosion, or foreign material.
- C. Sandblasting Procedures:
  1. Conduct all blasting in accordance OSHA and Calaveras County Air Pollution Control District regulations.
  2. Do not allow surfaces to become wet after blasting and before painting.
  3. Apply primer same day as blasting.
  4. Depth of sandblasted surface: Not less than 1 mil or greater than 2 mils.
  5. Air free of water and oil.
  6. Fully contain sandblast sand and dust to area being prepared.
  7. Protect nameplates, valve stems, rotating equipment, motors, and other damageable items.
  8. Do not reuse sand.
  9. Plug pipe, holes, or openings before sandblasting. Keep covered until sand removed.
  10. Provide full containment.
  11. Prevent blasting material from draining offsite or into storm drains.
- D. Surface Preparation of Previously Painted Surfaces:
  1. Remove existing paint from entire surface.
  2. All previously painted surfaces selected for new coating to be prepped per SSPC-SP 10.
- E. Protection of Surfaces:

1. Use drop cloths, masking tape, and other measures to protect all surfaces from accidental spraying, spattering, or spilling of paint.
2. Repair all damage caused by painting to other items of Work.
3. Immediately remove paint deposited on surfaces not being painted.
4. Surface clean bituminous paints spilled or dropped and spot paint with aluminum paint prior to specified paint.
5. Remove and rebuild concrete surfaces damaged by paint, or where authorized by Inspector, paint with 2 coats masonry paint.

### **3.03 MIXING AND TINTING**

- A. Deliver paints and enamels ready-mixed to job site.
- B. Mix only in mixing pails, suitably sized, non-ferrous or oxide metal pans.
- C. Use tinting colors recommended by manufacturer for specific type of finish.
- D. Do not add any adulterants or unauthorized thinners.
- E. Thoroughly mix each time the paint is withdrawn from container.
- F. Keep containers closed tightly, except while paint is withdrawn.
- G. All paint shall be factory mixed.
- H. Thinning only permitted to obtain recommended coverage at lower application temperatures.
- I. Do not thin paint below recommended coverage rate.
- J. Two-part epoxy paint systems:
  1. Painter shall notify Inspector prior to mixing of each batch of two-part epoxy paint.
  2. Contractor shall verify for Inspector that appropriate "sweat in" time has been provided for each batch in accordance with paint manufacturer's specifications.

### **3.04 APPLICATION**

- A. General Requirements:
  1. Do not apply initial coating until moisture content of surface is within moisture limitations of paint manufacturer.
  2. Atmospheric control:
    - a. Provide ventilation, dehumidification and heating equipment for the duration of all field sandblasting and painting when atmospheric conditions are outside the suggested manufacturer range. Reference SSPC-TR3 for dehumidification and temperature control.
    - b. Capacities as selected by manufacturer to permit unrestricted production through the project duration.
    - c. Dehumidification/ventilation equipment to remain in operation for at least 72 hours after the final interior finish coat application if atmospheric conditions are outside of manufacturer's suggested range.
    - d. Capacity: 2 complete air changes per hour.
    - e. Maintain a relative humidity of 35 percent.
    - f. Conform to the guidelines set forth by equipment supplier.
  3. Apply paint with suitable brushes, rollers, or spraying equipment:
    - a. Rate of application shall not exceed that as recommended by paint manufacturer for the surface involved.
    - b. Keep brushes, rollers, and spraying equipment clean, dry, free from contaminants and suitable for the finish required.
  4. Comply with recommendation of product manufacturer for drying time between succeeding coats.
  5. Vary slightly the color of successive coats. Final coat color to be uniform.
  6. Sand and dust between each coat to remove defects visible from a distance of 5 feet.

7. Finish coats shall be smooth, free of brush marks, streaks, laps or pile up of paints, and skipped or missed areas.
8. Inspection:
  - a. Do not apply additional coats until completed coat has been inspected by the Engineer.
  - b. Only inspected coats of paint will be considered in determining number of coats applied.
  - c. Make edges of paint adjoining other materials or colors clean and sharp with no overlapping.
  - d. Leave all parts of moldings and ornaments clean and true to details with no undue amount of paint in corners or depressions.
  - e. Apply primer on all work before glazing.
  - f. Refinish whole wall where portion of finish color is not uniform or has been damaged or is not acceptable.
  - g. Surfaces to be painted with water-thinned paint: Spot prime exposed nails and other ferrous metals with aluminum paint.
  - h. Provide full containment for all blasting and painting applications.
  - i. Relative humidity: Provide dehumidification control in accordance with 3.4.A.2 above.
- B. Painted Work:
  1. Back prime all exterior woodwork with oil-base primer.
  2. Back prime all interior trim.
  3. Runs on face not permitted.
- C. Rate of Application:
  1. Coverage not greater than value recommended by manufacturer.
  2. Use of paint thinner not to be used as means of extending coverage of paint.
- D. Touch-up:
  1. Touch-up paint to be applied with roller or spray to provide similar texture to original primer or finish coat. Brush apply touch-up only for small areas approved by Engineer, or where original prime or finish coats approved to be brush applied.

### **3.05 CLEANING**

- A. Touch-up and restore finish where damaged.
- B. Remove spilled, splashed, splattered or overspray paint from all surfaces.
- C. Do not mar surface finish of item being cleaned.
- D. Leave storage space clean and in condition required for equivalent spaces in project.

### **3.06 PAINTING SCHEDULE:**

- A. Metal Surfaces:
  1. Surface preparation: Sandblast per SSPC-SP 10, with 1-3 mil blast profile. Comply with recommendations of paint manufacturer, AWWA C210, C222, and AWWA D102 as applicable, and this specification section for use with potable water.
  2. Note atmospheric control requirements in accordance with paragraph 3.04A of this specification section.
  3. Primer: Series 20-1255 Tnemec, Beige, 5 mil DFT minimum or Carboline Kop-Coat 340 Gold Primer, 5 mil DFT minimum.
  4. Finish: Two coats (first grey and second white), Series 20 Epoxy Polyamide Tnemec, or Carboline Kop-Coat 891, 5 mil DFT minimum per coat Two coats (first grey and second white).
  5. Total dry film thickness: 15-20 mils.
  6. Exterior top coat: Manufacturer's compatible acrylic polyurethane per AWWA C222, 3-5 mils DFT. Tnemec series 72 Endurashield, Carboline Carbothane 133, or equal.

7. Interior coatings shall be ANSI/NSF 61 certified for contact with potable water. Tnemec Series 72 Edurashield. Carboline Carbothane 133, or equal.
- B. All submerged or partially submerged and buried exterior surfaces, not in contact with potable water, including valves, valve boxes, cast iron and steel pip, supports, fittings, flanges and bolts:
  1. Primer: 46-450 Tnemec-Tar or Bitumastic "Super Service Black" at 10 mils.
  2. Finish: 46-450 Tnemec-Tar or Bitumastic "Super Service Black" at 10 mils.
  3. Total dry film thickness: 20 mils DFT.
- C. All submerged or partially submerged steel surfaces in contact with potable water.
  1. In accordance with Section 3.06.A of this specification.
- D. All exposed surfaces of cast iron and steel piping inside buildings, including valves, fittings, flanges, bolts, supports, and accessories therefore, including galvanized surfaces:
  1. Primer: Tnemec Series 135 Chembuild or Carboguard 890 at 5.0 mils.
  2. Finish: Tnemec Series 69 Epoxoline or Carboguard 890 at 6.0 mils.
  3. Total dry film thickness: 11.0 mils.
  4. Color: To be selected from manufacturer's standards by District.
- E. All above-grade outdoors, including valves, fittings, flanges, bolts, supports, and accessories therefore, including galvanized surfaces:
  1. Primer: Tnemec Series 135 Chembuild or Carboguard 890 at 5.0 mils
  2. Finish: Series 20 Epoxy Polyamide Tnemec or Carboline Kop-Coat 891, 5 mil DFT minimum per coat
  3. Total dry film thickness: 11.0 mils
  4. Color: To be selected from manufacturer's standards by District.

### **3.07 SURFACES NOT TO BE PAINTED**

- A. Except As Otherwise Required or Directed, Do Not Paint the Following Surfaces:
  1. Exposed surfaces of aluminum.
  2. Polished or finished stainless steel. Unfinished stainless steel shall be painted.
  3. Nickel or chromium.
  4. Rubber and plastics, including fiberglass-reinforced plastics.
  5. Exterior concrete.
  6. Surfaces specified to be factory finished.
  7. Existing manufacturer nameplates.

### **3.08 CLEANING**

- A. Collect waste material that may constitute fire hazard, place in closed metal containers, and remove daily from Site.
- B. Clean surfaces immediately of overspray, splatter, and excess material.
- C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

### **3.09 PROTECTION**

- A. Protect adjacent surfaces and materials not receiving coating from overspray.
- B. Mask when necessary to provide adequate protection and repair damage.

**END OF SECTION 09 96 00**



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**SECTION 11 00 72**  
**PUMPING EQUIPMENT: VERTICAL TURBINE (LINE SHAFT)**

**GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Vertical turbine pumps to be placed in existing booster pump station.
- B. Related Sections include but are not necessarily limited to:
  - 1. Section 01 33 00 – Submittal Procedures.

**1.02 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Iron and Steel Institute (AISI).
  - 2. American National Standard Institute (ANSI):
    - a. B16.1, Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.
  - 3. ASTM International (ASTM):
    - a. A48, Standard Specification for Gray Iron Castings.
    - b. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
    - c. A108, Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality.
    - d. A120, Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless for Ordinary Uses.
    - e. A276, Standard Specification for Stainless Steel Bars and Shapes.
    - f. B505, Standard Specification for Copper-Base Alloy Continuous Castings.
    - g. B584, Standard Specification for Copper Alloy Sand Castings for General Applications.
  - 4. American Water Works Association (AWWA):
    - a. E101, Deep Well Vertical Turbine Pumps - Line Shaft Type.
  - 5. Hydraulic Institute Standards (HI).
  - 6. Society of Automotive Engineers (SAE).
- B. Quality Assurance
  - 1. Equipment furnished under this Section shall be supplied by manufacturers who have been regularly engaged in the design and manufacture of the equipment for at least five years. Manufacturers shall demonstrate to the satisfaction of the Engineer and Owner that the quality is equal to equipment made by those manufacturers named herein.
  - 2. The manufacturer shall have a factory owned service center within 250 miles of Project Site
- C. Warranty
  - 1. Minimum warranty will be 12 months. Warranty time is not to begin until pump is accepted by Owner. Acceptance is contingent upon installation and successful completion of the field test.

**1.03 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Section 01 33 00.
  - 2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Pump performance curves over entire operating range of pump.
    - c. Motor data.
    - d. Pump layouts and dimensions.

- e. Performance data and curves with flow (gpm), head (FT), horsepower, efficiency, NPSH requirements, submergence requirement.
  - f. Pump accessory data.
  - g. Bearing supports, shafting details and lubrication provisions.
3. Manufacturer's installation instructions.

B. Operation and Maintenance Manuals:

#### 1.04 SEISMIC REQUIREMENTS FOR ANCHORING EQUIPMENT

- A. General: All, pumps their components and appurtenances, including their anchorages, supplied by manufacturers or suppliers, shall be designed for the following seismic forces:

$$FP = 4.0 Ca IP WP$$

- where: FP = Lateral Seismic Force  
 Z = Seismic Zone Factor = 0.3 for Zone 3  
 IP = Seismic Importance Factor = 1.5  
 Ca = Seismic Coefficient  
 WP = Operating Weight of the Equipment Including Contents

### PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
- 1. Byron Jackson.
  - 2. Floway.
  - 3. Or approved equal.

#### 2.02 PERFORMANCE AND DESIGN REQUIREMENTS

- A. Performance Parameters:
- 1. High Head Pump (variable speed):
    - a. Primary design conditions (pumps in parallel): 3,300 gpm at 435 FT TDH and 82 percent minimum efficiency.
    - b. Secondary design conditions (single pump): 1,650 gpm at 440 FT TDH and 82 percent minimum efficiency.
    - c. Maximum speed: 1770 rpm.
    - d. Maximum required horsepower: 250 HP anywhere on curve.
    - e. Maximum shutoff condition: 0 gpm at 575 FT.
    - f. Column size: 10 IN.
    - g. Discharge flange: 20 IN (350 psi flange).
    - h. Type of discharge head: surface type, fabricated.
    - i. NPSH required: 13.80 FT.
    - j. Minimum submergence available: 3.5 FT.
- B. Provide pumps with increasing head characteristics from secondary design conditions to primary design condition. Provide pumps with net positive suction head requirements (NPSHR) less than the net positive suction head available (NPSHA) at all operating conditions.
- C. Pump Best Efficiency Point:
- 1. Flow shall be within a tolerance of +5 percent to -2 percent of the primary design condition flow.
  - 2. Primary design point shall not be less than 90 percent of the pump best efficiency point flow, or greater than 102 percent.

#### 2.03 ACCESSORIES

- A. Anchorage:
- 1. Cast-in-place anchorage:

- a. Provide ASTM F593, Type 316 stainless steel anchorage for all equipment.
  - b. Configuration and number of anchor bolts shall be per manufacturer's recommendations.
  - c. Provide two nuts for each bolt.
- 2. Drilled anchorage:
  - a. Adhesive anchors.
  - b. Epoxy grout.
  - c. Threaded rods same as cast-in-place.
- B. Data Plate:
  - 1. Attach a stainless steel data plate to each piece of rotary or reciprocating equipment.
  - 2. Permanently stamp information on data plate including manufacturer's name, equipment operating parameters, serial number and speed.
- C. Gages:
  - 1. Provide at the following locations:
    - a. Inlet and outlet of all reciprocating, centrifugal and positive displacement mechanical and process equipment.
    - b. At locations identified on Drawings.
  - 2. Utilize tapping sleeves for mounting.
- D. Lifting Eye Bolts or Lugs:
  - 1. Provide on all equipment 50 LBS or greater.
  - 2. Provide on other equipment or products as specified in the narrow specifications.
- E. Each Unit:
  - 1. Lifting eye bolts or lugs.
  - 2. Plugged gage cock connection at suction and discharge nozzles.
  - 3. Tapped and plugged openings for casing and bearing housing vents and drains.
  - 4. Fittings for properly adding flushing lubricant.
  - 5. Pressure relief fittings for grease lubrication.
- F. Mechanical Seals:
  - 1. Provide as specified in the narrow-scope pump sections.
  - 2. Provide rotating balanced O-ring type.
  - 3. Provide water lubrication - cooling.
  - 4. Materials:
    - a. Metal parts except springs: 316 stainless steel.
    - b. Springs: Hastelloy C.
    - c. Seal faces: Unfilled carbon graphite versus silica-free Grade 99.5 ceramic.
- G. Elastomers: Viton.

## 2.04 COMPONENTS

- A. General:
  - 1. Furnish units consisting of a vertical shaft turbine, direct connected to a vertical hollow shaft motor with a steady bushing. Design unit with non-reversing ratchets.
  - 2. Weight of revolving parts of pump including unbalanced hydraulic thrust of impeller is carried by thrust bearing in driver.
  - 3. Make provision at driver shaft for adjusting impeller with reference to bowls.
  - 4. Unless otherwise stated herein, the pump construction shall in all respects conform to ANSI/AWWA E101 for Vertical Turbine Pumps.
  - 5. Seismic: Entire pump and installation including motor, discharge head, anchors, column, drive shaft, pump bowls and impellers and fasteners shall comply with the seismic requirements in Section 11005.
  - 6. All wetted components must comply with NSF 61 requirements.

- B. Column:
1. Construct 16 IN discharge column pipe of 0.375 IN thick steel and supply with flanged connections.
  2. Provide top and bottom sections of column pipes to 5 FT lengths.
  3. Provide intermediate column sections not exceeding 10 FT in length.
  4. Abrasive blast interior and exterior column.
  5. Coat with Tnemec Series 91 H2O Hydro-Zinc (Prime: 1 coat, 3 mils) and Tnemec Series N140 Pota-Pox (polyamidoamine Epoxy) (Finish 1: coat at 5 mils, Finish 2: coat at 5 mils) or equivalent Carboline or Koppers coatings. Coating shall be NSF approved for potable water.
  6. Provide coating equal to that recommended by Tnemec, Carboline, or Koppers and approved for use with potable water.
  7. Provide 316 stainless steel bolting for all column flange connections.
  8. Provide o-rings for sealing column flanges.
- C. Enclosed Line Shaft:
1. Construct line shafting from ASTM A582-416SS stainless steel, rolled and ground.
  2. Provide shaft with a minimum 1-11/16 IN diameter in sections having maximum length of 10 FT.
  3. Enclose line shaft in tube constructed of 2-1/2 IN diameter, 304 SS, Sch 80 Pipe in sections not to exceed 5 FT in length.
  4. Provide ASTM B505 bronze line shaft bearings at maximum 5 FT intervals.
    - a. Furnish sealed tension bearing assembly to provide tension on shaft enclosing tube and to serve as line shaft bearing. Construct bearing portion of assembly from bronze and assure it is designed not to "freeze" to shaft enclosing tube.
  5. Provide connection to external fresh water piping to provide proper lubrication of shaft bearings.
- D. Pump Bowl and Suction Bell:
1. Provide bowl constructed of alloy steel, ASTM 4330 HT or equal, free from imperfections and accurately machined and fitted.
  2. Abrasive blast and coat pump bowl ID and OD. Apply manufacturer's standard abrasion-resistant baked enamel, phenolic or epoxy on bowl ID. Coat bowl OD per Article 2.4, B.5. above.
  3. Suction bell to be close grained cast iron, ASTM A48.
  4. Separate flanged impeller case to be ASTM 4330 HT or equal.
  5. Provide ID and OD coatings that are NSF approved for potable water service.
  6. Design to ensure easy removal of bearings and impeller.
  7. Furnish suction bell with flared end to reduce entrance losses and with a sufficient number of vanes to support lower guide bearings and weight of impeller and pump shaft when dismantling pump.
  8. Furnish ASTM A479 TP 410 stainless steel wear rings on all pump bowls.
  9. The bowl shaft shall be rifle bored to allow fresh water lubrication to the bearing surfaces.
- E. Bearings:
1. Provide units with sleeve bearings of bronze ASTM B505 in each bowl and in suction bell.
  2. In bowl, provide main bronze bearing immediately above impeller and a lower bronze bearing immediately below impeller.
  3. Provide for lubrication of bowl bearings from an external fresh water injection line.
  4. Furnish suction bell bearing having minimum length equal to five shaft diameters.
  5. Bell bearing to be freshwater lubricated.
  6. Bottom bell bearing shall be protected from sand or grit by means of a bronze sand cap.
- F. Pump Shaft and Impeller:

1. Provide pump unit shaft constructed of rolled and ground ASTM A479-410 HT stainless steel.
  2. Furnish semi-enclosed type impellers constructed of ASTM 433 HT alloy steel or equal and securely attached to impeller shaft.
  3. Ensure impeller is accurately fitted and statically and dynamically balanced to Hydraulic Institute Standards.
  4. Impellers shall have integral wear rings.
  5. Provide ASTM A479 TP 410 stainless steel replacement wear rings in each bowl to prevent wear on bowls.
  6. The first critical shaft speed shall be at least 125 percent of normal operating speed.
  7. The axial position of the impeller shall be adjustable for optimum efficiency or to compensate for wear by means of adjustment at the motor.
- G. Discharge Head Assemblies:
1. Centerline elevation of discharge flange/head shall be shop fabricated to match centerline elevations of existing pump discharge piping. Field verify required dimensions prior to fabrication.
  2. Design discharge head assembly for 150 psi working pressure and 250 psi test pressure.
  3. Provide discharge head for above ground mounting constructed of fabricated steel with integral discharge flange and 1/2 IN tap to accept ARV assembly. Also provide port for external fresh water injection piping connection. Provide direction of rotation arrow.
  4. Construct discharge nozzle with a vertical vane to minimize turbulence.
  5. Furnish ANSI B16.1 125/150 LB discharge flange and a flange x victaulic steel spool for connection to existing piping. Field verify spool length.
  6. Mount discharge head on fabricated steel base plate of sufficient size to span opening in support structure. Field verify required dimensions.
  7. Supply base plate with lifting lugs capable of supporting weight of entire unit.
  8. Furnish cartridge style mechanical seals as per Section 11060, designed to handle potable water at system head and shut-off pressures specified herein.
  9. Provide a mechanical seal and a flanged adjustable spacer type coupling for use within a hollow shaft motor. All metallic parts of the mechanical seal shall be type 316 stainless steel. All seal components shall be suitable for a pH 5.0 to 11.0. Top shaft shall be of the same material as line shaft. Provide type 304 stainless steel shaft sleeve through seal area.
  10. Abrasive blast discharge head assembly interior and exterior and coat per Article 2.4, B.5. above; coating shall be NSF approved for potable water.
- H. Suction Baffle:
1. Supply heavy duty 304 stainless steel suction baffle as detailed in Figure 1.
  2. Suction baffle shall be fastened to suction bell with 316 stainless steel bolts.
- I. Data Plates:
1. Provide stainless steel data plate securely attached to pump.
  2. Include manufacturer's name, pump size and type, serial number, speed, impeller diameter, capacity and head rating, and other pertinent data.
- J. Motors:
1. Vertical hollow shaft, high thrust squirrel cage, induction type, inverter rated.
  2. 460 V, 60 HZ, 3 PH.
  3. Open, WP-1 type with 1.15 service factor, premium efficiency, NEMA nominal efficiency 95.0.
  4. Size motor to drive pump continuously over the complete head - capacity range without the load exceeding the nameplate rating.
  5. Design motor for 40 DegC ambient.

6. Motors shall be suitable for operation with a full voltage starter, reduced voltage solid state starter or VFD over the specified operating range of the pump.
7. Installation Class F.
8. Code G.
9. Provide a 120 VAC single phase motor heater. Bring leads out to motor terminal box.

## 2.05 MAINTENANCE MATERIALS

- A. Extra Materials:
  1. Furnish the Owner the following extra parts:
    - a. Seal: One (1) complete spare cartridge style mechanical seal, with all appurtenances required for installation.
    - b. For the shaft: One (1) complete set of bearings.
    - c. For the bowl assembly: One (1) complete set of bearings an impeller wear rings and bowl wear rings with all appurtenances required for complete installation.

## EXECUTION

### 3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions in the presence of the manufacturer's engineer or designated representative.
- B. Check pump and motor alignment according to the standards of the Hydraulic Institute after complete unit has been installed at the site.
- C. Installation includes connection to existing discharge piping and to existing services with the exception that no electrical connection will be made.

### 3.02 SOURCE QUALITY CONTROL

- A. Factory Test Requirements
  1. All units:
    - a. Hydrostatic test at 150 percent of shutoff head for a minimum of 5 minutes.
  2. Adjustable speed units:
    - a. Head (FT) verses flow (gpm) pump curves:
      - 1) Maximum, minimum and two equally spaced intermittent speeds.
      - 2) Efficiencies along each curve.
      - 3) Brake horsepower along each curve.
  3. Constant speed units:
    - a. Head (FT) versus flow (gpm) pump curves:
      - 1) Efficiencies along curve.
      - 2) Brake horsepower along each curve.
  4. Results certified by a registered professional engineer.
- B. Statically and dynamically balance each pump per HI standards.
- C. Factory tests: Results from all tests conducted on any pumping system shall be prepared to industry standards and are subject to Owner approval. Such reports shall be included in the manuals submitted to the Owner.
  1. General:
    - a. Factory test one (1) pump of each service class.
    - b. Field tests shall be performed on all installed pumps.
    - c. Results of factory tests shall be submitted to and approved by Owner prior to shipping pumps. If a unit fails a factory test due to defects in materials, workmanship, and/or due to performance issues, it shall be fixed by the manufacturer and the factory test shall be repeated at no cost to the Owner.
  2. Hydrostatic test:
    - a. Each part of the pump that contains liquid under pressure shall be capable of withstanding hydrostatic test of 150 psig for a minimum of 10 minutes.

- b. Test liquid shall be water.
  - c. The test shall be conducted on entire liquid containing area of the pump.
  - d. No leakage or pressure lost is allowable, except through the stuffing box packing.
  - e. Document test of each pump in accordance with Hydraulic Institute requirements.
3. Performance test:
- a. Perform test in accordance with Hydraulic Institute 2.6 – 1994 Vertical Pump Tests.
  - b. Furnish characteristic curve including efficiency and horsepower.
  - c. Results shall be certified by a registered engineer.
  - d. The job motor shall be used for factory pump tests and shall be operated at its rated full load speed.
  - e. Document test of each pump in accordance with Hydraulic Institute requirements.
4. Witnessed tests:
- a. Two representatives of the Owner and one of the Engineers may witness all shop tests as well as inspect and check testing equipment used. Inform Engineer one (1) week prior to beginning of testing.
  - b. Submit test procedures and diagram of test set-up two weeks prior to witnessed tests.

### 3.03 FIELD QUALITY CONTROL

- A. After installation of all pumps, pump manufacturer or authorized representative shall perform the following:
- 1. Check equipment for vibration and verify that it is within specified limits.
    - a. Test units installed at normal operating conditions discharging into the system at all rates between low and high discharge head conditions.
    - b. Vibration RMS velocity shall not exceed that allowed by Hydraulic Institute 9.6.4-2000 Vertical Pumps Figure 9.6.4.13.
    - c. If units' exhibit vibration in excess of the limits specified adjust or modify as necessary. If unable to do so, then units shall be replaced at no cost to Owner.
    - d. Units with critical speeds located inside of the specified limits shall be replaced.
    - e. For all equipment tested, provide:
      - 1) Equipment identification number.
      - 2) Equipment nameplate information.
      - 3) Vibration tester/date/time.
      - 4) Vibration testing equipment and calibration date.
      - 5) General statement of environmental conditions.
      - 6) Characteristics of the measurement system.
      - 7) Machine operating conditions such as load, transient or steady state operation, etc.
      - 8) Description of resonance characteristics of the equipment mounting.
      - 9) Vibration background data.
      - 10) Vibration survey data.
      - 11) Vibration amplitudes versus frequencies graph.
      - 12) Vibration displacement versus frequency graph.
      - 13) Vibration velocity versus frequency graph.
      - 14) Vibration acceleration versus frequency graph.
      - 15) Installed pump curves, efficiencies, etc.
    - f. Determine units' resonance frequency.
- B. At the end of the first year of operation, repeat all the tests identified in Paragraph 3.3 B.

**END OF SECTION 11 00 72**



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## SECTION 26 05 00

### ELECTRICAL

#### PART 1 - GENERAL

##### 1.01 SCOPE OF WORK

- A. The Contractor shall install, ready for use, the electrical and instrumentation system as specified herein and shown on the Contract drawings. This document describes the function and operation of the system and particular components, but does not necessarily describe all necessary devices. All components and devices shall be furnished and installed as necessary/required to provide a complete operable and reliable system for accomplishing the functions and meeting the performance set forth hereinafter.
- B. Furnish all required labor, materials, project equipment, tools, construction equipment, safety equipment, transportation, test equipment, incidentals, and services to provide a complete and operational electrical & instrumentation system as shown on the E&I - Series Drawings, included in these Specifications, or required for fully operating facility.
- C. Examine the specification and Drawings for mechanical equipment and provide all circuit breakers, switches, pushbuttons and appurtenances which are not specified to be with the mechanical equipment. Erect all electrical equipment not definitely stated to be erected by others, furnish and install conduit, wire and cable and make connections required to place all equipment in complete operation.
- D. It is recommended that the Electrical Contractor attend the job walk for the site and shall have accomplished the following:
  - 1. Thoroughly examine existing conditions before submitting his bid proposal to perform any work. He shall compare site conditions with data given on the plans or in these Specifications. No allowance shall be made for any additional costs incurred by the Contractor due to his failure to have examined the site or to have failed to report any discrepancies to the Owner prior to bid.
  - 2. It is the Contractor's responsibility to be fully familiar with the existing utility locations, conditions and local requirements and regulations.
  - 3. Verify all measurements and conditions and shall be responsible for the correctness of same. No extra compensation will be allowed because of differences between Work shown on the Drawings and measurements at the site.
- E. Any major deviations in location and conduit routing that the Contractor makes without the express written review or direction of the Engineer, shall be considered to have been made at the Contractor's sole responsibility. Such deviations made by the Contractor shall be reflected on the Contractor supplied "Record Drawings." The Owner will reimburse the Engineer and the Owner will then deduct an amount equal to said reimbursement from the Contractor's contract for all engineering, drafting, and clerical expenses associated with updating the Record Drawings due to any major unauthorized changes.

- F. The major areas in the scope of work shown on E&I - Series Contract Drawings which includes the furnishing and installation:
1. Copper Cove Water Treatment Plant
    - a. Motor Control Center, Variable Frequency Drives, Control Panel including Programmable Logic Controller and Operator Interface (OI) hardware for controlling the pump, and other miscellaneous device.
    - b. Instrumentation and other miscellaneous devices. This includes all wiring and cables.
    - c. Reconnect I/O to existing field panels and instrumentation.
  2. Tank C
    - a. Chlorine Analyzer Panel.
  3. Provide all necessary conduits, junction boxes, grounding system, field interconnection wiring, hardware, fittings, and devices to connect the designated equipment and wiring.
  4. Installation of primary devices, equipment and instruments are not completely detailed on Contract Drawing plan sheets.
  5. All necessary miscellaneous shut off, sample, and calibration valves to sensors.
  6. Trenching, back filling, compaction and resurfacing to match existing surfaces for each underground conduit route.
  7. Grounding system and equipment grounding.
  8. Concrete pads and supports for electrical and instrumentation equipment
- G. SCADA and PLC programming will be done by others.
- H. Existing site is limited in space. It is the Contractor's responsibility to provide an electrical and instrumentation package to fit in the allocated space.
- I. Provide all necessary hardware, conduit, wiring, fittings, and devices to connect the electrical equipment provided under other Sections.
- J. All electrical equipment and materials, including installation and testing, shall conform to the applicable codes and standards listed in this and other Sections. All electrical work shall conform with the National Electrical Code (NEC) 2020 issue. Nothing on the Drawings or in the Specifications shall be construed to permit work or materials not conforming to these codes and standards.
- K. It is the Contractor's responsibility for obtaining instrumentation configuration software, manuals and disks necessary for the Contractor to program and configure the instrumentation. All software shall be licensed and turned over to the Owner.
- L. The following specifications incorporate specific equipment and devices that are standards of the Owner because of their serviceability, because of the local availability of labor, parts and materials, or because of the ability of the Owner to umbrella the equipment under existing maintenance contracts; however, favorable alternatives proposed in writing will be considered by the Owner.
- M. Contractor shall field verify all existing conditions, equipment, wires, conduit, etc. as required to complete the project

- N. It is the intent of the Owner to secure the highest quality of work for this project. System Integrator shall be responsible for supplying the control panels, all field instruments listed for Division 26, PLC hardware, drawings, submittals, startup and download, testing, training and operations & maintenance manuals.

## 1.02 CODES AND STANDARDS

- A. All electrical/instrumentation equipment and materials, including installation and testing, shall conform to the following applicable codes and standards:
1. ANSI - American National Standards Institute, Inc.
  2. EIA - Electronics Industries Association.
  3. ETL - Electrical Testing Laboratories.
  4. FM - Factory Mutual.
  5. GO128 - General Order No. 128, Rules for Construction of Underground Electrical Supply and Communication Systems, Public Utilities Commission of the State of California.
  6. IEEE - Institute of Electrical and Electronics Engineers.
  7. ICEA - Insulated Power Cable Engineers' Association.
  8. ISA - International Society of Automation (ISA) Standards (formerly Instrument Society of America).
  9. NEC - National Electrical Code, 2020 Edition.
  10. NEMA - National Electrical Manufacturers Association.
  11. NETA - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems, International Electrical Testing Association.
  12. NESC - National Electrical Safety Code.
  13. NFPA - National Fire Protection Agency & NFPA820
  14. OSHA - Occupational Safety and Health Act Standards.
  15. UL - Underwriter's Laboratories, Inc.
- B. The revisions of these codes and standards in effect on the date of issuance of the Contract Documents shall apply.
- C. Codes and standards referenced shall be considered minimum acceptable work.
- D. In instances where two or more codes are at variance, the most restrictive requirements shall apply.
- E. Nothing on the Drawings or in the Specifications shall be construed to permit work or materials not conforming to the preceding codes and standards.
- F. All work shall also be performed in accordance with the Owner, State, County or Owner standards, and local Utility codes.
- G. The Contractor shall furnish without extra charge any additional material and labor which may be required for compliance with these codes and standards, even though the work is not explicitly mentioned in the Specifications or shown on the Contract E- Series Drawings.

- H. Amperage listed on the single-line Drawings for motors are per NEC Table 430.250 and may not necessarily match that of the equipment supplied. It is the electrical system supplier and Contractor's responsibility to furnish equipment sized for the motors supplied for this project at no additional cost.
- I. All electrical work shall conform with the National Electric Code (NEC) 2020 issue and the latest NFPA 70E. Nothing on the Drawings or in the Specifications shall be construed to permit work or materials not conforming to these codes and standards.

#### 1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Provide electrical system that interfaces to work performed under other Mechanical and Equipment plans.
- B. The following is part of Division 26:
  - 1. Section 26 05 73 – Electrical System Analysis

#### 1.04 ELECTRICAL CONTRACTOR QUALIFICATIONS

- A. It is the intent of this Division that the complete responsibility for management and installation of the electrical and instrumentation required for this project be by a qualified Electrical Contractor. This responsibility includes, but not limited to, supervision and coordination of work performed by all suppliers of Division 16.
- B. Uncertified electricians shall not perform electrical work for which certification is required per Labor Code Section 3099. Electricians shall be required to carry proof of certification on their person at all times. Electricians found on the jobsite without proof of certification will be asked to leave, prohibited from working on-site until proof of certification has been provided and may be reported to the Contractors State License Board (CSLB).
- C. The Electrical Subcontractor shall meet the following minimum qualifications:
  - 1. Has a current C-10 Electrical Subcontractor's License.
  - 2. Has regularly engaged in similar electrical contracting for the Municipal Water Industry.
  - 3. Has successfully performed work of similar or greater complexity on at least two previous projects under one company name and under the present company name.
  - 4. Has all persons performing work as electricians certified by the California Apprenticeship Council per California Labor Code Section 3099.
  - 5. Has been actively engaged in the type of electrical and instrumentation work specified in this Division for a minimum of two years.
- D. Bid package shall include a list of five (5) completed projects of similar size and nature for water treatment plants the Electrical Contractor has completed:
  - 1. Provide completion dates of projects.
  - 2. References of Owner Representative in charge of project, including contact name and telephone number.

## 1.05 SYSTEM SUPPLIER QUALIFICATIONS

### A. General:

1. It is the intent of this Division that complete responsibility in the supplying of the Control Panels/PLC, and all instrumentation in Appendix "B" Device Index and other equipment required for this project be supplied by one System Supplier. This responsibility includes, but not limited to, all work necessary to select, furnish, program, supervise installation, calibrate, and place into operation all transmitters, instruments, controllers, alarm equipment, monitoring equipment, and accessories as specified herein.
2. The system supplier shall have an on staff project engineer with prior experience on similar sized projects. This project engineer shall coordinate the technical aspects of this project and prepare the submittals and drawings. The system supplier project engineer shall attend all coordination meetings and be on-site when requested by the Owner's Engineer.

### B. Pre-Qualified System Suppliers

1. The Suppliers listed below have been determined to meet minimum qualifications specified in this Division and are pre-qualified by the Owner for providing supplier bids as system suppliers on the project.
  - a. Primex Controls (phone 707 449-0341)
  - b. Technical Services, Inc. (TSI) (phone 530 710-3325)

### C. Non-Pre-Qualified System Suppliers

1. System Suppliers not pre-qualified by the Owner shall submit the information listed herein at least 14 calendar days prior to bid date, and if approved by the Owner, will be listed in a Contract addendum prior to bid.
  - a. Company history.
  - b. List of five (5) completed projects of similar size and nature for water treatment plants under one company name and under the present company name within the past five (5) years.
  - c. Provide completion dates of projects.
  - d. References of Owner Representative in charge of project, including contact name and telephone number.
  - e. List of projects in progress.
  - f. Description of scope of projects.
  - g. Dollar amount of projects.
  - h. References of Owner Representative in charge of project, including contact name and telephone number.
  - i. Complete 2023 Year End Financial statement prepared by a Certified Accountant or complete 2023 Company Tax Returns listing assets and liabilities.
2. Factory tests for this project shall be held within 150 miles of project location at the System Suppliers shop.

3. Additional information for clarification as requested by the Owner in writing shall be provided by the System Supplier asking for the qualification or qualification will automatically be denied.
4. System Supplier providing financial statements lacking detail or stating that detailed financial records are proprietary will be disqualified as a qualified System Supplier and is grounds alone for disqualification.
5. Any qualification package deemed incomplete or lacking sufficient information to determine qualification will result in System Supplier not being qualified.
6. No reason will be released on why a System Supplier was not qualified.

#### 1.06 CONTRACT DOCUMENTS

- A. The Contract drawings and specifications are intended to be descriptive of the type of electrical system to be provided; any error, omission, or minor details missing in either shall not relieve the Contractor from the obligations there under to install in correct detail any and all materials necessary for a complete operational system, at no additional cost.
- B. The Contract drawings are generally diagrammatic; exact locations of electrical products shall be verified in the field with the Engineer. Except where special details on drawings are used to illustrate the method of installation of a particular piece or type of equipment or materials, the requirements or descriptions in this Section shall take precedence in the event of conflict.
- C. The Contract Electrical elementary, elevation and one-line diagrams are the basis of the electrical system to be provided and are for reference only. It is the Contractor's responsibility to adjust and make minor revisions to the diagrams as necessary for operational system at no additional cost to the Owner. Additional isolators, relays, wiring, terminal blocks, and appurtenances, shall be provided for an operation system at no additional cost to the Owner.
- D. Location at facilities of new equipment, inserts, anchors, panels, pull boxes, conduits, stub-ups, and fittings for the electrical system are to be determined by the Contractor and Engineer at time of installation. Contractor shall make minor adjustments to locations of electrical equipment required by existing conditions and coordination with other trades at no additional cost.
- E. The Conduit and Wire Routing Schedule, wire fill, and number of conduits are based on the best information available.
  1. It is the Contractor's responsibility to modify the conduit schedule based upon Shop Drawings for the actual equipment. Such modifications in conduit sizes and numbers of conductors shall be at no additional cost to the Owner, if such changes are the direct result of the equipment selected by the Contractor.
  2. A copy of the Conduit and Wire Routing Schedule and Electrical plans showing conduit routing shall be updated weekly by the Contractor. Progress payments will be withheld if during monthly checks it is found that the Contractor fails to maintain the Conduit Schedule updates.

- F. Electrical & instrumentation, conduit & wire lengths shown on Contract Drawings are approximate. The Contractor is responsible for determining actual lengths for bidding and installation purposes. Contractor is to be made aware that equipment may be installed in the lower levels of the building and instrumentation manufacturer's cable length depends on conduit routing. It is the Contractor's responsibility to supply adequate instrument manufacturer cable length from the processor to the field instrument without splices. Cable length shall be coordinated and verified in the field with the Electrical Contractor. Splices found during field inspection or testing will require replacement of the instrument with the proper cable length without extension of Contract Time at no additional cost to the Owner.
- G. The Contractor shall examine the architectural, mechanical, structural, electrical and instrumentation equipment provided under other Sections of this Contract in order to determine the exact routing and final terminations for all conduits and cables. The exact locations and routing of cables and conduits shall be governed by structural conditions, physical interferences, and the physical location of wire terminations on equipment. Conduits shall be stubbed up as near as possible to equipment.
- H. All equipment shall be installed and located so that it can be readily accessed for operation and maintenance. The Engineer reserves the right to require minor changes in location of equipment, without incurring any additional costs.
- I. Provide means to furnish equipment and accessories, do the installation, complete connections, submit documentation, perform start-up, and be responsible for the warranty.
- J. Where conduits are shown as "home runs" on the Contract drawings or stated to be furnished, but not explicitly shown as part of the scope of work; the Contractor shall provide all fittings, boxes, wiring, etc., as required for completion of the raceway system in compliance with the NEC and the applicable specifications in this Section.
- K. No changes from the Contract drawings or specifications shall be made without written approval of the Engineer. Should there be a need to deviate from the Contract documents, submit written details and reasons for all changes to the Engineer for favorable review within 30 days after award of Contract.
- L. When existing conduits are to be used, it is the Electrical Contractor's responsibility to verify conduit size and routing. This includes all potholing or other location methods. Existing conductors and conduits damaged by Contractor during construction shall be repaired or replaced at no cost to Owner.
- M. The resolution of conflicting interpretation of the Contract documents shall be as determined by the Engineer.
- N. The Contractor shall coordinate with other Suppliers on the project for a complete and operable system.
- O. It is the System Supplier's responsibility for obtaining instrumentation transmitter configuration software, manuals, USB drives and disks necessary for the Contractor to program and configure the instrumentation transmitters.



- P. The Electrical Contractor shall maintain a separate set of neatly and accurately marked set of Record Documents, consisting of spreadsheets, specifications and full size blue-line Electrical (E-Series) and Instrumentation (I-Series) Contract Drawings.
1. These documents are to be used specifically for recording the as built locations and layout of all electrical and instrumentation equipment, routing of raceways, junction and pull boxes, and other diagram or document changes.
  2. These Record documents shall be kept up-to-date during the progress of the job, with all "change orders", submittal modifications, and construction changes shown and stamped with "As-Built" at end of job.
  3. These Record documents shall not be used for daily construction use and shall not contain any mark-ups that are unrelated to as-built corrections.
  4. The following lists the record documents shall be as-built by Electrical Contractor:
    - a. E-Series Drawings.
    - b. Panelboard schedules.
    - c. Conduit and Wire Routing Schedule.
    - d. Lighting Schedule.
    - e. Duct banks and their routing with offset measurement and indicate changes in depth. Duct bank elevations shall not be drawn or penciled in by hand. Provide CAD drawings of duct banks.
  5. The following lists the record documents that shall be as-built by System Supplier to be maintained by Electrical Contractor:
    - a. I-Series Drawings
    - b. Instrumentation Index.
  6. Record documents shall be kept current weekly with all "change orders," submittal modifications, and construction changes shown. Record Documents shall be subject to the inspection by the Engineer at all times, progress payments or portions thereof may be withheld if Record Documents are not accurate or current.
  7. When documents are changed, they shall be marked with erasable colored pencils using the following coloring scheme:
    - a. Additions - red
    - b. Deletions - green
    - c. Comments - blue
    - d. Dimensions - black
  8. Show the following on the Electrical (E-Series) Record Contract Drawings by dimension from readily obtained base lines:
    - a. Exact location, type and function of electrical and instrumentation equipment and devices.
    - b. Precise routing and locations of underground conduits, pullboxes, junction boxes, and appurtenances that make-up the raceway system.
    - c. Show the dimensions, location and routing of electrical work, which will become permanently concealed.
    - d. Show complete routing and sizing of any significant revisions to the systems shown.

9. Prior to acceptance of the work, the Contractor shall deliver to the Engineer one set of record full size drawings neatly marked accurately showing the information required above.

#### 1.07 COORDINATION

- A. The Contractor shall coordinate the electrical work with the other trades, code authorities, utilities, and the Engineer; with due regard to their work, towards promotion of a rapid completion of the project. If any cooperative work must be altered due to lack of proper supervision of such, or failure to make proper provisions, then the Contractor shall bear expense of such changes as necessary to be made in the work of others.
- B. Manufacturer's directions and instructions shall be followed in all cases where such is not shown on the Contract Drawings or herein specified.
- C. Coordinate all work with the serving Power Utility, Pacific Gas & Electric (PG&E), for the work shown on Contract Drawings.
  1. The Contractor shall arrange a pre-construction meeting with the PG&E representative prior to start of any utility-related work.
  2. All work shall be performed per the PG&E engineered drawings and requirements and at no additional cost to Owner.
  3. The Contractor shall obtain the required inspections for the new electrical service.
  4. Provide a written statement from the Utility that shows approval of the proposed metering.
  5. All work associated with material and installation for the Utility power service, not paid by the Utility, shall be borne by the Contractor. The Contractor shall provide and install all material, conduits, wiring, pull ropes, pole risers, pull boxes, transformer pads, bollards, etc., as shown on PG&E engineered drawings, for new power service.
  6. All fees and charges for the Utility power service hook-up will be paid by the Owner.
- D. Contractor shall be responsible for obtaining utility Engineered Drawings for service conductor conduits, pull boxes, wire size requirements, pull rope requirements, etc. Conflicts between the Contract Drawings and the utility engineered drawings shall be brought to the attention of the Engineer.
- E. The Contractor shall cease work at any particular point, temporarily, and transfer his operations to such portions of work as directed, when in the judgment of the Owner it is necessary to do so.
- F. Prior to commencing construction, the General Contractor shall arrange a conference with the General Contractor, Electrical Contractor, System Supplier, Resident Engineer & Owner as well as all equipment and system suppliers vital to the current phase of work. During the meeting, the equipment supplier shall verify types, sizes, locations, installation requirements, controls and diagrams of all equipment furnished. The Equipment and System Suppliers shall, in writing, inform the Engineer that all phases of coordination of this equipment have been covered and if there are any unusual conditions, they shall be enumerated at this time.

- G. It is the responsibility of the Contractor to make all equipment approval arrangements and scheduling with the power utility company connected with this project. Schedule within 30 days after award of contract all service installations and connections with the power and telephone utility. Lack of effort by the Contractor to properly schedule Utility service will not be considered valid justification for delays in project completion and no extension in contract time will be given.
- H. The Contractor shall coordinate with Owner, witnessing Engineer and System Supplier to test the entire system.

## 1.08 SUBMITTAL AND DRAWING REQUIREMENTS

### A. General:

1. Submit shop documents and drawings for approval in accordance with this subsection and Specification Section 01 33 00 – Submittal Procedures.
2. Electrical submittals shall be submitted for favorable review by the Owner or Engineer per this subsection. They shall be complete giving all details of connections, wiring, instruments, enclosures, materials and dimensions. Standard sales literature will not be acceptable.
3. A copy of the appropriate Division Specification Sections, with addendum updates included and with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.
  - a. Check marks (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated and, therefore, requested by the Contractor, each deviation shall be underlined and denoted by a unique number in the margin to the right of the identified paragraph. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the Specifications.
  - b. The submittal shall be accompanied by a detailed, written justification for each numbered item explaining variance or non-compliance with specifications.
  - c. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no review.
4. The Contractor shall coordinate submittals and required meetings with the work, panel fabrication and factory tests so that project will not be delayed. This coordination shall include scheduling the different categories of submittal, so that one will not be delayed for lack of coordination with another.
5. No material or equipment shall be allowed at the job site until the submittal for such items has been reviewed by the Engineer and marked “No Exceptions Taken” or “Make Corrections Noted.”
6. The equipment specifications have prepared on the basis of the equipment first named in the Specifications. The Supplier shall note that the second named equipment, if given, is considered acceptable and equal equipment, but in some cases additional design, options, or modifications may be required, at no additional cost, to meet intent of Design documents.

7. The decision of the Engineer governs what is acceptable as a substitution. If the Engineer considers it necessary, tests to determine equality of the proposed substitution shall be made, at the Contractor's expense, by an unbiased laboratory that is satisfactory to the Engineer.
  8. The Contractor shall cease work at any particular point, temporarily, and transfer his operations to such portions of work as directed, when in the judgment of the Engineer it is necessary to do so.
  9. No submittal documents shall be labeled as proprietary. Labeling documents as proprietary will be sufficient cause for rejection of entire submittal. The Owner reserves the right to copy or duplicate any and all portions of the documents provided for the project including copyrighted documents as desired.
  10. Identify all submittals by submittal number on letter of transmittal. Submittals shall be numbered consecutively and resubmittals shall have a letter suffix. For example:
    - a. 1st submittal: 1
    - b. 1st resubmittal: 1A
    - c. 2nd resubmittal: 1B, etc.
- B. The electrical submittals shall include but not be limited to data sheets and drawings for each product together with the technical bulletin or brochure. No FAX copies of documents are allowed. Color copies shall be provided when black and white copies do not show adequate clarity. The electrical submittals shall include:
1. Product (item) name used herein and on the Contract Drawings.
  2. The manufacturer's model or other designation.
  3. Tag name/number per the P&ID drawings, schedules, and indexes.
  4. Index Binder Tab Dividers.
  5. Detailed electrical one line, elementary and control diagrams showing all wiring requirements for each system.
  6. Complete documentation with full description of operation.
  7. Complete catalog cuts with full description of equipment. General sales literature will not be acceptable. The part or model number with options to be provided shall be clearly identified. Where more than one item or catalog number appears on a catalog cut, the specific item(s) or catalog numbers(s) proposed shall be clearly identified.
  8. Location of assembly at which it is installed.
  9. Input-output characteristics.
  10. Range, size, and graduations as required.
  11. Physical size with dimensions and mounting details. System Supplier submit a letter listing all instrumentation pipe sizes, pipe connections, flange types, and ANSI ratings signed by Contractor and System Supplier to certify coordination for proper installation prior to flow elements being purchased.
  12. Enclosure fabrication and color.
  13. Enclosure layout and elevation drawings to scale.
  14. Quantity and quality requirements for electric power.
  15. Materials of construction of components.
  16. Nameplate schedule.
  17. Failure to provide submittals with heavy duty permanent plastic labeled index tabs may be grounds for immediate rejection without review.

18. Bill of Materials: A complete Bill of Materials list shall be provided at the inside of the front cover. The Contractor shall provide Bill of Material for electrical components formatted as shown in Appendix "A". A separate set of Material Listing forms shall be provided for the MCC, spare parts, and another listing all field equipment. Generic names or part numbers used by a distributor or Systems House are not acceptable; originating manufacturer's name and part number shall be listed.
  19. A separate instrument data sheet shall be provided for each instrument per ISA S20 standards or approved equal. Data sheets shall be printed on blue or pink paper. Provide an index with proper identification and cross-referencing of each data sheet.
  20. Submit USB electronic copies of all submitted drawing in AutoCAD format.
  21. For each resubmittal, provide a copy of submittal comments and a separate letter, on Company letterhead, identifying how each submittal comment has been addressed in the resubmittal.
  22. Electronic PDF version of submittals shall follow hard copy format of submittal and shall be "bookmarked" at each index, subtab, copy of appropriate check-marked Specification Section, bill of materials, copy of submittal comments (for resubmittals), Contractor's response to submittal comments (for resubmittals), drawings, etc. Failure to bookmark PDF or broken bookmarks may be grounds for immediate rejection without review. Bookmarks shall not be out of order; the English description shall match that listed in the Submittal's Table of Contents.
  23. Submittal Drawings shall be provided in 11 inch by 17 inch hardcopy format.
- C. All drawings shall be generated with a computer utilizing AutoCAD drafting package. Standard preprinted drawings simply marked to indicate applicability to the Contract will not be acceptable. Drawings shall be prepared in a professional manner and shall have borders and a title block identifying the project, system, drawing number, drawing title, AutoCAD file name, project engineer, date, revisions, and type of drawing. Drawings shall be no smaller than 11" x 17" and printed with a laser jet printer or plotted in ink on vellum. The lettering shall be legible and no smaller than 0.075 inch in height. Diagrams shall carry a uniform and coordinated set of wire colors, wire numbers, and terminal block numbers. A Drawing Index shall be provided that lists each Drawing title and drawing number. Each Drawing title and number shall be unique. The index shall not include drawings listed as "This Page Intentionally Left Blank". The shop drawings shall include:
1. Electrical one or three line diagrams detailing all devices associated with the power distribution system. The following applicable information or data shall be shown on the one- or three- line diagram: location, size and amperage rating of bus; size and amperage rating of wire or cable; breaker ratings, number of poles, and frame sizes; generator; automatic transfer switch; utility metering; voltage; amperage; number of wires and phases; fault interrupt ratings; ground size and connections; neutral size and connections; power fail and other protective devices; fuse size and type; panelboard; starters; contactor size and overload range; motor full load amperage of submitted motor and horsepower; rating for miscellaneous loads; etc. Submit equipment motor voltage, phase and full load amps provided for this project for verification of accuracy of submitted one line drawings.
  2. Elementary diagrams shall be provided for all relay logic, power supplies, PLC I/O and other wiring. All elementary diagrams shall be drawn in EMP/EGP format and

- standards similar to those shown on the E-series elementary diagrams showing ladder rung numbers and coil and contact cross referencing numbers.
3. Analog and digital PLC I/O wiring diagrams shall be provided showing the wiring requirements for each instrument loop. Graphic symbols shall conform with ISA S5.4 drawing standards. A loop diagram shall be furnished for each analog and digital I/O process and all PLC I/O points. Loop diagrams shall include the following as a minimum:
    - a. The loop diagram shall be drawn with sufficient detail to express control philosophy. The diagram shall show all components and accessories of the instrument loop, highlighting special safety and other requirements. These diagrams shall be arranged to emphasize device elements and their functions as an aid to understanding the operation of a system and for maintaining or troubleshooting that system.
    - b. Analog and digital I/O shall be arranged on the diagram in the same order as the physical arrangement of the group terminations. All termination points on the diagram shall be shown with the actual equipment identification, device and relay terminal number or letter, and I/O point P&ID English descriptor and tag name.
    - c. A separate drawing shall be prepared for each analog and digital card. Each card shall be arranged on the diagram in the same order as the physical arrangement of the card terminations.
    - d. Energy sources – electrical power, air supply, pneumatic and hydraulic fluid supply, designating voltage, current, pressure, etc. shall be shown in detail on the diagram. Input and output signals (e.g., 1-5 VDC, 4-20 mA DC, 3-15 psig, etc.), power and instrument supplies to devices (e.g. 120 VAC, 24 VDC, 80 psig, etc.) shall be shown.
    - e. Engineering units shall be shown on the diagram. Each wire label, equipment identification terminal number or letter and color code shall be shown. Signal and DC polarities shall be shown.
    - f. All spare wires, cables and termination points shall be shown. All jumpers, grounding, shielding, power supply details shall be shown.
  4. Enclosure and Elevation layout diagrams shall be provided to show all deadfront, front panel and backpan devices drawn to scale. Show fabrication methods and details; including material of construction, paint color, support and latching mechanisms, fans and ventilation system, and conduit entrance areas.
  5. Submit full size drawing of all nameplates and tags, as specified herein, to be used on project. The Engineer has the right to adjust nameplate engraving titles during submittals at no additional cost to the Owner. Submittal to include the following:
    - a. Dimensions of nameplate.
    - b. Exact lettering and font for each nameplate.
    - c. Color of nameplate.
    - d. Color of lettering.
    - e. Materials of construction.
    - f. Method and materials for attachment.
    - g. Drawing showing location of nameplates on each panel and enclosure.

6. Copying contract drawings and providing them as submittals will be considered unresponsive and the submittal will be rejected without review.
- D. Each submittal shall be bound in a three ring binder, which is sized such that when all material is inserted the binder is not over 3/4 full. Binder construction shall allow easy removal of any page without complete manual disassembly; spiral ring type binders are not acceptable.
1. Each binder shall be appropriately labeled on the outside spine & front cover with the project name, contract number, equipment supplier's name, specification section(s), and major material contained therein.
  2. An index shall be provided at the inside of the front cover. This index shall itemize the contents of each tab and subtab section. Also list the project name, contract number and equipment supplier's name, address, phone number, and contact person on the index page.
  3. Field equipment shop documents, panel equipment shop documents, drawings, and bill of materials shall be grouped under separate tabs. Catalog cuts shall be ordered in the same sequence as their corresponding Contract specification subsection.
  4. All copies shall be clear and legible. Data sheets shall be provided for each instrument, with an index and proper identification and cross-referencing.
  5. Exceptions to the Contract specifications or drawings shall be clearly defined by the equipment supplier.
    - a. Data shall contain sufficient details so a proper evaluation may be made by the Engineer. Contractor shall provide separate letter (located in the front of the submittal) detailing specific exceptions to the Contract Specifications or Drawings.
    - b. Exceptions that are noted in the marked-up Drawings or Specifications, but not listed on the Exceptions/Clarifications letter, will be considered as non-responsive and not accepted as changes to the Contract Documents.
  6. Request for information (RFIs) shall not be included in submittals. RFIs supplied with submittals will not be answered. RFIs shall be submitted following proper channels.
  7. Resubmittals shall be provided with a copy of the previous submittal comments and a separate letter, on company letterhead, identifying how each submittal comment has been addressed in the resubmittal.
  8. Drawings shall be submitted in a separate hole-punched binder that covers the entire 11" x 17" length of the Drawing:
    - a. Shop Drawings with less than 20 sheets total in the submittal, may be provided in an 11½-inch by 17½-inch reinforced folder.
    - b. All Shop Drawings of 20 sheets or more shall be provided in separate heavy duty three-ring binder to allow drawings to be easily removed. Binder shall be Cardinal D-Ring Easy Open Ledger Binder with locking D-Rings or approved equal.
    - c. Failure to provide drawing submittal in correct binder format may be grounds for immediate rejection without review.
    - d. Each drawing title block shall contain the English description name for drawing contents (i.e. Lift Pump No. 1 Interconnect Drawing) and drawing

number. All pages and drawings in the submittal shall be numbered sequentially (with no number skipped) in lower right hand corner.

- e. Drawings that are "C" or "D" size shall be folded, with the title block visible and placed in reinforced clear plastic pockets.
- E. Shop documents and drawings shall be submitted for all devices and components in the electrical system. The Contractor is notified that this is a "Fast Track" project and all electrical & instrumentation drawings shall be submitted in a timely manner as not to delay completion of the project.

#### 1.09 SUPERVISION

- A. The Contractor shall schedule all activities, manage all technical aspects of the project and attend all project meetings associated with this Section.
- B. The Contractor shall supervise all work in this Division, including the electrical system general construction work, from the beginning to completion and final acceptance.
- C. The Contractor shall supervise and coordinate all work in this Division to insure that each phase of the project, submittal, delivery, installation, and acceptance testing, etc., is completed within the allowable scheduled time frames.
- D. The Contractor shall be responsible for obtaining, preparing, completing, and furnishing all paper work for this Section, which shall include transmittals, submittal, forms, documents, manuals, instructions, and procedures.

#### 1.10 INSPECTIONS

- A. All work or materials covered by the Contract documents shall be subject to inspection at any and all times by the Owner. If any material does not conform to the Contract documents, or does not have an "No Exceptions Taken" or "Make correction Noted" submittal status; then the Contractor shall, within three days after being notified by the Owner, remove the unacceptable material from the premises; and if said material has been installed, the entire expense of removing and replacing same, including any cutting and patching that may be necessary, shall be borne by the Contractor.
- B. The Contractor shall give the Owner 10 working days' notice of the dates and time for inspection. Date of inspection shall be as agreed upon by both the Contractor and Owner.
- C. Work shall not be closed in or covered over before inspection and approval by the Owner. All costs associated with uncovering and making repairs where non-inspected work has been performed shall be borne by the Contractor.
- D. The Contractor shall cooperate with the Owner and provide assistance for the inspection of the electrical system under this Contract. The Electrical Contractor shall remove covers, provide access, operate equipment, and perform other reasonable work which, in the opinion of the Engineer, will be necessary to determine the quality and adequacy of the work.



- E. Before request for final inspection is made, the Contractor shall submit to the Owner in writing, a statement that the Contractor has made his own thorough inspection of the entire project enumerating punch list items not complete and that the installation and testing is complete and in conformance with the requirements of this Division.
- F. The Owner may arrange for a facility inspection by Cal-OSHA Consultation Service at any time. The Contractor shall make the necessary corrections to bring all work in conformance with Cal-OSHA requirements, all at no additional cost to the Owner.
- G. Contractor will be Responsible for any Additional Cost for Overtime, Weekend Overtime or Differential Time, Expenses for Inspection of Defective Work that has to be re-inspected.

#### 1.11 JOB CONDITIONS

- A. The Contractor shall make all arrangements and pay the costs thereof for temporary services required during construction of the project, such as temporary electrical power and telephone service. Upon completion of the project, remove all temporary services, equipment, material and wiring from each site as the property of the Contractor.
- B. The Contractor shall provide adequate protection for all equipment and materials during shipment, storage and construction. Equipment and materials shall be completely covered with two layers of plastic and set on cribbing six inches above grade so that they are protected from weather, wind, dust, water, or construction operations. Equipment shall not be stored outdoors without the approval of the Owner. Where equipment is stored or installed in moist areas, such as unheated buildings, provide an acceptable means to prevent moisture damage, such as a uniformly distributed heat source to prevent condensation.
- C. The elevation of the project site is shown on Contract Civil Drawings. All equipment shall be derated, as recommended by the manufacturer or in accordance with ANSI C37.30.
- D. The normal outdoor, not in direct sunlight, ambient temperature range of the job site will vary between 0 to 110 degrees Fahrenheit. All equipment shall be rated to operate in these temperature ranges or provisions for adequate heating and cooling shall be installed, at no additional cost to Owner.
- E. The jobsite is prone to vandalism and theft. Contractor shall be responsible for securing all materials and equipment against theft and vandalism for the duration of the project.
- F. Contractor & Subcontractors shall utilize temporary services during construction of the project. No Contractors shall utilize building power, receptacles, etc. during construction.

## **PART 2 - MATERIALS**

### **2.01 QUALITY**

- A. It is the intent of the Contract specifications and drawings to secure the highest quality in all materials and equipment in order to facilitate operation and maintenance of the facility. All equipment and materials shall be new and the products of reputable suppliers having adequate experience in the manufacture of these particular items. For uniformity, only one manufacturer will be accepted for each type of product.
- B. All equipment shall be designed for the service intended and shall be of rugged construction, of ample strength for all stresses which may occur during fabrication, transportation, erection, and continuous or intermittent operation. All equipment shall be adequately stayed and braced and anchored and shall be installed in a neat and workmanlike manner. Appearance and safety, as well as utility, shall be given consideration in the design of details. All components and devices installed shall be standard items of industrial grade, unless otherwise noted, and shall be of sturdy and durable construction suitable for long, trouble free service. Light duty, fragile and competitive grade devices of doubtful durability shall not be used.
- C. Products that are specified by manufacturer, trade name or catalog number established a standard of quality and do not prohibit the use of equal products of other manufacturers provided they are favorably reviewed by the Engineer prior to installation.
- D. Underwriters Laboratories (UL) listing is required for all substituted equipment when such a listing is available for the first named equipment.
- E. When required by the Contract specifications or requested by the Engineer, the Contractor shall submit equipment or material samples for test or evaluation. The samples shall be furnished with information as to their source and prepared in such quantities and sizes as may be required for proper examination and tests, with all freight and charges prepaid. All samples shall be submitted before shipment of the equipment or material to the job site and in ample time to permit the making of proper tests, analyses, examinations, rejections, and resubmissions before incorporated into the work.
- F. All equipment shall be designed and constructed so that in the event of a power interruption, the equipment specified hereunder shall resume normal operation without manual resetting or operator interaction when power is restored.
- G. Signal transmission from remote or field electric and electronic devices shall be 4-20 mA, sourced by a 24 VDC loop supply from the panel that is to receive the signal. Nonstandard transmission methods such as impulse duration, pulse rate, and voltage regulated will not be permitted except where specifically noted.
- H. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised and/or converted to compatible standard signals for remote transmission.

- I. It is the System Supplier's responsibility to visit jobsite to collect and document existing conditions and equipment device part numbers in order for all similar called out new equipment to match existing.

## 2.02 NAMEPLATES AND TAGS

- A. EQUIPMENT EXTERIOR NAMEPLATES: Nameplate material shall be rigid laminated black phenolic with beveled edges and white lettering, except for caution, warning, and danger nameplates the color shall be red with white lettering. The size of the nameplate shall be as shown on the Drawings. No letters are allowed smaller than 3/16". All phenolic nameplates located outdoors shall be UV resistant. Securely fasten nameplates in place using two 316 stainless steel screws if the nameplate is not an integral part of the device. Epoxy cement or glued on nameplates will not be acceptable.
  1. Each major piece of electrical equipment shall have a manufacturer's nameplate showing the Contract specified name and number designation, the manufacturer's name, model designation, part number, serial number, and pertinent ratings such as voltage, amperage, # of phases, range, calibration, etc.
  2. For each device with a specific identity (pushbutton, indicator, field control station, disconnect switches, etc.) mounted on the exterior or deadfront of a piece of equipment, provide a nameplate with the inscription as shown in the Contract Documents. Where no inscription is indicated in the Contract Documents, furnish nameplates with an appropriate inscription providing the name and number of device.
  3. For all receptacles and switches, provide a faceplate engraved or stamped with the panelboard and circuit number it is fed from. Also, include on faceplate or on a separate nameplate for each light switch identification use such as "OUTSIDE BUILDING LIGHTS", "PERIMETER LIGHTS", "MCC ROOM", etc.
  4. All field instruments and devices shall be labeled with designation shown on P&ID diagrams.
  5. All transformers and panelboards shall have nameplates with 1/2" high letters and be engraved with designations as shown on one-line Drawings.
  6. All safety and disconnect switches shall have nameplates with 1/2" high letters and be engraved with designations as shown on one-line drawings.
  7. Underground Pull Box and Vault Cover Identification: Engrave or bead weld pull box covers with minimum 1/4" thickness and 1/2" letters and covers shall be engraved with designations as shown on Contract drawings or as directed by Owner.
  8. Aboveground Pull Box Cover Identification: 316 stainless steel screws attached stamped 316 stainless steel plate nameplates with 1/2" letters and be engraved with designations as shown on Contract drawings or as directed by Owner.
  9. Provide engraved nameplate at service entrance equipment (red with white lettering) indicating type and location of standby generator per NEC 702.7 (A).
  10. Provide engraved nameplate at service entrance equipment per NEC 702.7(B)
  11. METERING – Service Equipment Label: Per NEC 110.24 (A) Service equipment shall be legibly marked in field with the maximum available fault current. Field marking shall include date the fault current calculation was performed and be weather & UV rated. Service equipment shall not be hand labeled.

- B. EQUIPMENT INTERIOR NAMEPLATES: Nameplate material shall be white plastic with black machine printed lettering as produced by a KROY or similar machine; except caution, warning, and danger nameplates shall have red lettering.
1. The size of the nameplate tape shall be no smaller than ½" in height with 3/8" lettering unless otherwise approved by the Engineer. Securely fasten nameplates in place on a clean surface using the adhesion of the tape. Add additional clear adhesive to hold the nameplate securely in place when necessary.
  2. For each device with a specific identity (relay, module, power supply, fuse, terminal block, etc.) mounted in the interior of a piece of equipment provide a nameplate located above the device with the inscription as shown in the Contract Documents. Where no inscription is indicated in the Contract documents, furnish nameplates with an appropriate inscription providing the name and number of device used on the Submittal Drawings. Stamp the nameplates with the inscriptions as approved by the Engineer in the submittal.
  3. Nameplates shall not be attached to wireway covers or to removable devices.
- C. EQUIPMENT TAGS: The Contractor shall attach a tag to the equipment (including instruments) with the same inscriptions as specified above in paragraph A. The tag shall be made from 316 stainless steel material and the size of the nameplate shall be no smaller than 3/8"h x 2"w with 3/16" machine printed or engraved lettering unless otherwise approved by the Engineer. The tag shall be attached to the equipment with 316 stainless steel wire of the type normally used for this purpose. SST wire must be crimp connected. Twisting ends together is not acceptable.
- D. Engrave or machine print the tags with inscriptions as approved by the Engineer in the nameplate submittal.
- E. Provide temporary labels for all instruments and devices immediately when installed. Temporary labels shall be provided with ½" letters minimum and labeled with P&ID tag number.

## 2.03 WIRE

- A. This Section applies to all wires or conductors used internal for all electrical equipment or external for field wiring. All wires shall be properly fused or protected by a breaker at the amperage rating allowed by the NEC.
- B. Material: Wire shall be new, plainly marked with UL label, gauge, voltage, type of insulation, and manufacturer's name. All wire shall conform to the following:
1. Conductors shall be copper, with a minimum of 97% conductivity.
  2. Wire shall be Class B stranded. Solid wire conductor prohibited.
  3. ASTM B8, soft drawn copper, maximum 12 months old.
  4. Insulation of all conductors and cables shall be rated 600 volt.
  5. Insulation type for conductors smaller than #6 AWG shall be moisture and heat resistant thermoplastic NEC Type THHN/THWN, rated 90 °C in dry locations and 75 °C in wet locations, or approved equal. Conductors #6 AWG and larger shall be XHHW insulation rated 90 °C in dry locations and 75 °C in wet locations.

6. Field wire minimum AWG sizes
  - a. #12 for wires used for individual conductor circuits 480 volt and above. #12 for wires used for individual conductor circuits 100 volt and above, except for PLC I/O which may be #14 AWG.
  - b. #14 for wires used for individual conductor circuits below 100 volt.
7. Non-field or panel wire minimum AWG sizes if properly protected by fuse or breaker:
  - a. #14 for wires used for individual conductor circuits 100 volt and above.
  - b. #18 for wires used for individual conductor circuits below 100 volt and above if properly protected by fuse or breaker.
8. Instrument Wiring
  - a. Field: Instrument cables shall have 600V tray cable rated insulation and 100% individual shielded twisted pair #16 conductors with drain wire. Single twisted shielded pair (T.S.P.R.) Cables shall be Belden, Manhattan, or approved equal.
  - b. Non-Field: Instrument cables shall have 300V rated insulation and 100% individual shielded twisted pair #18 conductors with drain wire. Single twisted shielded pair (T.S.P.R.) cables shall be Belden, Manhattan, or approved equal.
  - c. General: Instrument cables shall have 600V rated insulation and 100% individual shielded twisted pair #16 conductors with drain wire. Single twisted shielded pair (T.S.P.R.) cables shall be Belden, or approved equal.

#### C. Wire Marking

1. Wire Identification: All wire terminations including field interconnect as well as wiring interior MCC cubicles, switchboard, panels, equipment, junction panels and boxes shall be identified with machine printed labels. Hand lettered labels are not acceptable and shall be replaced at the Contractor's expense. The wire identification code for all field interconnect and panel interior wiring, shall be similar to the designations shown on the Contract example drawings.
2. Wire Labels: The labels shall be machine printed with indelible ink, heat-shrink type, capable of accepting a minimum of 23 machine printed characters per sleeve, label by Brady "Bradysleeve" or equal. Labeling shall be neatly installed for visibility and shall be clearly legible. Each wire and conductor shall be labeled with wire label, as shown on approved loop, and elementary Drawings. Labels shall not be wrap-around or Snap-On type.
3. Where there is insufficient space for labels on locally interconnected neutral wires such as jumpers between adjacent auxiliary relay coil neutral terminals, these labels may be omitted. "Locally" is defined as wires no longer than 8".
4. Wire labels for lighting and receptacles shall be installed and consist of the panelboard and circuit number (i.e., Panelboard "LP100", circuit breaker #3 would have wire label line "LP100-L3" and neutral "LP100-N3").
5. All spare wires shall be labeled with equipment number followed by X1, X2, etc. (i.e. P11001-X1 for first spare wire).
6. All control and signal wiring terminations shall have the correct wire label applied prior to making connection.

D. Special Purpose Wiring

1. Manufacturer Supplied Cables (MNFR CBL): Cables and wiring for special systems shall be provided by the manufacturer with the equipment and installed per the manufacturer's recommendations.
2. CAT 6 communication cable in underground (UG) conduit shall meet the following requirements:
  - a. TIA/EIA-568-B Category 6E Specifications.
  - b. #24 AWG solid bare copper conductor, 4 or 25 pair shielded twisted pair per "Conduit & Wire Routing Schedule".
  - c. Rated for direct burial application.
  - d. Insulation: Solid Polyolefin, 600V rated.
  - e. Filling compound: 80°C extended thermoplastic rubber.
  - f. Outer Jacket: Black, water and UV resistant polyethylene.
  - g. Electrically continuous aluminum shield.
3. Indoor CAT 6 communication cable meet the following requirements:
  - a. TIA/EIA-568-C.2 Category 6 100 MHz specifications.
  - b. #24 AWG solid bare copper conductor, 4 twisted pairs.
  - c. Polyolefin insulation.
  - d. Shielded bulk cable.
  - e. PVC jacket.
  - f. Nominal Impedance: 100 ohms.
  - g. Nominal capacitance: 15 pf/ft. maximum.
  - h. UL listed.
  - i. Non-plenum usage rated when routed in conduit.
  - j. Plenum usage rated when routed in plenum spaces.
  - k. Cable shall be rated for water.

E. Color Code

1. Color code of all wire shall conform with the following table.

**WIRES COLOR CODE TABLE**

Description	Phase/Code Letter	Field Wire or Tape Color	Non-Field Wire Color
480 V, 3 Phase	A	Brown	Brown
	B	Orange	Orange
	C	Yellow	Yellow
240 V or	A	Black	Black
208 V, 3P	B	Red (Orange if high leg)	Red (Orange if high leg)
	C	Blue	Blue
240 / 120 V, 1 P	L1	Black	Black
	L2	Red	–
24 V Positive	24P	Dark Blue	Light Blue
24 V Negative	24N	Gray	Gray
AC Control		Violet	Red (Yellow for Foreign Circuits)

Description	Phase/Code Letter	Field Wire or Tape Color	Non-Field Wire Color
DC Control		Dark Blue	Light Blue
Neutral	N	White	White
Ground	G	Green	Green
Shielded Pair	+	Clear	Clear
	-	Black	Black

2. No other colors shall be used without prior approval of the Owner.
3. The same color shall be connected to the same phase throughout the panel.
4. All wires shall be properly fused or protected by a breaker at the amperage rating allowed by the NEC.
5. Neutral used for AC Control shall be white.
6. Phase color insulation shall be provided for complete length of #8 wire or smaller, colored phase tape is not allowed on #8 and smaller wire.

## 2.04 CONDUIT, RACEWAYS, AND WIREWAYS

- A. General: Conduit, raceways, wireways, wiring methods, materials and installation shall meet all requirements of the NEC, be UL labeled for the application, and meet the minimum following specifications:
  1. All wiring shall be installed in conduits, raceways, or wireways when interconnecting equipment and devices.
  2. The Contractor shall use special conduit, raceways, wireways, construction methods, and materials as shown on the Contract drawings; which shall take precedence over any general methods and materials specified in this Section.
  3. The minimum size conduit shall be ¾-inch unless indicated otherwise on the Drawings or for special connections to equipment.
  4. Conduit stubs for future use shall be capped with coupling, nipple, plug, and cap and each end identified with conduit labels.
  5. Conduits to be abandoned that protrude above graded shall be cut flush and filled with grout
  6. Conduits shall not be filled to more than 50% of their total cross – sectional area.
  7. Conduits entering enclosures shall be fitted with locknut and insulated grounding bushing; O-Z "HBLG", Appleton "GIB", or approved equal. All grounding bushings shall be tied to the grounding system with properly sized bonding conductors per the NEC code.
- B. Conduit Marking
  1. All conduits listed in the "Conduit and Wire Routing Schedule" shall have conduit tags at both ends of each conduit segment. This includes all conduits in pullboxes and vaults.
  2. Tag material shall be rigid laminated red phenolic with white lettering. The size of the tag shall be 2" diameter. No letters are allowed smaller than 7/16". Tags shall be heat and UV resistant, stain-proof, electrically non-conductive and non-corroding. Securely fasten tags in place using 316 stainless steel wire of the type normally used for this purpose. Stainless steel wire shall be crimp connected. Twisting ends together is not acceptable. Engrave the tags, on both sides, with the conduit number as listed in the Conduit and Wire Routing Schedule on the Contract "E"-series Drawings. Labeling shall be neatly installed for visibility and shall be clearly legible. Conduit tags shall be Brady Custom B-1, or approved equal.

3. Prior to encasement, concealment, backfilling of conduits, temporary conduit labels shall be provided at each end of conduit. Temporary conduit labels shall have ½-inch (minimum) lettering at all transition points. After encasement and concealment temporary conduit labels shall be placed at each exposed end.

C. Galvanized Rigid Steel Conduit (GRS)

1. Rigid steel conduit, couplings, bends and nipples shall be in accordance with ANSI C80.1 and UL-6.
2. Hotdip galvanized inside and outside after fabrication and then coated with a zinc bichromate finish.
3. Minimum trade size – three-quarters inch (¾”) unless otherwise shown on Contract Drawings.
4. Conduits entering enclosures shall be fitted with insulated grounding bushing; O-Z "HBLG", Appleton "GIB", or approved equal. All grounding bushings shall be tied to the grounding system with properly sized bonding conductors per the NEC code.
5. Galvanized rigid steel factory elbows for indoor 90 degree transitions.
6. EMT or IMC is not considered an equivalent to GRS.
7. GRS conduit is allowed only when specifically called out in the “Conduit and Wire Routing Schedule”.

D. Galvanized Rigid Steel Conduit – PVC Coated (GRS-PVC)

1. Standard weight, galvanized conduit with a 40-mil thick polyvinylchloride coating bonded to both the outside and urethane interior coating. Conduit shall be hot-dip galvanized conforming to NEMA RN 1. GRS-PVC conduit to be Robroy Plasti-bond Red, Perma-Cote, or approved equal.
2. Provide PVC coated galvanized rigid steel factory elbows for 90 degree transitions.
3. Fittings shall be hot dipped galvanized steel or galvanized cast ferrous metal with a PVC 40 mils thick coating. Provide threaded-type fittings, couplings, and connectors; set-screw type and compression-type are not acceptable. Fittings shall be Robroy Liquitite coated fittings or approved equal.
4. All junction boxes shall be galvanized with exterior surfaces PVC coated to 40 mils thickness except where 316 stainless steel boxes are called out.
5. Conduits entering enclosures shall be fitted with insulated grounding bushing; O-Z "HBLG", Appleton "GIB", or approved equal. All grounding bushings shall be tied to the grounding system with properly sized bonding conductors per the NEC code.
6. Support channel and pipe straps shall be PVC coated. Exposed metal/nuts, all-thread rod shall be 316 stainless steel.
7. PVC coating patching material shall be as provided by the manufacturer.
8. PVC coated Aluminum conduit is not acceptable.

E. PVC Conduit (PVC-40 OR PVC-80)

1. Shall be high impact polyvinylchloride suitable for use underground, direct burial and for use with 90 C wires, and shall conform to UL 651. PVC conduits shall be UL listed and labeled for “direct” burial.
2. A copper bonding conductor shall be pulled in each raceway and bonded to equipment at each end with approved lugs.
3. Bends, elbows, and risers shall be made with PVC coated galvanized rigid steel (GRS-PVC) conduit using threaded adapters. Bond each metallic portion to each other and to equipment connected at each end of conduit run.



4. Risers shall be made with PVC coated galvanized rigid steel (GRS-PVC) conduit using threaded adapters. Bond each metallic portion to each other and to equipment connected at each end of conduit run.
5. PVC fittings shall have watertight solvent-weld-type conduit connections.
6. PVC conduit shall be stored on a flat surface and shielded from the sun.
7. PVC conduit shall not be used above grade.

F. Liquid Tight Flexible Metal Conduit (FLEX)

1. Minimum trade size one-half inch (1/2").
2. All flex conduits shall be metallic with water tight outer jackets.
3. Connectors:
  - a. NON-NEMA 12 AREA: PVC coated metallic with insulated bushings.
  - b. NEMA 12 AREA: Metallic with insulated bushings.
4. Final connections to vibrating equipment such as motors and fans shall be made with flexible conduits.
5. Flexible conduit lengths shall not be greater than 36 inches.
6. Flexible metallic conduit shall not be considered as a ground conductor, install a separate wire for equipment bonding.
7. Flexible conduit shall only be installed in exposed or accessible locations.
8. Flexible conduits shall be used for conduit coupling to all vibrating and shifting equipment.

## 2.05 TERMINAL BLOCKS & FUSES

A. Control Panel Terminal Blocks:

1. General

- a. Terminal blocks to be screw type, 6mm spacing, 600 volt, minimum rating of 30 amps, and mounted on DIN rail, Phoenix Contact, Allen-Bradley or approved equal. DIN rail shall be same type as used for the relays. Install an extra DIN rail on each type of terminal strip with 20% spare terminals for future additions.
- b. Provide terminal blocks with "follower" plates that compress the wires and have wire guide tangs for ease of maintenance. Terminal blocks that compress the wires with direct screw compression are unacceptable. All power, control and instrument wires entering and leaving a compartment shall terminate on terminal blocks with wire numbers on terminals and on both ends of the wires.
- c. Terminal Tags and Markers: Each terminal strip shall have a unique identifying alphanumeric code at one end. Numbers shall be assigned to all blocks except grounding blocks. Fuse blocks shall be assigned unique tag numbers such as FU1, FU2. No two fuses shall be assigned the same tag number. Terminal blocks are to be labeled to match the wire landed.
- d. Terminal blocks shall be physically separated into groups by the level of signal and voltage served. Power and control wiring above 100 volts shall have a separate group of terminal blocks from terminal blocks for wiring below 100 volts, intermixing of these two types of wiring on the same group of terminal blocks is not allowed.

- e. Provide a ground terminal or connection point for each grounding conductor.
  - f. Provide a separate terminal block for every two neutral terminations or as coordinated with the interconnect diagrams.
  - g. All Terminal blocks fuse blocks, barriers, etc. shall be Phoenix Contact, Allen-Bradley or approved equal.
2. Power Termination Blocks shall be rated for 600V main power connection. The power termination blocks shall be rated to accept Copper or Aluminum cable rated as shown on Contract one-line diagrams. The power termination block shall be capable of being mounted anywhere in a termination box. Each termination block shall be provided with lug shield to prevent contact with power connections. The power termination blocks shall be Connectron, Cooper or approved equal.

#### B. Fuses

- 1. Fuses used in circuits 200 VAC and above shall be time-delay type FNQ or approved equal, 13/32" x 1-1/2", and have an interrupting rating of 42,000 AIC at 500 VAC. Fuse holders shall be of the barrier type and rated 600 VAC.
- 2. Fuses used in 120 VAC shall be time-delay type MDL or approved equal, 1/4" x 1-1/4", and have a rating of 250 VAC. Fuse-holders shall be of the terminal block type.
- 3. Fuses used in signal and 24 VDC circuits shall be fast acting type GMA or approved equal, 5 mm x 20 mm/1/4" x 1-1/4", and have a rating of 250 VAC. Fuse-holders shall be of the terminal block type.
- 4. Fuses shall be sized in conformance with the NEC.

### 2.06 COMPONENTS

#### A. Switches and Pushbuttons

- 1. Switches and pushbuttons for general purpose applications shall be water and oil tight as defined by NEMA 4X, corrosion resistant as defined by NEMA ICS 6-110.58, U.L. listed, standard 30 mm diameter, with round plastic clamp ring. Switches shall be Allen-Bradley 800H, or approved equal.
- 2. Switches and pushbuttons shall have contacts rated 10 amperes continuous and 600 VAC.
- 3. Manufacturer's standard size legend plates shall be provided and engraved to specify each switch and pushbutton function. The legend plate color shall be black.
- 4. Selector switch handles and pushbutton caps shall be black.
- 5. Selector Switch Positions
  - a. Hand-off-auto (HOA) applications shall have the hand position to the left, off in center, and auto in the right position.
  - b. On/Off shall have the ON position to the right.
  - c. Local/Remote shall have the REMOTE position to the right.
  - d. Open-Close-Auto applications shall have the open position to the left, close in center, and auto in the right position.

## B. Relays and Timers

1. GENERAL: Relays and timers shall be provided with N.O. or N.C. contacts as shown on the Contract drawings. All spare contacts shown shall be provided. Contacts shall be rated 10 amps minimum at 120 VAC, 60 Hz unless otherwise stated. Supply power or coil voltage shall be 120 VAC unless shown otherwise on the Contract drawings. Relays and timers shall be designed for continuous duty. All relays shall be U.L. listed. The following is a summary of abbreviations associated with relays and timers:

CR	–	Control relay
TR	–	Timing relay
TDOE	–	Time delay on energization
TDOD	–	Time delay on de-energization
2. Control relays (CR) shall be “ice cube” type general purpose relays utilizing 10 amp rated contacts at the specified control voltage. Relays shall be provided as DPDT or 3PDT to meet application requirements. Relay base configurations shall be DIN rail mount and selected such that AC and DC control relays are not interchangeable, thereby preventing accidental damage to relay coils as a result of incompatible voltages. Relays shall be provided with one spare NO/NC contact. Relays shall be provided with an operational status LED providing positive status of relay energization. Relays shall be IDEC, RELECO or equal.
3. Time delay relays (TR) on energization or de-energization shall be solid state plug-in relays with a timer adjustable over the range 1 second to 3 minutes unless other ranges are indicated or required. Provide LED timer energized indicator lamp. Sockets for plug-in timers shall be standard octal type with barriered pressure screw terminals. Time delay relays shall be IDEC RTE, Square D, SSAC TD or approved equal.

## C. Indicating Lights

1. Indicating Lights for general purpose applications shall be water and oil tight as defined by NEMA 4X, corrosion resistant as defined by NEMA ICS 6-110.58, U.L. listed, High intensity multi-chip LEDs, full voltage (unless shown otherwise), standard 30 mm diameter, with round plastic lens and miniature bayonet lamp base. Indication lights shall be Allen-Bradley 800H, or approved equal.
2. Manufacturer’s standard size legend plates shall be provided and engraved to specify each light’s function. The legend plate color shall be black.
3. Indicating lights designated "PTT" shall be provided with a push-to-test switch and wiring.
4. Indicating light type and color of lens shall be as shown on the Drawings or specified in the Contract documents. Lamp color will be as follows:

a.	Open/On	Green
b.	Closed/Off	Red
c.	Alarm	Amber
d.	Power On	White

## D. Circuit Breakers

1. Circuit breakers shall be of the indicating type, providing ON, OFF and TRIPPED positions of the operating handle. Circuit breakers shall be quick-make, quick-break, with a thermal-magnetic (TM) action or Motor Circuit Protectors (MCP) as shown on One-Line Diagrams. Circuit breakers feeding Soft Starters or VFDs shall have true adjustable long, short and instantaneous trip units.

2. Main Circuit breakers shall be the bolted on type. The use of tandem or dual circuit breakers in a normal single-pole space to provide the number of poles or spaces specified are not acceptable. All multiple-pole circuit breakers shall be designed so that an overload on one pole automatically causes all poles to open. Main Circuit breakers and motor circuit protectors shall be manufactured by Eaton, G.E., ITE, or approved equal.
  3. Each 480 volt or 240V circuit breaker shall have a minimum interrupting capacity of 35,000 amperes. Each 120 volt breaker shall be rated for a minimum 10,000 amperes interrupting capacity. Breakers shall be sized as shown on Drawings and as necessary for the supplied equipment.
  4. Fused disconnects shall not be used in place of breakers.
  5. Breakers shall be sized and have a minimum interrupting capacity as shown on Drawings and as required for the supplied equipment.
  6. All breakers shall be supplied with the correct sized copper only lugs for wire sizes as listed in "Conduit & Wire Routing Schedule". Provide larger frame breaker or lug adapters as necessary when connecting to the listed oversized wire.
- E. Control Power Transformer:
1. Control power transformer (CPT) shall be provided with a time-delay, slow-blow secondary fuse rated to protect the transformer and interrupt 10,000 amperes at 120VAC. Two primary fuses with KAIC interrupt rating of corresponding power connection shall be provided. Transformer size minimum ratings shall be as shown on Contract E-Series Drawings.
- F. Elapsed Time Meter
1. Elapsed time meters (ETM) for general use shall be non-resettable, with 0.0 to 99,999.9 hour readout, permanently lubricated synchronous motor drive, nominal 2-1/2 inch square two-hole surface mount housing, screw terminals, and rated at 120 VAC, at 60 Hz. Elapsed time meters shall be Cramer 635, Stemco-Engler Series, 710-0002, Reddington or equal.
    - a. compress the wires with direct screw compression are unacceptable. All power, control and instrument wires entering and leaving a compartment shall terminate on terminal blocks with wire numbers on terminals and on both ends of the wires.
    - b. Terminal Tags and Markers: Each terminal strip shall have a unique identifying alphanumeric code at one end. Numbers shall be assigned to all blocks except grounding blocks. Fuse blocks shall be assigned unique tag numbers such as FU1, FU2. No two fuses shall be assigned the same tag number. Terminal blocks are to be labeled to match the wire landed.
    - c. Terminal blocks shall be physically separated into groups by the level of signal and voltage served. Power and control wiring above 100 volts shall have a separate group of terminal blocks from terminal blocks for wiring below 100 volts, intermixing of these two types of wiring on the same group of terminal blocks is not allowed.
    - d. Provide a ground terminal or connection point for each grounding conductor.
    - e. Provide a separate terminal block for every two neutral terminations or as coordinated with the drawings.

2. Power Termination Blocks shall be rated for 600V main power connection. The power termination blocks shall be rated to accept Copper or Aluminum cable rated as shown on Contract one-line diagrams. The power termination block shall be capable of being mounted anywhere in a termination box. Each termination block shall be provided with lug shield to prevent contact with power connections. The power termination blocks shall be Connectron or approved equal.

## 2.07 CONTROL PANEL

- A. Control Panel Components shall consist of the PLC system, power supply, enclosure, and other devices for a complete and operational system. No equal are allowed for PLC and OI components.
  1. Programmable Logic Controller (PLC) to be Allen-Bradley Micro 850 series, provided with number of cards, as shown on Contract drawings:
    - a. CPU 2080-L50E-48QB with 28-24V DC Inputs, 20-Relay Output.
    - b. Digital Input: 2085-IQ16      16pt, 24VDC
    - c. Analog Input: 2085-IF8      8-ch V/I
    - d. Analog Output: 2080-OF4      4-ch V/I
    - e. Fuse all individual I/O points.
    - f. Provide end caps as required.
    - g. All wiring from the PLC I/O terminals shall be wired to interface terminal blocks, including all spares.
    - h. Connect OI to PLC via Ethernet.
  2. General - Direct field wiring to PLC I/O cards and other control panel devices are not allowed.
    - a. Fuse all individual I/O points.
    - b. Discrete outputs shall be wired to interposing relays.
    - c. All spare I/O shall be wired to terminal strips.
    - d. Provide additional isolation relays when driving a foreign voltage (voltage sourced other than from the PLC panel).
    - e. Ethernet cables from outside Control Panel shall land on surface mounted Ethernet jacks, Panduit, Leviton or approved equal. Provide patch cable between surface mounted Ethernet jack and Ethernet switch.
  3. See Appendix "C" for I/O layout.

B. Operator Interface:

1. Provide Operator Interface (OI) Automation Direct (C-More) EA9-T15CL-R, 15" TFT Color Touchpanel system, or approved equal. OI to be panel mounted through cutout in Control Panel door. Provide all cables, configuration software, user manual and mounting hardware necessary for a complete and operable system.
2. Provide an operator interface that meets the following requirements:
  - a. Touch screen operator interface with built-in Ethernet Communication Port, USB port (2) and memory card slots (2).
  - b. Operator interface with 15" TFT color liquid crystal display with analog resistive NEMA 4X touch screen.
  - c. 24VDC powered
  - d. Compatible with Allen-Bradley MicroLogix.
  - e. Operator terminal capable of setup using standard PC.
3. Full programming software to be licensed and delivered to Owner.

C. Devices:

1. Lights, switches, pushbuttons, terminal blocks etc. to match those specified under Devices subsection.
2. Connection between Ethernet Port and Ethernet switch shall be made with Cat 6 patch cable. Patch cable shall be 4 pair stranded PVC cable with HI-FLEX conductors. Length shall be 5 feet minimum. Color of cable shall be red. Ethernet patch cables shall be labeled with primary devices it is connected to (i.e. "PLC", "OI", etc.).
3. Ethernet switch shall be Allen-Bradley Stratix 5700 Switch 1786-BMS06SGA plus two copper SFPs, Stratix 1783-BMS20CGPK, or approved equal.
4. Receptacle to be duplex and rated 20 amps, 120 VAC, 2 pole, 3 wire grounding, NEMA 5-20R configuration, specification grade, and side wired to screw terminals.
5. DC power supply to be non-switching, VDC quantity and sizes per Contract drawings, Sola, Idec, Power One Linear series, or approved equal.
6. The 120 VAC power feed to all Uninterruptible Power Supplies (UPS) shall be fed through an RFI power line filter. Size equal to or larger than amp rating of the power source fuse. The filter shall remove line-to-ground and line-to-line noise present in the power feed. The filter shall effectively

remove pulsed, continuous, and/or intermittent RFI interference. The filter shall be a Corcom "K" Series or approved equal.

7. Uninterruptible power supply:
  - a. The Uninterruptible Power Supply (UPS) to provide VA shown on Contract drawings (minimum) backup power upon power failure to the 24 VDC power supply, Operator Interface (OI), 120VAC powered instruments & displays, and the processor logic controller (PLC) and PLC I/O cards in the Control Panel for 15 minutes (minimum).
  - b. Mount UPS in control compartment and provide all necessary power wiring. Plug cords and receptacles shall be provided so that the UPS can be readily bypassed with power being obtained directly from the panelboard.
  - c. UPS to have temperature rating compatible with expected internal enclosure temperature. Provide enclosure with adequate ventilation fans or AC unit to keep enclosure internal temperature within UPS temperature rating.
  - d. UPS to be APC Smart-UPS, Allen-Bradley, Marathon or approved equal.
- D. Provide metal data pocket within each enclosure to hold as-built drawings.
- E. Install 20% spare terminal blocks for future additions.
- F. Top of operator interface (pilot devices / breaker) to be maximum 66" above finished floor.
- G. Provide label on Control Panel door, below door handle, identifying all sources of foreign power (i.e. "Control Panel Fed from LP1-Ckt#4", "Fans & Lights Fed from LP1-Ckt#2", etc.). Label shall be white plastic with black machine printed lettering as produced by a KROY or similar machine with lettering no smaller than 3/8". Securely attach to door with clear tape.

## 2.08 . MOTOR CONTROL CENTER

- A. General
  1. The motor control center (MCC) shall be built and tested in accordance with:
    - a. NEMA Standards.
    - b. ANSI.
    - c. Underwriter's Laboratories, Inc.
  2. The MCC shall comply with all provisions of UL 845, and bear a separate UL label on each individual MCC Section. In addition, all wiring, devices, and components contained therein, shall be UL labeled for the application.

UL approval and labels shall be provided for the individual MCC Sections prior to delivery from the factory. Field UL labeling will not be allowed.

3. MCC shall be 600 volt class rated to operate from an incoming power as shown on Contract one-line diagrams.
4. MCC construction shall consist of NEMA rated as shown on Contract Drawings deadfront enclosure. MCCs shown as NEMA 12 shall have gasketed doors to reduce dust entry. The height of the MCC shall be 90 inches.
5. MCC fabrication shall be NEMA Class II with NEMA Type B wiring.
6. The MCC shall be provided with the type, capacity, and ratings of components shown on the Drawings or otherwise specified. The 460 VAC breakers shall be rated to withstand an available fault current shown on contract Drawings.
7. MCP and TM breakers shall be selected to have trip and breaker size based on the motor full load amps of motor loads supplied for this project.
8. Top of operator panels, pilot devices, etc. shall be maximum of 66" above finished floor.

#### B. Qualifications

1. MCC structures shall provide for all equipment detailed on the single line Drawings including all spares and spaces. Where possible, the MCC shall be built in strict accordance with overall sizing and component layouts as detailed on the Drawings and no deviations will be allowed without prior approval of the Owner.
2. When physical size requirements for individual components are different than those detailed on the MCC elevation Drawings, the single line Drawing shall supersede the elevation Drawing and the Supplier shall furnish additional vertical Sections based on the Owner's approval as required to provide for all equipment including spares and spaces at no additional cost to the Owner.
3. MCC shall have major components and subsystems therein (i.e., breakers, contactors) that are standard for the MCC manufacturer.
4. All devices and components located in different MCC cubicles (i.e., VFDs, contactors, control relays, timers, etc.), shall be the product of same manufacturer throughout for each device or component type.
5. MCC shall be Square D, Eaton (Cutler-Hammer) or approved equal.

#### C. Construction

1. The MCC shall consist of standard metal-enclosed, freestanding, dead-front and dead-back vertical Sections, not more than 90 inches in height and not less than 20 inches deep. The framework shall be made of 12-gauge steel channels. The composite MCC shall consist of vertical sections that are of equal height.



2. Working height excluding the upper and lower wireways of MCC shall be 72 inches (min). Minimum compartment height shall be twelve inches.
3. Each Section shall be provided with a horizontal top and bottom wireways. Wireways shall be readily accessible and isolated from all busing by grounded steel barriers, plastic or bakelite. The bottom wireways shall have adequate conduit entrance area and shall not be obstructed by transformers, capacitors or other devices. The wireways in each Section shall line up with wireways in the adjacent Sections, with openings between, so that wires may be pulled the entire MCC length.
4. Where shown on the Drawings, isolated vertical wireways shall be provided, each with a separate full height door. Vertical wireways shall intersect the top and bottom horizontal wireways for easy cable routing. Vertical wireways shall have wire hangers for wire tie-down spaced throughout the complete vertical trough. Vertical wireway doors shall be latched by quarter-turn indicating-type fasteners.
5. The MCC shall be designed for front access maintenance. All wiring, bus joints, and other mechanical parts requiring tightening or other maintenance shall be accessible from the front. Rear or side access shall not be necessary for inspection or maintenance.
6. All steel work shall be immersion cleaned and phosphated to inhibit rust prior to painting. Paint finish shall be electrostatically applied dry powder, baked to thermoset. MCC compartment interior color shall be white. All other interior and exterior MCC structure surfaces shall be finished in an ANSI 61 gray color. No field painting will be allowed except for "touching up" of damaged areas.
7. A manufacturer's nameplate shall be attached to each MCC giving the model number, serial number, bus amps, voltage, and other manufacturer's information pertaining to the MCC construction.
8. MCC shall be furnished completely factory assembled and shipped to the jobsite in shipping sections. Assembly of components into MCC at the jobsite is not allowed (except for connection of shipping section). Removable lifting angles or eyes shall be provided on the top of each MCC shipping section.
9. MCC shall be factory inspected and witness tested by the Owner prior to it being shipped to the jobsite. If a MCC shows up at the jobsite and has not been previously inspected and tested by the Owner, then the Supplier shall remove the MCC from the jobsite and return it to the factory for factory inspection and witness testing, all at the expense of the Supplier.

D. Bus System

1. All bus material shall be copper. Aluminum buswork is not allowed. All buses, except ground buses, shall be completely isolated by steel plates or insulating material.
2. A continuous horizontal bus shall be furnished and rated as shown on the Contract one-line Drawings.

3. A full length vertical bus shall be furnished in each Section and rated as shown on the Contract Elevation diagrams. Current rating shall apply to the full length of the vertical bus, tapered bus shall not be allowed. Vertical buses shall be insulated and isolated with glass polyester or equivalent continuous barriers. Cutouts shall be provided in the barriers for plug-in stab connections. Unused stab openings shall be plugged. Lower ends of vertical buses shall be insulated.
4. Buses shall be sized and braced to withstand a fault of symmetrical amperes listed on Contract one-line drawings. MCC protective breaker(s) shall have an interrupting capacity to isolate a fault current of this magnitude.
5. A copper ground bus shall be provided in the bottom horizontal wireway of each Section. The ground bus shall be rated 300A minimum. It shall be electrically continuous the entire width of each MCC. Provide cable lugs on ground bus for incoming power grounding conductors.

E. Compartments

1. Compartments shall be isolated from each other by separate horizontal steel plates without openings that are a part of the unit itself. Draw-out units shall totally isolated enclosed equipment. All unused openings to the adjacent vertical wiring space shall be plugged. All openings used for wiring shall have insulating grommets.
2. Doors for each compartment shall be fabricated from formed sheet steel of not less than 14 gauge thickness. The door opening shall be of sufficient size to permit ready removal of any of the devices in the compartment. Doors shall be mounted on adjustable and removable pin type concealed hinges so arranged that compartment doors may be removed without disturbing compartment doors above or below. Door latches shall be quarter turn indicating type fasteners. Overload relays shall be reset from outside the enclosure by means of an insulated button mounted on the door.
3. An operator mechanism mounted on the draw-out unit shall provide the means for operating the compartment breaker or disconnect switch. The operator shall extend through an opening in the compartment door and shall clearly indicate whether the disconnect is "on," "off" or "tripped." This indication shall function whether the door is open or closed. The operating mechanism shall not be attached to the compartment door.
4. Each compartment for combination starters, breakers, and disconnect switches shall be draw-out construction, containing individual units. Draw-out provisions shall include a positive guide rail system and stab shrouds to absolutely ensure alignment of stabs with the vertical bus. The stabs shall be tin plated copper alloy and shall provide a self-aligning pressure connection. The stab design shall ensure a consistent low-resistance contact with the vertical bus even after repeated insertions and removals. Power wiring to stabs shall be contained within the draw-out unit. No wire shall extend behind the unit.

5. All similar compartments shall have the same structural features and the units shall be interchangeable.
6. With the disconnect in the "on" position, a mechanical interlock shall prevent opening of the door. This interlock shall be provided with a defeater so that authorized personnel may gain access to the compartment without interrupting service. This interlock shall also prevent unintentional closing of the disconnect when the compartment door is open. A second mechanical interlock shall prevent any possibility of removing or reinserting the draw-out unit while the disconnect is in the "on" position.
7. The operator mechanism shall allow padlocking of the disconnect in the "off" position with up to three padlocks.
8. All compartment interconnect wiring to field devices shall be connected to pull apart terminal blocks.
9. Pushbuttons, selector switches, and indicating lights shall mount where shown on the Drawings on a removable device panel which is part of the draw-out unit. The device panel shall not be part of the door.
10. Compartments containing motor starters shall each have an overload selection table posted inside the door.
11. MCC compartments labeled as "space" shall have a blank-hinged door and draw-out section panel installed, occupying the full space area.

F. Power monitor:

1. Each digital power monitoring system to be as manufactured by Electro Industries Shark 200 with all six virtual upgrade packs (V-Switch), Square D or approved equal. Power monitor shall display: Voltage (phase A-B, A-N, B-N); current (Phases A, B); power (KW, KVA); power factor, total harmonic distortion and frequency. Monitor shall have 10 amp secondary, multifunction meter only.
2. Provide additional options/software for monitoring of values by existing PLC.
3. Provide two (2) external current transformers with rating as indicated on the drawing or sized for incoming service. Provide two (2) external potential transformers (when necessary) with rating as indicated on the drawing or sized for incoming service.
4. Power monitor shall include Ethernet port for connection to PLC.

G. Floor mats:

1. Provide flat, smooth, rubber mats in front of MCC. Mat shall extend the full length of the MCC. Mat shall have a minimum width of 36 inches extending out from in front of MCC. The mat supplied shall be specifically made for this insulation/isolation application.

## 2.09 VARIABLE FREQUENCY DRIVE

- A. The variable frequency drive (VFD) units shall be Square D Altivar 630 Series with Human Interface Module (HIM) and other options, to match Owner standard.
- B. Load - The VFD shall be designed to continuously operate the following motor/pump load:
  - 1. Horsepower, VFD amp size (minimum) shown on Contract Drawings, at Full speed R.P.M. of motor data of supplied pump motor. The controller's full load output current rating shall be based on 40° ambient and no less than a 3.6 kHz switching frequency to reduce motor noise and avoid increased motor losses.
  - 2. Voltage, 460 VAC, three phase, 60 cycle.
  - 3. Service factor, 1.15 S.F.
- C. Digital Programmer/Controller –The VFD shall be provided with a door mounted alpha-numeric human interface module (HIM) digital display with keypad to view and adjust the setpoints, parameters, diagnostic, and status indicators. Cable for remote digital programmer/controller shall be supplied. The remote controller shall be deadfront door mounted with bezel to provide NEMA rating shown on Contract Drawings.
- D. Input and Output Terminations - The VFD assembly shall have functional provisions and termination points at terminal blocks as shown on the Contract "E"-Series and Elementary Drawings.
  - 1. Copper lugs shall be provided for wire sizes listed in the Conduit and Wire Routing Schedule.
- E. The VFD manufacturer shall provide, as a minimum, input line series reactors and motor terminators as shown on Contract One-Line diagrams to prevent VFDs from interacting with the incoming Utility power line or the generator. Harmonics generated by a VFD shall not affect any device on the existing power distribution system; harmonics from any device on the existing power distribution system shall not affect the operation of the VFD.
- F. VFD shall be configured to be capable of automatically restarting after a power fail. VFD requiring a manual reset at the drive after a power fail is unacceptable.
- G. Top of panels, displays, pilot devices, etc. shall be maximum of 66" above finished floor.
- H. Provide AC choke, dV/dt filters, etc. as required for each VFD based on distance between VFD and motor.

## 2.10 ACTIVE HARMONIC FILTER

- A. General:
  - 1. Active harmonic filter shall supply non-fundamental current demanded by the non-linear load that results in a near sinusoidal current being drawn

from the supply. DC bus shall store power for power semiconductor switching. Filter shall maintain power factory between 0.95 and 0.999 lagging when operating. Active Harmonic Filter shall be Transcoil Inc. (TCI) Harmonic Guard active harmonic filter with current transformers and associated devices, MTE, Schneider Electric or approved equal.

B. Design:

1. The active harmonic filter shall:
  - a. Be provided with over-current and current limiting self-protection. Operation shall continue indefinitely at manufacturer defined safe operating levels without trip off or destruction of the active harmonic filter.
  - b. Have inductive elements in the power circuit be coreless, in order to maintain constant inductance and avoid saturation at high current levels
  - c. The active harmonic filter shall feature a fully digital, broadband current regulator with progressive gains to eliminate system resonance tuning issues and simplify startup and commissioning.
  - d. The active harmonic filter shall feature single processor control of all power electronic devices per a single active filter to reduce fault response latency and harmonic correction loop times
2. Filter shall have built in redundancy so at least one half of the corrective current capacity is available after a normal single point fault.
3. Two distinct levels of faults shall be employed:
  - a. Critical level faults (all other faults) stop the function of the unit and await operator action to restart. The run relay shall be disabled and the fault relay enabled. Operator shall be required to initiate a power reset (cycle power off and on) to restart the active harmonic filter.
  - b. Non-critical level faults (e.g. AC line power loss) will provide automatic restart and a return to normal operation upon automatic fault clearance without operator initiation.
4. The logic of the active harmonic filter shall monitor the load current by utilizing two (2) current transformers (CTs) mounted on phases A and C in the Main Switchboard to direct the function of the power electronic converter.
5. Filter shall be rated for 480V, 3 phase, 3 wire plus ground with +/- voltage tolerance. Input circuit breaker shall be rated for 100KAIC.
6. Filter shall correct harmonic and voltage distortion to meet IEEE 519-2014.

C. Controls:

1. Automatically start to correct harmonic currents after power-up without operator intervention.
2. Operational Modes: (selectable at Operator Interface)
3. Harmonic Correction Only.

4. Power Factor Correction Only Mode.
  5. Combination Harmonic and power factor mode.
  6. Remote Monitoring: Provide configurable relay based run/stop command inputs and manual and auto run/stop commands.
  7. Provide ability to load and save operational parameters and revert to factory default settings.
  8. Integral serial Ethernet Modbus TCP/IP field bus slave network connection for Modbus.
- D. Operator Interface:
1. Operator interface shall be 5.6", 65k colors with LED backlight.
  2. Provide Home, Status, Fault and Setup screens (minimum).
  3. Display THD, Power Factor, RMS current, RMS voltage, and fault history. Graph wave forms of both RMS current and voltage.
  4. Graphically display active filter current usage (0-100% capacity). Show nominal operation and "at capacity" operation.
  5. Display trends history data for four operator selectable variables.
- E. Enclosure:
1. Active harmonic filter shall be installed in MCC lineup.
  2. Door shall be interlocked with the circuit breaker to prevent the door from being opened when the unit is energized.
  3. Enclosure shall have flush door-mounted digital Operator Interface.
  4. Top of Operator Interface, pilot devices, etc. shall be maximum of 66" above finished floor.

## 2.11 CHLORINE ANALYZER PANEL

- A. The panel shall be a single panel with instruments mounted, wired and plumbed prior to shipment to the project site. Analyzer shall measure free chlorine in fresh water and shall be provided with the following: constant head flow controller, free chlorine sensor, flow cell and transmitter. Analyzer shall be reagentless and powered from 120VAC. Transmitter shall have two 4-20mA outputs and three (3) configurable relay outputs.
- B. Enclosure
1. Enclosed in fiberglass NEMA 4X enclosure.
  2. 36"H x 36"W x 12"D (minimum) Provide larger enclosure as required to accommodate the supplied equipment at no additional cost to the Owner.
  3. Single 3-point latch handle with padlock provisions.
  4. ¼" aluminum or 3/8" PVC backpan.
  5. Nameplate labeling as specified herein.

6. Provide accessories consisting of breaker to disconnect incoming power, heater, fan, removable metal louvers, and thermostats.
  7. A copper ground bus shall be provided in the enclosure. Provide full height white backpan in box.
  8. Provide metal data pocket within each enclosure and box to hold as-built drawings.
- C. The sample and drain system shall accommodate flows of 1000 to 1500 mL/min. The sample system shall consist of a single sample manifold to supply the instrument. A single drain manifold shall be provided to collect discharge from the analytical instrument.
- D. Chlorine Analyzer shall be Electro-Chemical Devices (EDC) FC-80 or approved equal.

## 2.12 PULL BOXES

- A. Underground pull boxes, where shown or required by length of conduit runs, shall be prefabricated concrete type with the size shown on the Drawings or larger to allow for adequate pull area. Extension sections shall be provided as necessary to reach the depth of underground conduits. All boxes shall have galvanized steel hold down bolts and hardware. Boxes located in paved areas or other areas which vehicles may travel shall be H/20 loading rated and have diamond plate steel traffic covers. Steel covers or lids shall be galvanized. Pull box covers shall be labeled with pull box designation. All underground pull boxes shall have an 18-inch bedding of 3/4-inch nominal crushed rock. Pull boxes shall be Christy Concrete Products, Brooks, or approved equal.

## 2.13 GROUNDING SYSTEM

- A. Ground clamps shall be bolt-on type as manufactured by ILSCO type AGC, O-Z Gedney Type GRC, Burndy Type GAR or GP, or approved equal.
- B. All ground rod, pipe, and steel plate and buried bond connections shall be made by welding process equal to Cadweld.
- C. Ground buses shall be provided in all electrical enclosures. Each ground bus shall be sized as shown on the Contract drawings or specified herein. The ground bus shall be adequately sized for the connection of all grounding conductors required per NEC. Screw type lugs shall be provided on all ground busses for connection of grounding conductors.
- D. Each ground bus shall be copper. Screw type fasteners shall be provided on all ground busses for connection of grounding conductors. Ground bus shall be a Challenger GB series, ILSCO D-167 series, or approved equal.
- E. Attachment of the grounding conductor to equipment or enclosures shall be by connectors specifically provided for grounding. Mounting, support, or bracing bolts shall not be used as an attachment point for ground conductors.

- F. All raceway systems, supports, enclosures, panels, and equipment housings shall be permanently and effectively grounded.
- G. One side of the secondary on all transformers shall be grounded.
- H. The system neutral (grounded conductor) shall be connected to the system's grounding conductor at only a single point in the system. This connection shall be made by a removable bonding jumper sized in accordance with the applicable provisions of the National Electrical Code if the size is not shown on the Drawings. The grounding of the system neutral shall be in the enclosure that houses the service entrance main over-current protection.
- I. The system neutral conductor and all equipment and devices required to be grounded by the National Electrical Code shall be grounded in a manner that satisfies the requirements of the National Code.
- J. Grounding conductors shall be sized as shown on the Plans or in accordance with NEC Table 250.122, whichever is larger.
- K. Grounding and bonding wires shall be installed on all conduits with grounding bushings, expansion joints and for continuity of raceways transitions. Bonding wires at endpoints shall be connected to enclosure ground bus or equipment grounding lug.
- L. Conduit grounding bushings shall be installed on all metallic conduits. Conduit grounding bushings shall be set screw locking type electro-galvanized malleable iron with insulation collar and shall be provided with a feed through compression lug for securing the ground bonding wire. Ground bonding wire shall be bare wire and shall be sized per NEC.
- M. All receptacles shall have their grounding contact connected to a grounding conductor.
- N. Branch circuit grounding conductors for receptacles, or other electrical loads shall be arranged such that the removal of a lighting fixture, receptacle, or other load does not interrupt the ground continuity to any other part of the circuit.
- O. Negative side of all VDC power supplies shall be grounded.

## 2.14 ELECTRICAL ENCLOSURES AND BOXES

- A. Enclosures and boxes to be wall mounted, minimum 14 gauge, type 316 stainless steel with seams continuously welded & ground smooth, and fast access door latches. A copper ground bus shall be provided in the enclosure. Outer door shall have provisions for locking enclosure with standard padlock. Provide white backpan in box.
- B. Provide accessories consisting of breaker to disconnect incoming power, heater, fan, removable metal louvers, and thermostats, where shown on Contract drawings.



- C. Provide larger enclosure as required to accommodate the supplied equipment at no additional cost to the Owner
- D. Provide metal data pocket within each enclosure and box to hold as-built drawings.
- E. All panel doors shall be installed with ground straps.
- F. Enclosure shall be Hoffman, Rittal or approved equal.

## **PART 3 - MATERIALS**

### **3.01 ELECTRICAL WORKMANSHIP**

- A. All work in this Section shall conform to the codes and standards outlined herein.
- B. The Electrical Contractor shall employ personnel that are skilled and experienced in the installation and connection of all elements, equipment, devices, instruments, accessories, and assemblies. All installation labor shall be performed by qualified personnel who have had experience on similar projects. Provide first class workmanship for all installations.
- C. Ensure that all equipment and materials fit properly in their installations.
- D. Perform any required work to correct improper installations at no additional expense to the Owner.
- E. The Engineer reserves the right to halt any work that is found to be substandard or being installed by unqualified personnel.

### **3.02 ELECTRICAL CONSTRUCTION METHODS, GENERAL**

- A. All wiring shall be neatly bundled and laced with plastic tie-wraps, anchored in place by round-head 316 stainless screw attached retainer. Where space is available, such as in electrical cabinets, all wiring shall be run in slotted plastic wireways or channels with dust covers. Wireways or channels shall be sized such that the wire fill does not exceed 50%. Wires carrying 100 volts and above shall be physically separated from lower voltage wiring by using separate bundles or wireways with sufficient distance to minimize the introduction of noise, crossing only at 90 degree angles. Tie-wraps shall be T & B TY-RAP's, or approved equal.
- B. Where wiring crosses hinged surfaces, provide a "U" shaped hinge loop protected by plastic spiral wrap. The hinge loop shall be of sufficient length to permit opening and closing the door without stressing any of the terminations or connections.
- C. All devices shall be permanently labeled and secured in accordance with subsections labeled "NAMEPLATES AND TAGS".
- D. All field wires and panel wires have wire markers as specified in the "WIRE" subsection.
- E. All components associated with a particular compartment's or enclosure's function shall be mounted in that compartment or enclosure.
- F. Spacing and clearance of components shall be in accordance with UL, JIC, and NEC standards.
- G. Wires shall not be spliced except where shown. Devices with pigtails, except lighting fixtures, shall be connected at terminal blocks. Equipment delivered with spliced wires shall be rejected and the Contractor required to replace all such wiring, at no additional cost to the Owner.

- H. No wires shall be spliced without prior approval by the Engineer.
- I. Where splices are allowed or approved by the Engineer they shall conform with the following:
  - 1. Splices of #10 and smaller, including fixture taps, shall be made with see-thru nylon self-insulated twist on wire joints; T & B "Piggys", Ideal "Wing Nut", or approved equal.
  - 2. Splices of #8 and larger shall be double crimped splices, or approved equal, insulated with heat shrink tubing, or approved equal.
  - 3. Splices in underground pullboxes shall be insulated and moisture sealed with 3M "Scotchcast" cast resin splice kits and shall have a date marking for shelf life. Do not use splice kits with a date marking for shelf life that has expired.
  - 4. Wire splicing devices shall be sized according to manufacturer's recommendations.
  - 5. Tape on splices shall not be allowed.
  - 6. Splices for motor leads shall be made with T&B MSC series splice kit, or approved equal.
- J. Tapes shall conform to the requirements of UL 510 and be rated: 105 degrees C, 600V, flame retardant, hot and cold weather resistant. Vinyl plastic electrical tape shall be 7 mil black. Phase tape shall be 7 mil vinyl plastic, color coded as specified. Electrical insulation putty shall be rubber based, elastic putty in tape form. Varnished cambric shall not be used.
- K. Connections to terminals shall be as follows:
  - 1. Use connector or socket type terminals furnished with component.
  - 2. Connections to binding post screw, stud or bolt use:
    - a. For #10 and smaller wire, T & B "Sta-Kon", Buchanan "Termend" or approved equal, self-insulated locking forked tongue lug.
    - b. For #8 to #4/0 wire, T & B "Locktite", Burndy QA or approved equal lug of shape best suited.
  - 3. Use ratchet type crimping tool which does not release until proper crimp pressure has been applied.
  - 4. Connections for all terminals shall be made with insulation stripped per manufacturer's instructions.
- L. Equipment shall be wired and piped by the manufacturer or supplier. Major field modifications or changes are not allowed without the written "change order" authority by the Engineer. When field changes are made, the components, materials, wiring, labeling, and construction methods shall be identical to that of the original supplied equipment. Contractor's cost to replace or rework the equipment to match original manufacturer or supplier methods shall be done at no additional cost to the Owner.
- M. Mating fittings, bulkhead fittings, plugs, lugs, connectors, etc. required to field interface to the equipment and panels shall be provided by the supplier when the equipment is delivered.
- N. All electrical and instrumentation factory as-built drawings associated with the equipment shall be provided with the equipment when it is delivered to the job site. Drawings for each

piece of equipment shall be placed in clear plastic packets of sufficient strength that will not tear or stretch from drawing removal and insertion.

### 3.03 ELECTRICAL EQUIPMENT FABRICATION, GENERAL

- A. Panel cutouts for devices (i.e. indicating lights, switches) shall be cut, punched, or drilled and smoothly finished with rounded edges. Exposed metal from cutouts that are made after the final paint finish has been applied shall be touched up with a matching paint prior to installing device. Do not paint nameplates, labels, tags, switches, receptacles, conductors, etc.
- B. All doors shall be fully gasketed, with non-shrinkable water and flame resistant material.
- C. Bolts and screws for mounting devices on doors shall be as specified by the manufacturer, otherwise they shall have a 316 stainless steel flush head which blends into the device or door surface. No bolt or screw holding nuts shall be used on the external surface of the door.
- D. No fastening devices shall project through the outer surfaces of equipment.
- E. Each component within the equipment shall be securely mounted on an interior subpanel or backpan and arranged for easy servicing, such that all adjustments and component removal can be accomplished without removing or disturbing other components. Mounting bolts and screws shall be front located for easy access and removal without special tools. Access behind the sub panel or backpan shall not be required for removing any component.
- F. HARNESS: Where space is available, all wiring shall be run in slotted plastic wire ways or channels with dust covers. If space is not available for wireways, then all wiring shall be neatly bundled and laced with plastic tie-wraps, anchored in place by 316 stainless steel screw attached retainer. Wire ways or channels shall be sized such that the wire fill does not exceed 50%. Tie-wraps shall be T&B TY-RAP, or approved equal.
- G. HINGE LOOPS: Where wiring crosses hinged surfaces, provide a "U" shaped hinge loop protected by clear nylon spiral wrap. The hinge loop shall be of sufficient length to permit opening and closing the door without stressing any of the terminations or connections. Spiral wrap shall be Graybar T25N, or approved equal.
- H. RETAINERS: Wire ways, retainers, and other devices shall be screw mounted with round-head 316 stainless steel screws or mechanically mounted by push-in or snap-in attachments. Glue or sticky back attachment of any type or style shall not be used. Retainers shall be T&B TC series, or approved equal.
- I. ROUTING: Wires shall be routed in slotted plastic wire-ways with snap covers.
  - 1. Wires carrying 120 VAC shall be separated as much as possible from other low voltage wires and signal cables, and shall be routed only in ducts for 120 VAC. If the power wiring has to cross the signal wiring, the crossing shall be as close to a right angle as possible.

2. Ducts for 24 VDC wiring shall be used for all other wires and cables. Routing of 120 VAC in combined ducts is not allowed without prior written approval of the Owner.
  3. Wires and cable shall be routed along the shortest route between termination points, excepting routes which would result in routing 120 VAC and other wires and cables in the same duct. Wires and cables shall have sufficient length to allow slack and to avoid any strain or tension in the wire or cable.
  4. Wires and cables shall be placed in the ducts in a straight, neat and organized fashion and shall not be kinked, tangled or twisted together. Additional wire ducting shall be provided for use by the electrical subcontractor for routing field wires to their landing points in the each electrical and instrumentation panel.
  5. Wiring not routed in duct work shall be neatly bundled, treed, and laced with plastic ties. Wiring across door hinges shall be carefully made up and supported to avoid straining and chafing of the conductors or from putting any strain on their terminals.
- J. TERMINATIONS: Single wire and cable conductors shall be terminated according to the requirements of the terminal device. All terminations must be made at terminals or terminal blocks. Use of spring or buttsplice connectors are not allowed.
1. Provide 2" minimum separation between wireway and terminal blocks. Installation of wireways too close to terminal blocks will be required to be completely reworked to the satisfaction of the Owner.
  2. For captive screw pressure plate type terminals, the insulation shall be removed from the last 0.25 inches of the conductor. The conductors shall be inserted under the pressure plate to full length of the bare portion of the conductor and the pressure plate tightened without excess force. No more than two conductors shall be installed in a single terminal. All strands of the conductor shall be captured under the pressure plate.
  3. Terminal blocks and same equipment type termination wiring shall have all wiring terminated with appropriate sized ferrules with insulation collars. Ferrule crimping (full ratcheting) tool with proper sized jigs shall be used per manufacturer's recommendations.
  4. For screw terminals, appropriately sized locking forked spade lugs shall be used. Lugs shall be crimp on type that form gas tight connections. All crimping shall be done using a calibrated crimping tool made specifically for the lug type and size being crimped.
  5. On shielded cables, the drain wire shall be covered with insulating tubing along its full bare length between the cable jacket and the terminal lug or terminal pressure plate.
  6. For screwless terminals, wire shall be stripped back and inserted per the manufacturer's instructions. When stripping insulation from conductors, do not score or otherwise damage conductor.
  7. Heat shrink shall be placed on ends of shielded cable to cover foil.
  8. Additional condulets with terminal blocks shall be supplied for wire termination to devices with leads instead of terminals. (i.e., solenoid valves, level probe, etc.).
  9. Terminate all status, control, and analog I/O wiring on terminal blocks, including spares. Provide additional relay, DIN rails, terminal blocks and side panels as required.
- K. A ground bus shall be provided in each enclosure or cabinet. It shall have provisions for connecting a minimum of ten grounding conductors. Screw type lugs shall be provided for

connection of grounding conductors. All grounding conductors shall be sized as shown on plans or in accordance with NEC Table 250.122, whichever is larger.

- L. Minimum wire bending space at terminals and minimum width of wiring gutters shall comply with NEC Tables 373.6(A) & (B).
- M. Wire sizes shall not be installed smaller than those shown in NEC Article 310 for each circuit amperage rating.
- N. Future device and component mounting space shall be provided on the door, backpan, and subpanel where detailed on the Drawings. Where no detail is shown, provide a minimum of 15 percent usable future space.
- O. Doors shall swing freely a minimum of 90° and close with proper alignment.
- P. Provide larger motor termination boxes and lugs as required to accommodate conduit and wires.

### 3.04 DELIVERY

- A. Contractor shall inspect each electrical and instrumentation item delivered to the jobsite.
- B. Contractor shall unpack each item for inspection within two (2) days of arrival.
- C. Complete written inventory shall be produced by Contractor and submitted to Owner within (2) days after arrival on jobsite for record keeping prior to any payment for the item.
- D. All panels and enclosures be delivered with as-built drawings in clear plastic packets within each panel and enclosure.

### 3.05 DAMAGED PRODUCTS

- A. Damage products will not be accepted. All damaged products shall be replaced with new products at no additional cost to the Owner.

### 3.06 FASTENERS & LUGS

- A. Fasteners for securing equipment shall be 316 stainless steel. The fastener size shall match equipment mounting holes. Layout to maintain headroom, neat mechanical appearance, and to support equipment loads required.
- B. All wire & cable lugs shall be copper; aluminum or aluminum alloy lugs shall not be used. The Electrical Contractor shall supply all lugs to match the quantity & size of wire listed in the conduit & wire routing schedule.
- C. Anchor Methods:
  - 1. Metal Surfaces: Machine screws, bolts or welded studs.
  - 2. Concrete Surfaces: Wedge or expansion 316 stainless steel anchors.

3. Structural Steel: Right angle, parallel and edge type rigid metal clamps. Do not weld or drill structural steel.

D. Equipment Mounting:

1. The Electrical Contractor shall be responsible for furnishing and setting all anchor bolts required to install his equipment.
2. Electrical equipment shall be unistrut "stand off" mounted a minimum of ½ - inch from the wall in a manner so that the rear of the equipment is freely exposed to air circulation. Unistrut material shall be 316 stainless steel in NEMA 4X areas and galvanized in non-NEMA 4X areas unless called out specifically in details.
3. All equipment enclosures shall be of the NEMA classification noted on the electrical plan Drawings for the area in which the device will be mounted.
4. Reinforced concrete pad with 316 stainless steel anchor bolts shall be provided for each electrical freestanding equipment.

- E. Dissimilar metals such as aluminum, stainless steel, steel, galvanized steel between enclosures, devices, etc. and mounting surfaces shall be isolated from each other using insulated tape or nonmetal spacers. Tape and spacers used shall be specifically manufactured for this application.

### 3.07 INSTALLATION, GENERAL

A. System

1. Install all products per manufacturer's recommendations and the Drawings.
2. Contract Drawings are intended to show the basic functional requirements of the electrical system and instrumentation system and do not relieve the Contractor from the responsibility to provide a complete and functioning system.
3. Keep a copy of the manufacturer's installation instructions on the jobsite available for review at all times prior to and during the installation of the associated equipment.

- B. Provide all necessary hardware, conduit, terminal blocks, wiring, fittings, and devices to connect the electrical equipment provided under other Sections. The following shall be done by the Contractor at no additional cost to the Owner:

1. Provide additional devices, wiring, terminal block, conduits, relays, signal converters, isolators, boosters, and other miscellaneous devices as required to complete interfaces of the electrical and instrumentation system.
2. Changing normally open contacts to normally closed contacts or vice versa.
3. Adding additional relays to provide more contacts as necessary.
4. Installing additional terminal blocks to land wires.
5. Provide larger pullboxes and junction boxes to accommodate the conduits and wires shown in the Conduit & Wire Routing schedule at no additional cost to Owner.

- C. All programmable devices, shall be programmed, set-up and tested by the Contractor prior to start of witness testing. This includes instrumentation. Programming and set-up parameters shall be adjusted or changed as directed by the Owner or Engineer during start-up and throughout the warranty period, at no additional cost to the Owner. Coordinate with the Owner and setup all alarm, process, time delays and operation setpoints.

- D. Coordinate with the Owner and setup all alarm, process, and operation setpoints.

#### E. Panels and Enclosures

1. Install panels and enclosures at the location shown on the Plans or approved by the Engineer.
2. Install level and plumb.
3. Clearance about electrical equipment shall meet the minimum requirements of NEC 110.26.
4. Box supports shall be located and oriented as directed in field by Owner.
5. Seal all enclosure openings, including bottom edge of all pad mounted enclosures to prevent entrance of insects, rodents, dirt, debris, etc.
6. All conduits entering outdoor panels and enclosures shall use watertight hubs. These hubs shall be located on sides or bottom only. Top entry of outdoor panels or enclosures is not allowed unless specifically shown on plans.
7. Additional condulets with terminal blocks shall be supplied for wire termination to devices with leads instead of terminals. (i.e. solenoid valves, level probe, etc.)
8. Terminate all status, control, and analog I/O wiring on terminal blocks, including spares. Provide additional relay, DIN rails, terminal blocks and side panels as required.
9. All panels and enclosures be delivered with as-built drawings in clear plastic packets within each panel and enclosure.
10. Provide larger motor termination boxes as required to accommodate conduit and wires.
11. All louvers shall be provided with removable metal filters.

#### F. Conduits and Ducts

1. Care shall be exercised to avoid interference with the work of other trades. This work shall be planned and coordinated with the other trades to prevent such interference. Pipes shall have precedence over conduits for space requirements. Exposed conduits shall be neatly arranged with runs perpendicular or level and parallel to walls. Bends shall be concentric.
2. Exposed conduits runs shall not be run directly on the ground. Secure conduits to 316 stainless steel unistrut.
3. Install conduit free from dents and bruises.
4. All conduits shall be labeled with conduit tags on all ends; at junction boxes, pull boxes, enclosures, stub-outs, or other terminations. All spare conduits shall be labeled.
5. A maximum of three equivalent 90 degree elbows are allowed in any continuous runs. Install pull boxes where required to limit bends in conduit runs to not more than 270 degrees or where pulling tension would exceed the maximum allowable for the cable.
6. Route all above grade outdoor conduits or conduits in rated areas parallel or perpendicular to structure lines and/or piping.
7. Conduits installed outdoor or in NEMA 4X rated areas above grade shall be braced in place with 316 stainless steel Unistrut stanchions or PVC coated clamps with backplates.
8. Conduit entrances: Seal each conduit entrance from below grade into the panels, and other electrical enclosures with plugging compound sealant to prevent the entrance of insects and rodents.
9. Special "Soft-Jaw" type pipe clamps shall be used to prevent damage to PVC-coated conduits while field threading, cutting to length, and coupling sections.



10. Conduits shall be painted to match the color of surface attached to as directed by Owner.
11. Prior to encasement, concealment, backfilling of conduits, temporary conduit labels shall be provided at each end of conduit. Temporary conduit labels shall have ½-inch (minimum) lettering at all transition points. After encasement and concealment temporary conduit labels shall be placed at each exposed end.
12. All spares shall be mandrel and have pull ropes installed. Provide caps on conduit ends to prevent entrance of dirt or insects. Provide a waterproof label on each end of the pull rope to indicate the destination of the other end.
13. Conduits shall be painted to match the color of surface attached to as directed by Owner.
14. All existing conduits that are reused shall have a mandrel or conduit piston pulled through the entire conduit run to prove the length contains no blockages or obstructions. Mandrelling shall be witness by the Owner.
15. Install new conduit tags for reused conduits at all transition boxes and endpoints. Conduit & Wire Routing Schedule shall be updated as these modifications take place.

G. Conduit and Wire Routing Schedule

1. Conduit material, wire size, and quantity listed in schedule take precedence over Division 26 Specifications.
2. All of the entries for each line in the conduit schedule apply to each conduit when multiple quantity of conduits (quantity of which are indicated by number entered in conduit no. column in schedule) are listed in the schedule.
3. Wire sizes listed are in AWG or Kcmil and are copper conductors.
4. Extra wire was intentionally placed in the "Conduit & Wire Routing Schedule" which shall be labeled on both ends with a unique wire label. All spare wires shall be labeled with equipment number followed by X1, X2, etc. (i.e. P11001-X1 for first spare wire).
5. Contractor to supply and install all conduits and wiring as shown on Utility Engineered Design drawings. Utility primary and secondary conduit and wiring shown in "Conduit and Wire Routing Schedule" is for bid purposes only. A credit or add-on will be provided by Contractor based on the actual work performed by Contractor for the Utility service.
6. All control and signal wiring terminations shall have the correct wire label applied prior to making connection.
7. Conduit entries listed as "GRS-PVC" in the Conduit & Wire Routing Schedule are to be "Galvanized Rigid Conduits with PVC coating" the entire length.
8. Vertical offsets and sloping of conduits are not detailed on plans, the Electrical Contractor shall include in his bid the price for the complete conduit run utilizing the civil & mechanical plans to measure vertical & slope distances.
9. Exposed conduits runs shall not be run directly on the ground or roof. Secure conduits to stainless steel unistrut.
10. Duct-taping conduits together is not acceptable. Conduits, installed into concrete pads, shall be installed with a minimum of 2" distance between conduits to allow installation of bushings.
11. Seals
  - a. Seal around all conduits, wires, and cables penetrating between panels, walls, ceilings, and floors in all buildings with a fire stop material. Seal shall be made at both ends of the conduit with a fire stop putty. Seal shall have

a minimum two hour rating. Fire stop sealing shall be International Protective Coatings Flamesafe, or approved equal.

- b. Seal around conduits entering outside to inside structures and around bottom of free standing enclosures to maintain watertight integrity of structure.
- c. Place conduit seal inside each underground conduit riser into panels and enclosures to prevent entrance of insects and rodents.
- d. Seal conduits entering any electrical instrument and install conduit drains as necessary to prevent corrosion from water condensation.
- e. Conduit entrances: Seal each conduit entrance from below grade into the MCC and other electrical enclosures with plugging compound sealant to prevent the entrance of insects and rodents. Conduits between the enclosures shall be sealed with plugging compound sealant on each end. Plugging compound sealant shall be PRC-DeSoto (formerly Courtaulds) Aerospace Semco PR-868 or approved equal.

#### H. Excavation and Back Filling

- 1. The Electrical Contractor shall provide the excavation for equipment foundations, and trenches for conduits or buried cables.
- 2. Underground conduits outside of structures shall have a minimum cover of 24 inches except for utility conduits depth shall be as required by the governing utility requirements. Back filling shall be done only after conduits have been inspected.
- 3. Trenches for all underground utility lines shall be excavated to the required depths.
- 4. Repave any area that was paved prior to excavation. Backfill and surface all areas as shown on the Drawings or where not shown to the original condition that was present prior to the excavation.
- 5. Contractor shall uncover any uninspected covered conduit trenches, at no additional cost to Owner, to verify proper installation.
- 6. Excavation and back fill conduit trenches shall conform to the requirements of the Earthwork Section of these Specifications, unless modified on plans, and to other entities as required. Backfill shall consist of 3/4 inch class 2 aggregate base material, unless otherwise noted.
- 7. At all times during the installation of the electrical distribution system, the Contractor shall provide barricades, fences, guard rails, etc., to safeguard all personnel, including small children, from excavated trenches.

#### I. Wiring, Grounding, and Shielding

- 1. It is important to observe good grounding and shielding practices in the generally noisy environment in this application. The shield of shielded cables shall be terminated to ground at one end only (source end), the shield at the other end (receive end) shall be encased in an insulated material to isolate it from ground.
- 2. Special cables shall be provided when required by manufacturer or necessary to correct noise or distortion interference at no additional cost to Owner.

#### J. Cutting and Patching: The Contractor shall do all cutting and patching required to install his work. Any cutting which may impair the structure shall require prior approval by the Engineer. Cutting and patching shall be done only by skilled labor of the respective trades. All surfaces shall be restored to their original condition after cutting and patching. Paint patched surfaces to match the original color.

K. Housekeeping Pads:

1. Concrete housekeeping pads are required for all free standing electrical equipment. Housekeeping pads shall be 3-1/2" inches above surrounding finished floor or grade unless otherwise shown and shall be 4 inches (minimum) larger in width on all sides of equipment. The depth of housekeeping pads shall be 18 inches (minimum).
2. Housekeeping pads shall be installed for future units as shown on the Contract Drawings.
3. Housekeeping pad shall be Class "A" concrete with rebar crossway network. The minimum size rebar allowed is #3. Concrete shall be precisely leveled so that equipment set in place will not require shimming.

L. Cleaning and Touch Up

1. Prior to startup and at completion of the work prior to final acceptance, all parts of the installation, including all equipment, exposed conduit, devices, and fittings shall be cleaned and given touch up by Contractor as follows:
  - a. Remove all grease and metal cuttings.
  - b. Any discoloration or other damage to parts of the building, the finish, or the furnishings, shall be repaired.
  - c. Thoroughly clean any of his exposed work requiring same.
  - d. Vacuum and clean the inside of all MCC and electrical and instrumentation enclosures. Removing debris with an air blower is not permitted.
  - e. Clean all above and below ground pull boxes, junction boxes, and vaults from all foreign debris prior to final acceptance.
  - f. Paint all scratched or blemished surfaces with the necessary coats of quick drying paint to match adjacent color, texture, and thickness. This shall include all prime painted electrical equipment, including enclosures, panels, poles, boxes, devices, etc.
  - g. Remove all decals and lettering from both sides of support plates.
  - h. Repair damage to factory finishes with repair products recommended by Manufacturer.
  - i. Repair damage to PVC or paint finishes with matching touchup coating recommended by Manufacturer.

3.08 ELECTRICAL TESTING

A. General Requirements

1. It is the intent of these tests to assure that all equipment is operational within industry and manufacturer's tolerances and is installed in accordance with design plans and specifications.
2. All equipment setup and assembled by the Contractor shall be in accordance with the design plans and Drawings and the manufacturer's recommendations and instructions and shall operate to the Engineer's satisfaction.
  - a. Follow all manufacturer's instructions for handling, receiving, installation, and pre-check requirements prior to energization.
  - b. After energization, follow manufacturer's instructions for programming, set-up and calibration of equipment.

- c. The Contractor shall be responsible for, and shall correct by repair or replacement, at his own expense, equipment which, in the opinion of the Engineer, has been caused by faulty mechanical or electrical assembly by the Contractor.
    - d. Necessary tests to demonstrate that the electrical and mechanical operation of the equipment is satisfactory and meets the requirements of these Specifications shall be made by the Contractor at no additional cost to the Owner.
  3. The testing shall not be started until the manufacturer has completed fabrication, wiring, and setup; performed satisfactory checks and adjustments; factory testing sheets approved by Owner; and can demonstrate the system is complete and operational.
  4. Factory Test Scheduling:
    - a. The testing shall not be started until:
      - 1) The manufacturer has completed fabrication, wiring, and setup; performed satisfactory checks and adjustments; and can demonstrate the system is complete and operational.
      - 2) Submittals associated with the equipment have been approved by the Engineer
      - 3) Certification of completion of Contractor's in-house tests shall be submitted prior to scheduling of factory testing.
    - b. If factory test equipment is significantly different from submittal drawings, this shall be grounds for cancellation and rescheduling of factory tests at no additional costs to Owner or extension of Contract time.
  5. The first Pre-Energization tests shall be performed to determine the suitability for energization and shall be completed with all power turned off and complete prior to the start of any of the Post-Energization Tests. The Electrical Contractor shall have qualified personnel on the job site for all Pre-Energization and Post-Energization tests.
  6. Testing Sheets and Procedures:
    - a. The supplier shall submit for approval, the proposed factory & field testing sheets at least two weeks prior to the start of the tests. Each testing sheet shall have a title giving the type of test and entry spaces for the name of the person who performed the test, name of the person who witnessed the test, and the date.
    - b. Separate test procedures in separate binders shall be submitted for approval for the Factory and Field Tests. Testing shall not commence until the test procedures have been reviewed and approved by the Owner. Tests forms shall be similar to those shown on Appendix "A".
  7. All tests shall be witnessed by the Engineer and/or Owner personnel. The test forms shall be completed by the testing person for field checkout, testing, and calibration of all equipment and instruments.
    - a. All filled in test forms shall be given to the Engineer and/or Owner the day of the test. Fill in two sets of test forms if Contractor wants to keep a copy.
    - b. All tests shall be documented in writing by the supplier and signed by the Engineer as satisfactory completed. The supplier shall keep a detailed log of all tests that failed or did not meet specifications, including date of occurrence and correction.

- c. Completed forms with proper signatures and dates shall be included and become a component of the Operations and Maintenance Manual for each of the respective systems.
- d. The Contractor shall notify the Owner and the Engineer of the Supplier's readiness to begin all factory and field tests in writing (a minimum of ten working days prior to start), and shall schedule system checkout on dates agreed to by the Owner and the Engineer in order that the testing be scheduled and witnessed.
- e. The Contractor shall fill in & submit for approval the "Scheduled Test Request Form" located in Appendix "A" for each requested inspection, factory and field test.

**B. FAILURE TO MEET TEST:**

1. Any system material or workmanship which is found defective on the basis of acceptance tests shall be reported to the Engineer. The Contractor shall replace the defective material or equipment and have tests repeated until test proves satisfactory to the Engineer without additional cost to the Owner.
2. If the results of any of tests are unacceptable to the Engineer, the Contractor shall make corrections and perform the tests again until they are acceptable to the Engineer; these additional tests shall be done at no additional cost to the Owner.
3. If testing, installation or configuration work performed is deemed inadequate by Owner or Engineer, then the Contractor shall provide a qualified technician to meet these requirements. No extension of Contract time will be allowed.
4. If Owner Representative determines that the System Set-up is not ready for testing, the Owner Representative reserves the right to cancel the Factory Test as the equipment is found to be not fully and completely ready for factory testing. The Contractor shall be responsible for paying for the Owner and Engineer to return for the factory testing when it has been cancelled.

**C. SAFETY**

1. Testing shall conform to the respective manufacturer's recommendations. All manufacturer's safety precautions shall be followed.
2. The procedures stated herein are guidelines for the intended tests, the Contractor shall be responsible to modify these tests to fit the particular application and ensure personnel safety. Absolutely no tests shall be performed that endanger personal safety.
3. The Contractor shall have two or more personnel present at all tests.
4. Two non-licensed portable radios are to be made available by the Contractor for the testing organization to conduct tests.
5. California Electrical Safety Orders (ESO) and Occupational Safety and Health Act (OSHA): The Contractor is cautioned that testing and equipment shall comply with ESO and OSHA as to safety, clearances, padlocks and barriers around electrical equipment energized during testing.
6. Field inspections and pre-energization tests shall be completed prior to applying power to equipment.
7. Vacuum and clean the inside of all MCC and electrical and instrumentation enclosures prior to any factory or field testing. Removing debris with an air blower is not permitted.

#### D. ELECTRICAL FACTORY TEST

1. The System supplier shall conduct a thorough and complete factory test by qualified factory-trained personnel witnessed by Owner per the criteria specified herein. Factory test shall be held within 150 miles of project location.
2. The "System set-up" for factory testing shall consist of, but is not limited to:
  - a. VFD Backpans
  - b. RTU Control Panel
  - c. Any miscellaneous associated electrical equipment or panels.
3. Temporary wiring and equipment shall be setup during these tests to simulate the complete assembled system.
4. The length of the factory testing for the "System setup" shall be a minimum of one (1) working days. If in the opinion of the Owner or Engineer the factory testing is not completed at the end of the working day, the testing shall be extended, at no additional cost to the Owner or extension in Contract time.
5. All factory tests shall be conducted at the Supplier's facility. All factory tests shall be completed prior to shipment of any of the "System set-up" to the jobsite. The "System set-up" shall be fully assembled, configured, and connected as it will be installed in the final configuration. If the "System set-up" is found to be not fully and completely ready for factory testing, the Contractor shall be responsible for paying for the Owner and Engineer to return for the factory testing. Factory testing is to ensure that there are no defects. The hardware and software shall be tested for compliance with the plans and Specifications included herein and for the ability to perform the control functions.
6. All components of the system setup shall be completely assembled and thoroughly pre-tested by the supplier or manufacturer before start of factory test.
7. Provide a complete clean copy of System Supplier drawings for Owner and Engineer's use during Factory Test prior to starting the tests. These drawings shall reflect the equipment being tested.
  - a. If Owner Representative determines that these drawings do not adequately reflect the actual equipment being tested or differs substantially from the approved equipment submittal, the Owner Representative reserves the right to cancel the Factory Test as the equipment is found to be not fully and completely ready for factory testing.
  - b. Equipment that differs substantially from the approved equipment submittal shall be resubmitted. Factory test will be rescheduled after revised submittals have been reviewed by the Engineer and marked "No Exceptions Taken" or "Make Corrections Noted".
  - c. No extension of Contract time will be allowed. Cancellation and rescheduling of factory tests shall occur at no additional costs to Owner
  - d. The Contractor shall be responsible for paying for the Owner and Engineer to return for the factory testing when it has been cancelled.
8. The associated factory tests for each of the factory testing sheets that are to be performed by the supplier and witnessed by the Owner/Engineer shall include the following for the "System set-up" as a minimum:
  - a. Inspections of the panels as follows:
    - 1) Visual and Mechanical:
      - a) Inspect for physical damage, proper support, and wiring.

- b) Check all starters, breakers, and other components for proper sizes.
- 2) The Contractor shall fill in test form TF4 located in Appendix "A".
- b. Testing of the Equipment as follows:
  - 1) Each line of control logic on the elementary or loop diagrams shall be checked. After a line of control logic is tested, the person performing test shall initial or highlight the corresponding line on the elementary diagram. When the complete elementary diagram has been checked, it shall be signed and dated by testing person and person witnessing test.
  - 2) I/O points to terminal blocks shall be simulated for the complete checkout of PLC interfaces.
  - 3) The tests, as a minimum, shall simulate all operating conditions including steady state, transients, upsets, startup, shutdown, power failure, and equipment failure conditions (for control logic).
  - 4) The Contractor shall complete each test and fill in the I/O test form TF13 located in Appendix "A".
- c. Testing of Control as follows:
  - 1) To facilitate testing and system simulation of the "System Set-up", the Supplier shall connect a separate toggle two position on-off switch to each status and alarm digital input. Three digital multi-meters (minimum +/- 0.2% accuracy) with clip-on leads shall be supplied and utilized during testing for measurement of digital and analog outputs. The supplier shall use simulated input signals to replicate varying field device signals during the factory tests in order to verify the proper functioning of hardware and software.
- d. The structured factory tests to be performed by the System Supplier and witnessed by the Owner shall include the following as a minimum:
  - 1) Control Checkout Tests: Simulate the digital or analog signals (or combination thereof) at the panel field terminals using the test hardware to verify that each control is functional and properly configured. Verify that all parameters (i.e., relay logic operations, relay timing, controller setpoints, etc.) of the control system are defined and operate according to the design documents.
  - 2) Alarm Checkout Tests: Simulate the digital or analog signals (or combination thereof) at the panels using the test hardware to verify that each I/O point is functional and properly configured. Verify that all parameters (i.e., description, engineering units, span, enable/disable, setpoints, runtimes, totalization, logic type, etc.) of the alarms are defined and operate according to the Specifications.
- e. Unstructured factory tests are required as part of the factory testing phase. These additional tests shall include any and all unstructured tests as directed by the Owner or Engineer. The various unstructured tests shall include, but are not limited to, the following:
  - 1) Verify the correct inventory of hardware, etc. All spare parts shall be included in the inventory.

- 2) The factory tests, as a minimum, shall simulate all normal and abnormal operating conditions including steady state, change of state, variable changes, fluctuations, transients, upsets, start-up, shutdown, power failure, and equipment failure conditions.
9. The factory test will be considered complete only when the integrated system has successfully passed all tests to the satisfaction of the Owner or Engineer and the Factory Test checkout form TF11 has been signed & dated by Owner. No electrical equipment shall be shipped to jobsite without authorization from the Owner or Engineer that the factory test has been completed.
10. Acceptance and witnessing of the factory tests does not relieve or exclude the Contractor from conforming to the requirements of the Contract Documents.
11. The testing personnel shall provide all material, equipment, labor and technical supervision to perform such tests and inspections.
12. During the testing period, under the supervision of the supplier, the Engineer and other Owner personnel shall have unlimited and unrestricted access to the usage and testing of all hardware and software in the system.
13. Spare parts, including spare I/O for the system shall also be tested during this test period. The supplier shall prove by temporarily connecting the spare hardware to the system that any or all of the spare parts function in a manner equivalent to the original equipment under test.
14. The Contractor shall pay all expenses incurred by his personnel which includes labor, material, transportation, lodging, daily subsistence, and other associated incidental costs during the factory testing.
15. Faulty and/or incorrect hardware operation of major portions of the system may, at the discretion of the Owner Engineer, be cause for suspension or restarting of the entire factory test, at no additional cost to the Owner or extension in contract time.
16. The factory test will be considered complete only when the system setup has successfully passed all tests both structured and unstructured to the satisfaction of the Owner Engineer.
17. No equipment shall be installed without authorization from the Owner Engineer that the factory test has been completed. Equipment that were shipped to the jobsite without authorization shall be shipped back to the System Supplier for witness testing at no additional cost to Owner
18. All modifications to drawings and documentation as a result of the factory tests shall be corrected and completed before shipment of drawings with equipment and the submittal and delivery of "operation and maintenance" manuals.
19. Copies of the completed, signed, and witnessed factory testing forms shall be placed in the Operation and Maintenance Manual.

#### E. Electrical Field Tests

1. The Contractor shall engage and pay for the services of an approved qualified testing company for the purpose of performing inspections and tests as herein specified. The testing company shall provide all material, equipment, labor and technical supervision to perform such tests and inspections. The Electrical Contractor shall be present on site for all field tests.
2. Prior to start of any field testing, the Field Test Procedures, and Preliminary Operation and Maintenance Manuals shall have been submitted by the Contractor and approved by the Engineer. Also, prior to start of field testing of equipment, correct machine printed wire labels shall be in place on all wires associated with that equipment.



3. The Electrical Contractor shall complete and submit "Schedule Test Request Form" as illustrated in Appendix "A" for each electrical field test.
4. The Electrical Contractor shall be at the jobsite to assist with all Electrical Field Tests.
5. Pre-Energization Tests: These tests shall be completed prior to applying power to any equipment.
  - a. Inspections:
    - 1) Visual and mechanical inspections:
      - a) Inspect for physical damage, proper anchorage and grounding.
      - b) Compare equipment nameplate data with design plans and starter schedule.
      - c) Compare overload setting with motor full load current for proper size.
    - 2) Performed NETA acceptance testing for each piece of equipment.
    - 3) The Testing Company shall compile, by visual inspection a record of all motor nameplate data, the following minimum data shall be neatly tabulated in spreadsheet form and submitted to Owner:
      - a) Manufacturer
      - b) Part and model number
      - c) Equipment driven
      - d) Motor horsepower
      - e) Nameplate amperes, volts and phase
      - f) Service factor
      - g) Temperature ratings
      - h) Overload catalog number
      - i) Overload current range and setting
      - j) Circuit breaker rating
      - k) Circuit breaker trip setting, for magnetic only circuit breakers.
    - 4) The Contractor shall fill in, for each piece of equipment, Test Form TF4 located in Appendix "A".
  - b. Torque Connections:
    - 1) All electrical, mechanical and structural threaded connections inside equipment shall be tightened in the field after all wiring connections have been completed. Every worker tightening screwed or bolted connections shall be required to have and utilize a torque screwdriver/wrench at all times. Torque connections to the value recommended by the equipment manufacturer. If they are not available, use NEC Annex I for torque values as guidelines.
  - c. Wire Insulation & Continuity Tests:
    - 1) All devices that are not rated to withstand the 500V megger potential shall be disconnected prior to the megger tests.
    - 2) Megger insulation resistances of all 600 volt insulated conductors using a 500 volt megger for 10 seconds. Make tests with circuits

installed in conduit and isolated from source and load. Each field conductor shall be meggered conductor to conductor and conductor to ground. These tests shall be made on cable after installation with all splices made up and terminators installed but not connected to the equipment.

- 3) Each megger reading shall not be less than 10 Meg-ohms resistive. Corrective action shall be taken if values are recorded less than 10 Meg-ohms. Values of different phases of conductors in the same conduit run showing substantially different Meg-ohm values, even if showing above 10 Meg-ohms shall be replaced.
  - 4) Each instrumentation conductor twisted shielded pair shall have the conductor and shield continuity measured with an ohmmeter. Conductors with high ohm values, that do not match similar lengths of conductors the same size, shall be replaced at no additional cost to the Owner.
  - 5) The Contractor shall fill in test forms Power and Control Conductor Test Form TF1 and Instrumentation Conductor Test Form TF2 located in Appendix "A".
- d. Grounding System Tests:
- 1) Visual and Mechanical Inspection:
    - a) Verify ground system is in compliance with Drawings and Specifications.
  - 2) Test Values:
    - a) The Contractor shall fill in Grounding System Test Form TF3 located in Section 26 05 00 Appendix "A".
- e. Breaker Test:
- 1) All breakers shall be checked for proper mounting, conductor size, and feeder designation. Operate circuit breaker to ensure smooth operation. Inspect case for cracks or other defects. Check tightness of connection with torque wrench in accordance with manufacturer's recommendations.
  - 2) All MCPs and breakers 100 amps and above shall be tested. Time current characteristic tests shall be performed bypassing three hundred percent (300%) rated current through each pole separately. Trip amps and time shall be measured. Instantaneous pickup current shall be determined by run up or pulse method. Clearing times should be within four (4) cycles or less. All trip times shall fall within NETA Table values. Instantaneous pickup current levels should be within 20% of manufacturer's published values.
  - 3) Contact and Insulation Resistance: Contact resistance shall be measured and be compared to adjacent poles and similar breaker. Deviations of more than 50% shall be reported to Engineer. Insulation resistance shall be measured and shall not be less than 50 megohms.
  - 4) At end of test the all breakers trip settings shall be set by Contractor to values listed in protective device coordination study to properly protect equipment.

- 5) The Contractor shall fill in MCC Device Test Form TF8 and Breaker Test Form TF9 located in Appendix "A".
6. Post Energization Tests
- a. Panels and Enclosure Tests:
    - 1) During these tests, test all local and remote control operations and interlocks.
    - 2) Electrical Tests:
      - a) Perform operational tests by initiating control devices to affect proper operation.
      - b) The Contractor shall fill in Operational Device Checks and Tests Form TF6.
  - b. Phase Rotation Tests:
    - 1) Check connections to all equipment for proper phase relationship. During this test, disconnect all devices which could be damaged by the application of voltage or reversed phase sequence. Three phase equipment shall be tested for the phase sequence "ABC" front to back, left to right, and top to bottom.
    - 2) All three phase motors shall be tested for proper phase rotation. Revise wire color codes to indicate correct phase color if wires are swapped.
    - 3) The Contractor shall fill in Phase Rotation Test Form TF7 located in Appendix "A".
  - c. Motor Testing:
    - 1) Record the amperage draw on all phases of each motor operating under full load. Ensure that these values do not exceed the motor nameplate full load amperage.
    - 2) Record the voltage between all phases of each motor operating under full load. If the voltage balance is not within plus or minus 5 percent of nominal, request the Utility power company or other responsible party to correct the problem.
    - 3) Record the Ohm's on phase to phase with low Ohms tester.
    - 4) The Contractor shall compile, by visual inspection of equipment installed for each motor, the following data in neatly tabulated form and be placed in the O&M manual:
      - a) Equipment driven.
      - b) Motor horsepower.
      - c) Nameplate amperes.
      - d) Service factor.
      - e) Temperature rating.
      - f) Overload catalog number.
      - g) Overload current range and setting.
      - h) Circuit breaker rating.
      - i) Circuit breaker trip setting, for magnetic only circuit breakers.

- 5) The Contractor shall fill in Motor Test Form TF10, located in Appendix "A."
  - 6) Additional motor testing requirements per Division 43.
- d. Control System Tests: The following tests shall be performed for all MCCs and for the control panels listed in Section 26 05 00 Appendix "B", including all non-Division 26 Control Panels
- 1) Component Tests:
    - a) Measure insulation resistance of starter phase to phase and phase to ground with the starter contacts closed and the protective device open. Test voltage and minimum acceptable values shall conform to NETA Section 3 "Test Values." Measure insulation resistance of each control circuit with respect to ground.
    - b) Motor overload units shall be tested by injecting primary current through overload unit and monitoring trip time.
    - c) Test the motor circuit protectors and thermal breakers as specified herein.
  - 2) Control Tests:
    - a) Remove motor overload heaters from each motor starter or disconnect pump/motor coupling. In case the motor overload heaters are fed by current transformers, the motor conductors shall be removed and insulated away from the load lugs of the motor starter.
    - b) Verify the pump control circuits are wired and operate as shown on the elementary diagrams. Check the indicator lights, alarm lights, local & remote selector switches, alarm contacts, power fail relays, overloads, etc., for proper operation.
    - c) Reinstall all heaters and all wiring removed for this test.
- e. PLC Control System Tests:
- 1) All the I/O points for the PLC shall be tested by the system supplier in the field for proper operation of alarms, status, analog, control, and display functions. Where practical, the final element shall be used, i.e. trip the intrusion switch or change levels. Testing shall be accomplished using simulated inputs only when necessary.
  - 2) During this task the System supplier shall have:
    - a) Qualified field technician with experience in the startup of similar systems with PLC controls, and other field devices.
    - b) Test instruments as required.
    - c) A pair of radios for communication.
  - 3) Contractor to fill in "I/O Point Checkout Sheet" TF13 located in Appendix "A".
- f. Program parameter record:
- 1) The Contractor shall fill in "VFD or Soft Starter Program Parameter Record Sheet" TF12 for each VFD/Soft Starter provided on this project. These parameter record sheets shall be filled out by a

qualified Contractor field technician when power in field is first applied to each VFD/Soft Starter. Completion of VFD/Soft Starter record sheets shall be witnessed by Owner and copies provided to Owner on day records are filled in by Contractor. A copy of all completed VFD/Soft Starter parameter record sheets shall be placed in O&M manual.

- g. Trial Operations: The entire electrical installation shall be either tested or trial operated to verify Contract compliance. That is, controls, heaters, fans, light switches, convenience receptacles, lights, etc. shall be trial operated. Contractor shall conduct trial operations in the presence of the Engineer and Operations and Maintenance personnel.

F. Operational Testing:

1. After all the previous tests in this subsection 3.07 and 3.08 are complete, the Contractor shall conduct operational testing.
2. The Contractor shall demonstrate the operation of each part of the control and instrumentation system to the satisfaction of the Owner and/or Engineer. Tests shall be repeated by the Contractor at no additional cost to the Owner and at the discretion of the Owner and/or Engineer to resolve whether the system has demonstrated that it will operate under all modes of operations and varying conditions.
3. For the operational testing the new equipment shall be activated to automatically run for 5 days, 24 hours per day, Monday through Friday. During this five day period, the Owner will run the different combinations of the monitoring options. If equipment failure occurs during the 5 days of operational testing, the Contractor shall repair or replace the defective equipment and shall begin another 5 day operational test, Monday through Friday. This shall be continued until the new equipment functions acceptably for 5 consecutive days.
4. The Electrical Contractor, testing firm and System Supplier shall re-visit the jobsite as often as necessary until all field tests, start-up and operation tests are completed and approved.

3.09 OPERATION AND MAINTENANCE MANUALS

- A. Operation and maintenance manuals covering instruction and maintenance on each type of equipment shall be furnished prior to completion of the project.
- B. These instructions shall provide the following as a minimum:
  1. Each set bound in a three ring binder and organized as specified herein. Binder shall be sized such that when all material is inserted the binder is not over 3/4 full
  2. "As Constructed" set of submittal shop documents, data sheets, and drawings (with all field changes included) for all items in the electrical system.
  3. A complete list of items supplied, including serial numbers, ranges, options, and other pertinent data necessary for ordering replacement parts.
  4. Full technical specifications on each item.
  5. Instrument data sheets for all instruments supplied on the project, clearly identifying the instrument tagname, range, part number, serial number, size, etc.
  6. Detailed service, maintenance and operation instructions for each item supplied. Schematic diagrams of all electronic devices shall be included. A complete parts

- lists with stock numbers shall be provided on the components that make up the assembly.
7. Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.
  8. Safety precautions and procedures.
  9. Record of the following:
    - a. Each breaker and overload heater element including manufacturer, full part number, size, setting etc.
    - b. Spread sheet listing all setpoints and programmable parameters entered for this project for instruments, etc.
  10. No photo copies are allowed of standard published manuals available from manufacturers such as for the PLC. All of the manuals shall be originals, not copies.
  11. Include all completed and signed test data and forms from factory and field testing.
  12. Warranty certificate with start dates, duration and contact information.
  13. Troubleshooting instructions.
  14. Record of all settings or parameters for all programmable devices.
- C. At the end of the project these manuals shall be updated to show "as-built or as-installed" conditions.
- D. Provide to the Owner four (4) sets of USB drives on lanyards and two sets of DVDs (DVDs shall contain all documents in both PDF format and unlocked AutoCAD - DWG format,):
1. As-built Contract electrical and instrumentation drawings prepared for this project.
  2. As-built set of all required Drawings for the project.
  3. Electronic PDF version of O&M manual. Version format shall follow the hard copy submittal of the O&M, including index, equipment record sheet, warranty information, theory of operation, maintenance instruction, etc. PDF shall be "bookmarked" at each index, subtab, transmittal letter, equipment record sheet, warranty information, theory of operation, maintenance instruction, etc. Failure to bookmark PDF may be grounds for immediate rejection without review. Bookmarks shall be descriptive of actual document, tab, etc. Bookmarks shall not be out of order; the English description shall match that listed in the Submittal's Table of Contents.
  4. These disks shall be the property of the Owner, for its use on this and future projects.
  5. Label drives with site name using white plastic with black machine printed lettering as produced by a KROY or similar machine. The size of the nameplate tape shall be with 3/8-inch lettering unless otherwise approved by the Engineer. Securely fasten nameplates in place on the USB drive using the adhesion of the tape.

### 3.10 TRAINING

- A. All training sessions shall be held on dates and times agreeable to Owner. A total of 5 or fewer Owner personnel shall be trained.
- B. After "Operation Testing" has started the Contractor shall provide a period of not less than 8 hours training for instruction of operation and maintenance personnel in the use of all the new electrical and instrumentation systems. The Contractor shall make necessary

arrangements with manufacturer's representative. Provide product literature and application guides for user's reference during instruction.

- C. Acceptable Operation and Maintenance Manuals shall be on site and available when training sessions are implemented.

### 3.11 SPARE PARTS

- A. The Contractor shall supply all spare parts prior to start of field tests. All parts shall be sealed in plastic bags and delivered to each site in a heavy duty plastic storage bag. Bag shall be clearly labeled on the outside with part name and number and the corresponding equipment tagname.
- B. The Contractor shall make available any replacement parts that are not manufacturer's normal stock items for immediate service and repair of all the instrumentation equipment throughout the warranty period.
- C. The following spare parts shall be provided to the Owner as part of this Contract for each site:
  - 1. Five (5) fuses for each type of fuse.
  - 2. Twenty (20) lamps for each type of light.
  - 3. Two (2) relays for each type of control, power fail and time delay relay.
- D. See other division 26 sections for additional spare parts to be provided.

### 3.12 WARRANTY

- A. The Contractor shall warrant all electrical and instrumentation equipment for a period of one (1) year from date of final acceptance. Standard published warranties of equipment which exceed the preceding specified length of time shall be honored by the manufacturer or supplier.
- B. The Contractor shall provide all labor and material to troubleshoot, replace, or repair any hardware or software that fails or operates improperly during the warranty period, at no additional cost to the Owner.
- C. The System Supplier shall have a staff of experienced personnel available to provide service on 2 working days' notice during the warranty period. Such personnel shall be capable of fully testing and diagnosing the hardware and software and implementing corrective measures.
- D. If the System Supplier "fails to respond" in 2 working days, the Owner at its option will proceed to have the warranty work completed by other resources; the total cost (direct and indirect) for these other resources shall be reimbursed in full by the Contractor.
  - 1. "Fail to respond" shall be defined as: The Contractor has not shown a good faith effort and has not expended adequate resources to correct the problem.
  - 2. The use of other resources, as stated above, shall not change or relieve the Contractor from fulfilling the remainder of the warranty requirements.

- E. The Contractor shall warrant all electrical and instrumentation equipment for a period of one (1) year from date of final acceptance. Standard published warranties of equipment which exceed the preceding specified length of time shall be honored by the manufacturer or supplier.
- F. Prior to “final acceptance”, the Contractor shall furnish to the Engineer a listing of warranty information for all manufacturers of materials, instruments, and equipment used on the project. The listing shall include the following:
  - 1. Manufacturer’s name, service contact person, phone number, and address.
  - 2. Material and equipment description, equipment number, part number, serial number, and model number.
  - 3. Manufacturer’s warranty expiration date.
- G. The Contractor shall provide all labor and material to troubleshoot, program, replace, or repair any hardware or software that fails or operates unpredictably during the warranty period, at no additional cost to the Owner.
- H. Each time the Supplier’s repair person responds to a system malfunction during the warranty period, he or she must contact the designated Owner maintenance supervisor for scheduling of the work, access to the jobsite, and permission to make repairs. Operation of facilities necessary to test equipment shall only be performed by or under the direction Owner staff. Owner reserves the right at its sole discretion to deny operations requested by the Supplier. A written description of all warranty work performed shall be documented on a field service report to be given to Owner prior to the repair person leaving job site. This field service report shall detail and clearly state problem, corrective actions taken, additional work that needs to be done, data, repair person name and company.

### 3.13 FINAL ACCEPTANCE

- A. Final acceptance will be given by the Owner after the equipment has passed the “operational testing” trial period, each deficiency has been corrected, final documentation has been provided, and all the requirements of design documents have been fulfilled.
- B. At the end of the project, following the completion of the field tests, and prior to final acceptance, the Supplier shall:
  - 1. Remove all temporary services, equipment, material, and wiring from the site.
  - 2. Verify Service equipment has been legibly marked in field with the maximum available fault current per NEC 110.24 (A). Field marking shall include date the fault current calculation was performed and be weather & UV rated. Service equipment shall not be hand labeled
  - 3. Two sets of all keys for locks supplied on this project. Submit each key with matching duplicate. Wire all keys for each lock securely together. Tag and plainly mark with lock number or equipment identification, and indicate physical location, such as panel or switch number.
  - 4. Verify that as-installed drawings, in reinforced clear plastic pockets, have been placed in all new or modified panels.
  - 5. Provide the following to the Owner:
    - a. Listing of warranty information.



- b. Each "operation and maintenance" manual shall be modified or supplemented by the Supplier to reflect all field changes and as-built conditions.
- c. O&M documentation as specified herein.
- d. Four (4) USB drives with copies of all final documentation to reflect as-built conditions.
- e. At least one set of manuals, all software, disks and required programming cables shall be turned over to the Owner's SCADA/Electrical division.

## APPENDIX "A"

### ELECTRICAL & INSTRUMENTATION FORMS

#### Index of Forms:

Bill of Material

Schedule Test Request Form

TF1 Power and Control Conductor Test Form

TF2 Instrumentation Conductor Test Form

TF3 Grounding System Test Form

TF4 Visual and Mechanical Inspection Form

TF6 Operational Device Checks and Tests Form

TF7 Phase Rotation Test Form

TF9 Breaker Device Test Form

TF10 Motor Test Form

TF11 Factory Test Checkout Form

TF12 VFD or Soft Starter Program Parameter Record Sheet

TF13 I/O Point Checkout Test Sheet

TF14 Instrument Data Sheet and Calibration Record



## SCHEDULED TEST REQUEST FORM

COMPANY PERFORMING TEST: \_\_\_\_\_  
TESTING PERSONNEL : \_\_\_\_\_  
PHONE NUMBER OF COMPANY: \_\_\_\_\_  
TEST PROCEDURE SUBMITTAL: \_\_\_\_\_ APPROVED : \_\_\_/\_\_\_/\_\_\_  
SCHEDULED TEST DATE : \_\_\_\_\_ DATE : \_\_\_/\_\_\_/\_\_\_

TIME	DESCRIPTION OF TEST
8:00	
9:00	
10:00	
11:00	
12:00	
13:00	
14:00	
15:00	
16:00	

NOTES:

TESTED BY : \_\_\_\_\_ DATE : \_\_\_/\_\_\_/\_\_\_  
WITNESSED BY: \_\_\_\_\_

**POWER AND CONTROL CONDUCTOR TEST FORM**  
TEST FORM (TF1)

EQUIPMENT  
NAME : \_\_\_\_\_ LOCATION : \_\_\_\_\_

CALIBRATION EQUIPMENT \_\_\_\_\_ DATE: \_\_\_\_\_  
DESCRIPTION \_\_\_\_\_

CONDUCTOR NUMBER	INSULATION TESTS					
	PHASE TO GROUND			PHASE TO PHASE		
	A	B	C	AB	BC	CA

**NOTES:**  
Record insulation test values in meg-ohms.

TESTED BY : \_\_\_\_\_ DATE : \_\_\_\_/\_\_\_\_/\_\_\_\_  
WITNESSED BY: \_\_\_\_\_

**INSTRUMENTATION CONDUCTOR TEST FORM**  
**TEST FORM (TF2)**

EQUIPMENT

NAME : \_\_\_\_\_ LOCATION : \_\_\_\_\_

CALIBRATION EQUIPMENT

DATE: \_\_\_\_\_

DESCRIPTION : \_\_\_\_\_

CONDUCTOR PAIR NUMBER	CONTINUITY TESTS		INSULATION TESTS		
	CONDUCTOR TO CONDUCTOR	CONDUCTOR TO SHIELD	CONDUCTOR TO CONDUCTOR	CONDUCTORS TO GROUND*	SHIELD TO GROUND

NOTES: \_\_\_\_\_ \* With both conductors tied together  
Record continuity test values in ohms.  
record insulation test values in meg-ohms.

TESTED BY : \_\_\_\_\_  
WITNESSED BY: \_\_\_\_\_

DATE : \_\_\_/\_\_\_/\_\_\_

**GROUNDING SYSTEM TEST FORM**  
**TEST FORM (TF3)**

CALIBRATION EQUIPMENT DESCRIPTION :

DATE: \_\_\_\_\_

FALL IN POTENTIAL TEST

MAIN GROUND LOCATION	APPLIED VOLTAGE V	MEASURED POINT 1 VOLTAGE	MEASURED POINT 2 VOLTAGE	MEASURED POINT 3 VOLTAGE	CALCULATED RESISTANCE OHMS

TWO POINTS TESTS

EQUIPMENT NAME	EQUIPMENT #	CIRCUIT #	APPLIED CURRENT	MEASURED VOLTAGE	CALCULATED RESISTANCE OHMS

NOTES:

TESTED BY : \_\_\_\_\_ DATE : \_\_\_\_/\_\_\_\_/\_\_\_\_  
WITNESSED BY: \_\_\_\_\_

# VISUAL AND MECHANICAL INSPECTION FORM

## TEST FORM (TF4)

### EQUIPMENT

NAME : \_\_\_\_\_ LOCATION : \_\_\_\_\_

### NAMEPLATE DATA

MFGR. :	_____	SERIES # :	_____
MODEL # :	_____	U.L. # :	_____
VOLTAGE :	_____	PHASE :	_____
AMPERAGE :	_____	SERVICE :	_____
BUS TYPE :	_____	BUS BRACING:	_____
VERT. BUS :	_____	HORZ. BUS :	_____
GND. BUS :	_____	NEU. BUS :	_____
ENCLOSURE :	_____		_____
	_____		_____

### INSPECTION CHECK LIST

ENTER: A-ACCEPTABLE R-NEEDS REPAIR OR REPLACEMENT NA-NOT APPLICABLE

TIGHTEN ALL BOLTS AND SCREWS	_____
TIGHTEN ALL WIRING AND BUS CONNECTIONS	_____
VERIFY ALL BREAKERS AND FUSES HAVE PROPER RATING	_____
CHECK BUS BRACING AND CLEARANCE	_____
CHECK MAIN GROUNDING CONNECTION AND SIZE	_____
INSPECT GROUND BUS BONDING	_____
CHECK EQUIPMENT GROUNDS	_____
CHECK CONDUIT GROUNDS AND BUSHINGS	_____
INSPECT NEUTRAL BUS AND CONNECTIONS	_____
CHECK HEATERS AND THERMOSTATS	_____
CHECK VENTILATION AND FILTERS	_____
CHECK FOR BROKEN OR DAMAGED DEVICES	_____
CHECK DOOR AND PANEL ALIGNMENT	_____
INSPECT ANCHORAGE	_____
CHECK FOR PROPER CLEARANCES AND WORKING SPACE	_____
REMOVE ALL DIRT AND DUST ACCUMULATION	_____
INSPECT ALL PAINT SURFACES	_____
CHECK FOR PROPER WIRE COLOR CODES	_____
INSPECT ALL WIRING FOR WIRE LABELS	_____
CHECK FOR PROPER WIRE TERMINATIONS	_____
CHECK FOR PROPER WIRE SIZES	_____
INSPECT ALL DEVICES FOR NAMEPLATES	_____
CHECK IF DRAWINGS MATCH EQUIPMENT	_____
CHECK ACCURACY OF OPERATION & MAINTENANCE	_____
	_____

TESTED BY : \_\_\_\_\_

DATE : \_\_\_/\_\_\_/\_\_\_

WITNESSED BY: \_\_\_\_\_



## OPERATIONAL DEVICE CHECKS AND TESTS FORM

TEST FORM (TF6)

NAME : \_\_\_\_\_

LOCATION : \_\_\_\_\_

CUB. #	EQUIPMENT NAME	EQUIP #	LOCAL SITE DEVICE CHECKS AND TESTS							REMOTE SITE DEVICE CHECKS & TESTS		
			SELECTOR SWITCH	INDICATOR LIGHTS	PUSHBUTTON & LOS	METERING & INDICATORS	OVERLOAD RESET	INTERLOCKS & CONTROL	ALARM & STATUS	SELECTOR SWITCH	INDICATOR LIGHTS	PUSHBUTTON & LOS

TESTED BY : \_\_\_\_\_ DATE : \_\_\_\_/\_\_\_\_/\_\_\_\_  
 WITNESSED BY : \_\_\_\_\_

NOTES: \_\_\_\_\_

## PHASE ROTATION TEST FORM

### TEST FORM (TF7)

EQUIPMENT NAME	EQUIPMENT #	CIRCUIT #	PHYSICAL PHASE LOCATION	PHASE COLOR CODE	MEASURED PHASE ROTATION

NOTES:  
Use phase tester to verify all circuits and equipment have a clockwise A-B-C phase rotation.  
Physical phase locations: Left to Right - LR or Top to Bottom - TB  
Phase color codes: Brown, Orange, & Yellow -BOY  
Black, Red, & Blue -BkRBe

CALIBRATION EQUIPMENT DESCRIPTION: \_\_\_\_\_ DATE : \_\_\_/\_\_\_/\_\_\_

TESTED BY : \_\_\_\_\_ DATE : \_\_\_/\_\_\_/\_\_\_  
WITNESSED BY: \_\_\_\_\_

# MCC DEVICE TEST FORM

## TEST FORM (TF8)

MCC # : \_\_\_\_\_ CUBICLE : \_\_\_\_\_  
 EQUIP NAME: \_\_\_\_\_ EQUIP # : \_\_\_\_\_

MOTOR DATA	CONTACTOR DATA		
H.P. : _____	MFGR. : _____	PART # : _____	
F.L.A. : _____	NEMA SIZE : _____	COIL VOLT : _____	

CALIBRATION EQUIPMENT \_\_\_\_\_ DATE: \_\_\_\_\_  
 DESCRIPTION : \_\_\_\_\_

### OVERLOAD TESTS

MFGR. : \_\_\_\_\_ HEATER # : \_\_\_\_\_ RANGE : \_\_\_\_\_  
 PART # : \_\_\_\_\_ FINAL OVERLOAD SETTING: \_\_\_\_\_

TEST AMPS	MEASURE TRIP TIME @ TEST AMPS			MFGR LISTED TRIP TIME	AMBIENT COMPENSATION
	PHASE A	PHASE B	PHASE C		

### BREAKER TESTS

MRGR. : \_\_\_\_\_ PART # : \_\_\_\_\_ FRAME # : \_\_\_\_\_

CONTACT RESISTANCE TESTS - OHMS			INSULATION RESISTANCE TESTS-MEGOHMS		
PHASE A	PHASE B	PHASE C	A-GND	B-GND	C-GND

MFGR TRIP TIME @300% MIN: \_\_\_\_\_ BREAKER RATING / RANGE: \_\_\_\_\_  
 MFGR TRIP TIME @300% MAX: \_\_\_\_\_ FINAL BREAKER SETTING: \_\_\_\_\_  
 MFGR INST. PICKUP AMPS: \_\_\_\_\_

TIME-CURRENT TEST			INSTANTANEOUS TRIP TEST - AMPS		
TRIP TIME IN SECONDS @ 300% AMPS					
PHASE A	PHASE B	PHASE C	PHASE A	PHASE B	PHASE C

NOTES:  
 \_\_\_\_\_  
 \_\_\_\_\_

TESTED BY : \_\_\_\_\_ DATE : \_\_\_\_/\_\_\_\_/\_\_\_\_  
 WITNESSED BY: \_\_\_\_\_

# BREAKER DEVICE TEST FORM

## TEST FORM (TF9)

FEEDER : \_\_\_\_\_ LOCATION : \_\_\_\_\_  
 EQUIP NAME: \_\_\_\_\_ EQUIP # : \_\_\_\_\_  
 EQUIP H.P. : \_\_\_\_\_ EQUIP KVA : \_\_\_\_\_

MFGR. : \_\_\_\_\_ PART # : \_\_\_\_\_ FRAME # : \_\_\_\_\_  
 VOLTAGE : \_\_\_\_\_ INTERRUPT : \_\_\_\_\_ CHARACTER: \_\_\_\_\_  
 RATING CURVE

CALIBRATION EQUIPMENT DATE: \_\_\_\_\_  
 DESCRIPTION : \_\_\_\_\_

**CONTACT RESISTANCE TESTS - OHMS    INSULATION RESISTANCE TESTS - MEGOHMS**

PHASE A	PHASE B	PHASE C	A-GND	B-GND	C-GND

MFGR TRIP TIME @300% MIN : \_\_\_\_\_ BREAKER RATING / RANGE: \_\_\_\_\_  
 MFGR TRIP TIME @300% MAX: \_\_\_\_\_ FINAL BREAKER SETTING : \_\_\_\_\_  
 MFGR INST. PICKUP APMS: \_\_\_\_\_

TEST-CURRENT TESTS			INSTANTANEOUS TRIP TEST - AMPS		
TRIP TIME IN SECONDS @ 300% AMPS					
PHASE A	PHASE B	PHASE C	PHASE A	PHASE B	PHASE C

**ADDITIONAL TESTS AND SETTING AS APPLICABLE**

FUNCTION	PICKUP		DELAY-TIME		
	RANGE	SETTING	RANGE	SETTING	
LONG TIME					
SHORT TIME					
GROUND FLT.					

NOTES:

TESTED BY : \_\_\_\_\_ DATE : \_\_\_\_/\_\_\_\_/\_\_\_\_  
 WITNESSED BY: \_\_\_\_\_

## MOTOR TEST FORM

### TEST FORM (TF10)

EQUIPMENT

NUMBER : \_\_\_\_\_ NAME : \_\_\_\_\_

CALIBRATION EQUIPMENT

DATE: \_\_\_\_\_

DESCRIPTION : \_\_\_\_\_

#### NAMEPLATE DATA - FIELD RECORDED

MANUFACTURER		MODEL #		SERIAL #		FRAME #	
H.P.	R.P.M	F.L.A	VOLTS	PHASE	FREQ.	P.F.	S.F.
CODE	N.E.M.A.	INSUL.	ENCLOSUR.	DUTY	DESIGN		

CALIBRATION EQUIPMENT

DESCRIPTION : \_\_\_\_\_ DATE: \_\_\_\_\_

INSULATION TESTS PHASE TO GROUND MEG-OHMS			MOTOR FRAME GROUNDING SYSTEM TEST			MOTOR HEATER	MOTOR THERMAL
A	B	C	APPLIED VOLTS	MEAS. AMPS	CALC. OHMS	MEAS. AMPS	TRIP TEST

#### MOTOR TESTS - MEASURED VALUES

AMPERAGE			VOLTAGE			POWER FACTOR	WATTAGE
A	B	C	AB	BC	CA		

NOTES:

VOLTAGE, AMPERAGE, POWER FACTOR, & WATTAGE SHALL BE RECORDED WITH A TRUE RMS METER.

TESTED BY : \_\_\_\_\_  
WITNESSED BY: \_\_\_\_\_

DATE : \_\_\_\_/\_\_\_\_/\_\_\_\_

**FACTORY TEST  
MCC/CONTROL PANEL CHECKOUT FORM (TF11)**

**Manufacturer:** \_\_\_\_\_ **Location:** \_\_\_\_\_

**Tel:** \_\_\_\_\_

**Test Equipment:** Description \_\_\_\_\_ Calib Date: \_\_\_\_\_

**MCC / Control Panel:** \_\_\_\_\_ **TEST RESULT**

<b>OVERALL PANEL INSPECTION</b>	<b><u>Pass</u></b>	<b><u>Fail</u></b>
1. All front panel and back panel components mounted securely.....	<input type="checkbox"/>	<input type="checkbox"/>
2. All wiring terminated and labeled correctly.....	<input type="checkbox"/>	<input type="checkbox"/>
3. All components, wiring, and labeling accurately reflected on the drawings..	<input type="checkbox"/>	<input type="checkbox"/>
<b>POWER-UP INSPECTION</b>		
1. Voltage levels on load side of circuit breakers.....	<input type="checkbox"/>	<input type="checkbox"/>
2. Voltage levels at the DC terminals of the power supply.....	<input type="checkbox"/>	<input type="checkbox"/>
3. Voltage levels at the DC power distribution terminals.....	<input type="checkbox"/>	<input type="checkbox"/>
<b>POWER DISTRIBUTION AND GENERAL COMPONENT TESTING</b>		
1. Power distribution to the appropriate components.....	<input type="checkbox"/>	<input type="checkbox"/>
2. Operation of the ancillary components such as receptacles, work lights, etc.	<input type="checkbox"/>	<input type="checkbox"/>
<b>CONTROL COMPONENTS CHECKS</b>		
1. Operators (push buttons, selector switches, pilot lights).....	<input type="checkbox"/>	<input type="checkbox"/>
2. Inputs from External Sources.....	<input type="checkbox"/>	<input type="checkbox"/>
3. Outputs to External Sources.....	<input type="checkbox"/>	<input type="checkbox"/>
4. Relay Logic.....	<input type="checkbox"/>	<input type="checkbox"/>
5. PLC I/O and Program Verification.....	<input type="checkbox"/>	<input type="checkbox"/>
6. O/I Display Verification.....	<input type="checkbox"/>	<input type="checkbox"/>

**Notes:**

1. For relay logic checks, each rung of the elementary or loop diagram is to be highlighted in yellow as they are verified for correct control functions.
2. For PLC I/O and program verification, the control strategies shall be highlighted in yellow as each logic function is tested.

**Tested by:** \_\_\_\_\_

**Witnessed by:** \_\_\_\_\_

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

**VFD OR SOFT STARTER PROGRAM PARAMETER RECORD SHEET  
TEST FORM (TF12)**

EQUIPMENT  
NAME : \_\_\_\_\_ LOCATION : \_\_\_\_\_

PARAMETER NUMBER	PARAMETER DESCRIPTION	DEFAULT SETTING	FIELD SETTING

NOTES:

TESTED BY : \_\_\_\_\_ DATE : \_\_\_\_/\_\_\_\_/\_\_\_\_  
WITNESSED BY: \_\_\_\_\_

# I/O POINT CHECKOUT TEST FORM

TEST FORM (TF13)

I/O TYPE : \_\_\_\_\_

LOCATION : \_\_\_\_\_

TEST EQUIPMENT : \_\_\_\_\_

CAL. DATE : \_\_\_\_\_

I/O POINT TAGNAME	I/O POINT ADDRESS	TEST INPUT VALUE %			DISPLAY VALUE %			PLC REGISTER VALUE	TEST RESULT FAIL OR PASS COMMENTS	DATE OF CORRECTIVE ACTION
		0	50	100	0	50	100			

NOTES:

TESTED BY : \_\_\_\_\_  
 WITNESSED BY: \_\_\_\_\_

DATE : \_\_\_/\_\_\_/\_\_\_



### INSTRUMENTATION DATA SHEET AND CALIBRATION RECORD TEST FORM (TF14)

<u>Component Description</u>			<u>Manufacturer</u>		<u>Location</u>
<u>Component Tag Name</u>			Name _____		Site _____
			Model _____		Equip _____
			Serial # _____		
	<u>Range</u>	<u>Unit</u>	<u>Test Equipment</u>		General Notes 1) Attach Calibration Curves for dp Flowmeters 2) Include mounting elevations for level Instruments 3) All entries within solid box to be typed in prior to start of test
Indicator Range			Description: _____		
Input Range			Calibration Date: _____		
Output Range					
<u>Designed Calibration</u>			<u>Measured Calibration</u>		
Input Signal	Output	Eng. Value	Input	Output	Comments
Notes _____ _____ _____ _____ _____					
Tested by (Print Name) _____			Witnessed by (Print Name) _____		
Signature _____			Signature _____		
Date    /    /			Date    /    /		

## APPENDIX "B"

### I/O LIST

**COPPER COVE WATER SYSTEM IMPROVEMENTS - C-TANK BPS MODIFICATIONS**  
**PLC I/O LIST - COPPER COVE WTP - BASE**  
**DIGITAL INPUT**

Point	P & ID	Tag Number	Description	I/O	0 State	1 State
0	I911	LSLL 9151	Low Low Cleawrwell 1 Level	N	Normal	Active
1	I911	ZS 9191	Clearwell 1 Tank Hatch Intrusion	N	Active	Normal
2	I911	UST 9100	Clearwell 1 Tank Vent Fail	N	Normal	Active
3	I911	Y 9100	Clearwell 1 Tank Vent Auto	N	Not Auto	Auto
4	I911	N 9100	Clearwell 1 Tank Vent Run	N	Off	Run
5	I911	ZS 9192	Clearwell 2 Tank Hatch Intrusion	N	Active	Normal
6	I911	UST 9200	Clearwell 2 Tank Vent Fail	N	Normal	Active
7	I911	Y 9200	Clearwell 2 Tank Vent Auto	N	Not Auto	Auto
8	I911	N 9200	Clearwell 2 Tank Vent Run	N	Off	Run
9	I911	UAY 9100	UPS Trouble	N	Normal	Active
10	I912	UST 9131	Effluent Pump 1 Fail	N	Normal	Active
11	I912	Y 9131	Effluent Pump 1 Auto	N	Not Auto	Auto
12	I912	N 9131	Effluent Pump 1 Run	N	Off	Run
13	I912	ZSC 9131	Effluent Pump 1 Control Valve Closed	N	Null	Closed
14	I912	UST 9132	Effluent Pump 2 Fail	N	Normal	Active
15	I912	Y 9132	Effluent Pump 2 Auto	N	Not Auto	Auto
16	I912	N 9132	Effluent Pump 2 Run	N	Off	Run
17	I912	ZSC 9132	Effluent Pump 2 Control Valve Closed	N	Null	Closed
18	I912	UST 9133	Effluent Pump 3 Fail	N	Normal	Active
19	I912	Y 9133	Effluent Pump 3 Auto	N	Not Auto	Auto
20	I912	N 9133	Effluent Pump 3 Run	N	Off	Run
21	I912	ZSC 9133	Effluent Pump 3 Control Valve Closed	N	Null	Closed
22-27			Spare	F	Off	On

**COPPER COVE WATER SYSTEM IMPROVEMENTS - C-TANK BPS MODIFICATIONS  
 PLC I/O LIST - COPPER COVE WTP - BASE  
 DIGITAL OUTPUT**

Point	P & ID	Tag Number	Description	I/O	0 State	1 State
0	I911	USY 9100	Common Alarm	N	Normal	Active
1	I911	X 9110	Clearwell 1 Tank Vent Call	N	Off	Run
2	I911	X 9110	Clearwell 2 Tank Vent Call	N	Off	Run
3	I912	X 9131	Effluent Pump 1 Call	N	Off	Run
4	I912	X 9132	Effluent Pump 2 Call	N	Off	Run
5	I912	X 9133	Effluent Pump 3 Call	N	Off	Run

**DIGITAL OUTPUT**

Point	P & ID	Tag Number	Description	I/O	0 State	1 State
6	I912	X 9141	Backwash Pump 1	N	Off	Run
7	I912	X 9142	Backwash Pump 2	N	Off	Run
8			Spare	F	Off	On
9			Spare	F	Off	On
10			Spare	F	Off	On
11-20			Spare	F	Off	On

NOTES: I/O

N => NEW

F => FUTURE

**COPPER COVE WATER SYSTEM IMPROVEMENTS - C-TANK BPS MODIFICATIONS**  
**PLC I/O LIST - COPPER COVE WTP - SLOT 1**  
**DIGITAL INPUT**

Point	P & ID	Tag Number	Description	I/O	0 State	1 State
0	I912	UST 9141	Backwash Pump 1 Fail	N	Normal	Active
1	I912	Y 9141	Backwash Pump 1 Auto	N	Not Auto	Auto
2	I912	N 9141	Backwash Pump 1 Run	N	Off	Run
3	I912	ZSC 9141	Backwash Pump 1 Control Valve Closed	N	Null	Closed
4	I912	UST 9142	Backwash Pump 2 Fail	N	Normal	Active
5	I912	Y 9142	Backwash Pump 2 Auto	N	Not Auto	Auto
6	I912	N 9142	Backwash Pump 2 Run	N	Off	Run
7	I912	ZSC 9142	Backwash Pump 2 Control Valve Closed	N	Null	Closed

NOTES: I/O

N => NEW

F => FUTURE

**COPPER COVE WATER SYSTEM IMPROVEMENTS - C-TANK BPS MODIFICATIONS**  
**PLC I/O LIST - COPPER COVE WTP - SLOT 2**  
**DIGITAL INPUT**

Point	P & ID	Tag Number	Description	I/O	0 State	1 State
0			Spare	F	Off	On
1			Spare	F	Off	On
2			Spare	F	Off	On
3			Spare	F	Off	On
4			Spare	F	Off	On
5			Spare	F	Off	On
6			Spare	F	Off	On
7			Spare	F	Off	On

NOTES: I/O

N => NEW

F => FUTURE

**COPPER COVE WATER SYSTEM IMPROVEMENTS - C-TANK BPS MODIFICATIONS**  
**PLC I/O LIST - COPPER COVE WTP - SLOT 3**  
**ANALOG INPUT**

Point	P & ID	Tag Number	Description	I/O	Range	Eng Units
0	I911	I 9110	Clearewell 1 Tank Vent Current	N		Amp
1	I911	L 9151	Clearewell 1 Tank Level	N		FT
2	I911	I 9120	Clearewell 2 Tank Vent Current	N		Amp
3	I911	L 9152	Clearewell 2 Tank Level	N		FT
4	I912	F 9171	To C Tank Flow	N		GPM
5			Spare	F	0-100	
6			Spare	F	0-100	
7			Spare	F	0-100	

NOTES: I/O

N => NEW

F => FUTURE

**COPPER COVE WATER SYSTEM IMPROVEMENTS - C-TANK BPS MODIFICATIONS**  
**PLC I/O LIST - COPPER COVE WTP - SLOT 4**  
**ANALOG OUTPUT**

Point	P & ID	Tag Number	Description	I/O	Range	Eng Units
0	I912	SC 9131	Effluent Pump 1 Speed	N	0-100	%
1	I912	SC 9132	Effluent Pump 2 Speed	N	0-100	%
2	I912	SC 9132	Effluent Pump 3 Speed	N	0-100	%
3			Spare	F	0-100	%

NOTES: I/O

N => NEW

F => FUTURE



**END OF SECTION 26 05 00**

## SECTION 26 05 73

### ELECTRICAL SYSTEM ANALYSIS

#### PART 1 - GENERAL

##### 1.01 SCOPE OF WORK

- A. The Contractor shall install, ready for use, the electrical and instrumentation system as specified herein and shown on the Contract drawings. This document describes the function and operation of the system and particular components, but does not necessarily describe all necessary devices. All components and devices shall be furnished and installed as necessary/required to provide a complete operable and reliable system for accomplishing the functions and meeting the performance set forth hereinafter.
- B. Provide the following submittals, per Section 26 05 00, for the electrical power system for the entire 240/120V distribution system:
  - 1. Short Circuit Study.
  - 2. Coordination Study
  - 3. Harmonic Analysis
  - 4. Arc Flash Study.
- C. Short Circuit, and Arc Flash Studies shall be prepared, stamped and signed by a professional Electrical Engineer registered in the State of California and in accordance with IEEE 242, IEEE 399 ANSI/IEEE C37.13 and IEEE 519.
- D. Exceptions / Clarifications
  - 1. Itemize all exceptions and clarifications to the Contract Documents in a letter (located in the front of the submittal) on company letterhead.
  - 2. Exceptions that are noted in the study, but not listed on the Exceptions/Clarifications letter, will be considered as non-responsive and not accepted as changes to the Contract Documents.
  - 3. All exceptions taken from the Drawings and specifications shall be documented with justifications. When noting the exception, list which Drawings or which Specification Subsection number the exception is taken.
  - 4. Clarification requests shall list which Drawing or Specification Subsection number the clarification is required for.
- E. Provide two (2) USB at the completion of the project. One USB will contain the as-built set of studies, reports, settings, etc. The other USB will contain the original source format of input data used for the PC based computer software, including all SKM files used to create the studies. Provide all setup information used for the computer based study and report.
- F. For each resubmittal, provide a copy of submittal comments and a separate letter, on Company letterhead, identifying how each submittal comment has been addressed in the resubmittal.

- G. When submittals are provided in PDF format, utilize the “Bookmark” feature of the Adobe Acrobat and clearly bookmark locations in the report to locations identified in the Report’s Table of Contents. Bookmarks shall not be out of order; the English description shall match that listed in the Report’s Table of Contents.

#### 1.02 SEQUENCING AND SCHEDULING

- A. It is the responsibility of those performing the electrical system analysis to collect and field verify all data. This includes verifying existing electrical distribution and obtaining all data from the Utility Company, Generator supplier and vendors necessary for completing the requested studies. Utilize proposed load data for the Studies obtained from submittals, Utility Company, Generator manufacturers, field verifications, etc.
- B. Contractor shall provide letter certifying the inspection and verification of existing equipment and distances used in study.
- C. A complete Protective Device Coordination Study shall be submitted within 60 days after approval of Short Circuit Study.
- D. At the completion of the project, all studies shall be resubmitted with all calculations rerun, data and graphs updated to reflect as-left conditions. Provide new Arc Flash labels to reflect as-constructed equipment and as-left circuit breaker settings.
- E. When previous electrical system analysis studies are available and provided to the Contractor, it is the Contractor’s responsibility to verify the accuracy of the data used and to update it to match existing conditions.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL**

- A. Equipment and component titles and numbers used in the Studies shall be identical to the equipment and component titles and numbers shown on the Drawings.
- B. Perform Studies using PC based computer software. State program name and version (e.g. version 2.1) in report.
- C. Perform complete fault calculations for Utility and generator sources. Equipment shall not be grouped as a single large load; they shall be treated as individual loads. When generators are incorporated into the system, develop two separate networks: one with utility only (no generator attached) and one with generator only (no utility attached)
- D. Complete protective device coordination study listing all device settings shall be utilized during start-up of electrical equipment.
- E. Provide unique page numbers for every sheet in Study. Unique page numbers to be manually placed by Study Company after printout if study report doesn't assign page numbers.
- F. One line diagrams
  - 1. Shall be readable on 11" x 17" paper. One line diagrams shall be redrawn in AutoCAD on multiple sheets if necessary or as requested by Owner.
  - 2. Buses and branches shall have descriptive names matching one line diagram or existing system (i.e. not Bus-0084).
  - 3. Automatic transfer switches (ATSs), Main Switchboards (MSBs), shall not have multiple node buses.
  - 4. Primary and secondary for transformers, Variable Frequency Drives (VFDs), etc. shall be changed to node buses.

### **2.02 SHORT CIRCUIT STUDY**

- A. Include the following in the short circuit study:
  - 1. Cable impedances based on copper conductors.
  - 2. Bus impedances based on copper bus bars.
  - 3. Transformer impedances based on tolerances specified in ANSI C57.12.00.
  - 4. Source data (i.e. cable lengths, sizes, and quantity, for all runs in study, listing of bus loads, etc.).
  - 5. Utility data:
    - a. Size of Utility transformer.
    - b. Impedance of Utility transformer.
    - c. Primary voltage of Utility transformer.

- d. Fault information on primary side of Utility transformer:
    - 1) Three phase bolted fault.
    - 2) X/R ratio (positive sequence).
    - 3) Line to ground fault.
    - 4) X/R ratio (zero sequence).
  - e. Protective relays (type & settings).
  - 6. Voltage drop and current flow at each node and load in system.
- B. Calculate Short Circuit interrupting duties for an assumed three-phase bolted fault and line-to-ground fault at each of the following locations:
- 1. Metering panels.
  - 2. Motor Control Center (MCC)
  - 3. All panelboards.
  - 4. 480V, 3 phase motor and equipment loads.
  - 5. 3 phase transformer secondaries.
  - 6. 240/208V equipment.
- C. Verify:
- 1. Equipment and protective devices are applied within their ratings.
  - 2. Adequacy of switchboard, panelboard and MCC bus bars to withstand Short Circuit stresses.
  - 3. Adequacy of transformer windings to withstand Short Circuit stresses and over-current.
  - 4. Cable sizes for ability to withstand normal and fault load currents.
- D. Provide the following in the Short Circuit study report:
- 1. Calculation methods and assumptions.
  - 2. Input data.
  - 3. Short circuit data:
    - a. Impedances.
    - b. X to R ratios.
    - c. Asymmetry factors.
    - d. Motor contributions.
    - e. Short Circuit kVA.
    - f. Symmetrical and asymmetrical line-to-line and line-to-ground fault currents.
    - g. Device evaluation including rating of equipment.
    - h. Bus evaluation including rating of equipment.
    - i. Source data, from Electric Utility Company. Include copy of correspondence with Utility Company indicating values used.
    - j. Source data from Generator Supplier (where applicable). Include copy of Generator provided values used.

4. Tabulations of calculated quantities.
5. Results, conclusions, and recommendations.
6. One line diagram of distribution system
7. Spreadsheet comparing the rating of the equipment and circuit breakers versus the calculated short circuit faults.
8. Impedance diagram showing the resistances and reactances for all cables of the distribution system.
9. Two studies (minimum) – one for one for actual equipment operating and one for arc flash reduction switch enabled (where applicable).

## 2.03 PROTECTIVE DEVICE COORDINATION STUDY

- A. Provide Protective Device Coordination drawings for each section of distribution system that includes the following:
  1. Graphically diagram displaying coordination time-current curves on conventional log-log curve sheets. Each time-current curve shall have a unique identifier label. This identifier shall be used in the tabulated settings spreadsheet and on the associated one-line diagram.
  2. Time-current curves shall include the following curves (minimum):
    - a. Utility relays (phase & ground) and high voltage switchgear relays (phase and ground).
    - b. All upstream protective devices and breakers.
    - c. All MCP breaker and associated motor or equipment load. Duplicates of the same sized protective device and motor size may be omitted (i.e., when there are 3 pumps for same application).
    - d. All mechanical overloads.
    - e. All transformers and associated primary and secondary protection.
    - f. Unique identifier for each protective device.
    - g. Provide separate TCC for phase and ground curves.
    - h. TCC for Ground curves shall include the transformer magnetizing inrush currents for all transformers downstream of the circuit breaker. Ground shall clear the inrush currents.
  3. One-line diagram that applies to specific portion of distribution system associated with time-current curves. One-line diagram shall include the following:
    - a. Location of each device.
    - b. Power and voltage ratings, primary and secondary transformers amperages.
    - c. All significant circuit elements such as transformers, cables, breakers, fuses, relays, etc. with their corresponding amperage ratings.
    - d. Tag of each branch and node (shall be the same tags used in short circuit study).
    - e. Mechanical overload and contactor.
    - f. English description, equipment name, HP, and full load amp rating of motors and other 3 phase loads.

- g. Terminate device characteristic curves at a point reflecting maximum fault current to which device is exposed as calculated in short circuit study.
- 4. Time current curves shall be provided for all protective devices with adjustable settings.
- B. Characteristics plotted on time current curves shall include:
  - 1. Protective current relays.
  - 2. Fuses including manufacturer's minimum melts, total clearing, tolerance, and damage bands.
  - 3. Circuit breaker trip devices, including manufacturer's tolerance bands.
  - 4. Transformer full-load currents at 100% and 600%.
  - 5. Motor and equipment full load currents. Motors fed from VFDs and Soft Starters shall have their starting curves adjusted according to inrush currents on the TCC. Motors on TCC shall show the DC offset for VFD and Soft Starter fed pumps.
  - 6. Transformer magnetizing inrush currents.
  - 7. Transformer damage curves.
  - 8. ANSI transformer withstand parameters.
  - 9. Fault currents.
  - 10. Ground fault protective device settings.
  - 11. Other electronic protective devices.
- C. Provide the following recommended settings in spreadsheet format in the Protective Device Coordination study report:
  - 1. Relay settings including CT values.
  - 2. Circuit Breakers adjustments:
    - a. Long Delay Pickup and Time.
    - b. Short Time Pickup and Time.
    - c. Instantaneous Pickup and Time.
    - d. Ground Pickup and Time.
  - 3. Programmable settings for all electronic devices. Settings for non-current relay settings shall also be provided.
  - 4. Settings shall be given both in amps and seconds as well as the corresponding physical setting (i.e. 30A and setting B on MCP) for device.
  - 5. Identify protective device associated with each curve by manufacturer type, function and part number.

## 2.04 HARMONIC STUDY

- A. Perform a harmonic analysis study in accordance with the latest version of IEEE 519 unless otherwise specified in contract documents.
- B. The total harmonic distortion (THD) at the point of common coupling (PCC) shall be predicted through computer modeling of the distribution system and connected AC drives.

PCC shall be considered as the main breaker of all MCCs and switchboards. Contractor shall calculate TDD and THD at each PCC.

- C. Do not exceed harmonic voltage and current distortion limits at PCC for general system applications, as recommended and defined by IEEE 519, unless specified otherwise in contract drawings.
- D. If the calculations determine that the harmonic distortion levels are higher than the voltage and current specified, the drive manufacturer shall provide line reactors, isolation transformers, multi-pulse drives or trap filters to meet the intent of IEEE 519.

## 2.05 ARC FLASH HAZARD STUDY

### A. General:

- 1. Arc flash boundary and incident energy shall be calculated using a PC computer program at all significant locations in the electrical network, including switchgears, switchboards, MCCs, transformers, and other major equipment where work could be performed on energized equipment.
- 2. Arc flash computation shall include both line and load side of main breaker calculations, where necessary.
- 3. Document method of calculation.
- 4. Do not include the motor contribution of motors fed by VFDs in the arc flash hazard study.

### B. Safe working distances shall be indicated for calculated fault locations based upon the calculated arc flash boundary considering an incident energy of 1.2 cal/cm<sup>2</sup>.

### C. Study shall include the following:

- 1. All significant locations in 480 volt, 240 volt and 208 volt systems fed from transformers equal to or greater than 125 kVA.
- 2. Incident energy and arc flash protection boundary calculations in spreadsheet format in the Arc Flash Hazard study report.
- 3. Provide the following incident energy and flash protection boundary calculations in spreadsheet format in the Arc Flash Hazard study report (values shall be calculated for all electrical equipment in the power distribution system):
  - a. Arcing fault magnitude
  - b. Device clearing time
  - c. Duration of arc
  - d. Boundary for:
  - e. Arc flash protection
  - f. Limited shock approach
  - g. Restricted shock approach
  - h. Working distance
  - i. Incident energy at 18 inches (in cal/sq.-cm)



- j. Recommendations for arc flash energy reduction for each location having more than 8 cal/sq.-cm. Provide preliminary cost estimate for implementing recommendations.
- k. List arc flash boundary in “inches” on label. No fractional distance in feet.
- 4. Provide recommendations for the Personal Protective Equipment (PPE) that the Owner should maintain on site.
- 5. Provide recommendations for safety label design that should be posted on electrical equipment.
- 6. Spreadsheet summarizing incident energy and flash protection boundary list Arc Flash Boundary in inches on label. No fractional distance in feet.

## 2.06 STUDY REPORTS

- A. Written reports submitted for approval shall contain:
  - 1. Scope of Studies performed.
  - 2. Explanation of bus and branch numbering system.
  - 3. Report calculations, tabulations and spreadsheets.
  - 4. Selected equipment deficiencies.
  - 5. Results of Short Circuit, & Arc Flash Studies.
  - 6. Comments, recommendations or suggestions regarding:
  - 7. Changes and additions to equipment rating and/or characteristics.
  - 8. Circuit protective devices improperly rated for overload or fault conditions.
  - 9. Arc Flash protective equipment and safety labels.
  - 10. Tabulation spreadsheet for all protective device settings.
  - 11. Stamped, signed and dated by Electrical Engineer registered in the State of California who performed the analysis.
  - 12. Motors fed from VFDs and Soft Starters shall have their starting curves adjusted according on the TCC
- B. Reports are to be updated to reflect as-built conditions and placed in O&M manual, per Section 16010 requirements.

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. Make minor modifications to equipment settings as required to accomplish conformance with the Short Circuit and Arc Flash Studies.
- B. Notify Engineer in writing of any required major equipment modifications.

### **3.02 FIELD TESTS**

- A. Provide field testing of protective equipment.
- B. Adjust relay and protective device settings according to values established by Coordination Study.

### **3.03 ARC FLASH WARNING LABELS**

- A. All Arc Flash warning labels shall meet NEC requirements, OSHA standards and NFPA recommendations.
- B. Provide and install 4 in. x 6 in. thermal transfer type labels of high adhesion polyester for each work location analyzed and as required by the NEC for flash protection on power distribution equipment.
- C. Each label shall have an orange header with the wording, "WARNING, ARC FLASH HAZARD," and shall include the following machine printed information:
  - 1. Location designation
  - 2. Nominal system voltage
  - 3. Arc Flash boundary
  - 4. Available Incident energy and corresponding working distance
  - 5. Minimum arc rating of clothing
  - 6. Site specific Level of PPE
  - 7. Engineering report number, revision number and issue date
  - 8. Company preparing report and contact phone number.
- D. Labels shall not be hand labeled.
- E. For all areas, Contractor shall post the following (do not list distances in decimal units if it's less than 5 feet, (i.e. 30 inches, not 2.5 feet, etc.):
  - 1. Working distances
  - 2. Shock hazard voltage
  - 3. Shock Approach Boundaries:
    - a. Limited
    - b. Restricted
  - 4. Provide Arc Flash labels for the each of the following pieces of equipment; including existing:
    - a. Switchboard
    - b. Automatic Transfer Switch

- c. 480V and applicable 208V panelboards
  - d. MCCs
  - e. MCCs
  - f. Metering equipment
  - g. Control Panels
- 2. All electrical equipment with an incident energy level greater than 1.2 Cal/cm<sup>2</sup>.
  - 3. Where Switchgear, Switchboard, MCC, Panelboard, Distribution Panel, etc. feed multiple circuit breakers from the enclosure, provide separate line and load side Arc Flash Labels for the Main Circuit Breaker
  - 4. Provide separate labels at each circuit breaker that has arc flash reduction switches indicating the appropriate values when the switch is enabled.
- F. Labels shall be submitted for approval. No labels shall be installed without prior approval by Owner or Owner representative.
- 3.04 ARC FLASH TRAINING
- A. The Electrical Engineer, who sealed the Electrical System Analysis shall train the Owner personnel of the potential arc flash hazards associated with working on energized equipment (minimum of 4 hours). Maintenance procedures shall be in accordance with the requirements of NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces and shall be provided in the equipment manuals.

**END OF SECTION**

**SECTION 31 20 00  
EARTHWORK**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Scope:
  - 1. Clearing, grubbing and site preparation.
  - 2. Removal and disposal of debris.
  - 3. Handling, storage, transportation and disposal of excavated material.
  - 4. Sheeting, shoring, bracing and protection Work.
  - 5. Pumping and dewatering excavations.
  - 6. Backfilling.
  - 7. Pipe embedment.
  - 8. Surfacing and grading.
  - 9. Potholing of existing utilities
  - 10. Appurtenant Work.

**1.02 QUALITY ASSURANCE**

- A. Labor Code 6705 – Protection of Workers in Excavations: As required by Section 6705 of the California Labor Code and in addition thereto, whenever work under the Contract involves the excavation of any trench or trenches 5 feet or more in depth, the Contractor shall submit for acceptance by the District or by a registered civil or structural engineer, employed by the District, to whom authority to accept has been delegated, in advance of excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for work protection from the hazard of caving ground during the excavation, of such trench or trenches. If such plan varies from the shoring system standards established by the Construction Safety Orders of the Division of Industrial Safety, the plan shall be prepared by a registered civil or structural engineer employed by the Contractor, and all costs therefore shall be included in the price named in the Contract for completion of the Work as set forth in the Contract Documents. Nothing in this Section shall be deemed to allow the use of a shoring, sloping, or other protective system less effective than that required by the Construction Safety Orders. Nothing in this Section shall be construed to impose tort liability on the District, or any of their officers, agents, representatives, or employees.
- B. Requirements of Regulatory Agencies:
  - 1. Comply with all requirements of local, county, and state agencies.
  - 2. Comply with Calaveras County Encroachment Permit.
  - 3. Provide an erosion control plan in compliance with all special erosion control regulations, Best Management Practices (BMP's) and ordinances.

**1.03 JOB CONDITIONS**

- A. Protection:
  - 1. Protect adjacent structures and surrounding areas from damage during excavation, filling, and backfilling.
  - 2. Do not remove trees from outside excavation or fill areas unless authorized by the Engineer; protect from permanent damage by construction activities.
  - 3. Protect Work from erosion or other similar types of damage until the Project has been completed.
- B. Weather:
  - 1. Do not backfill or construct fills or embankments during freezing weather or during periods of heavy rainfall when soil moisture conditions will not permit achieving required compaction.
  - 2. Do not use frozen materials, snow, or ice in any backfill, fill area or embankment.
  - 3. Do not backfill or construct fill or embankments on frozen surfaces.

4. Jobsite elevations are approximately 780 - 1,160 ft MSL

#### 1.04 SUBMITTALS

- A. Material Samples and Certificates of Compliance:
  1. Road base.
  2. Pipe embedment.
  3. Imported backfill.
  4. General backfill.
- B. Gradation Curves:
  1. Mechanical Properties
  2. Moisture-Density Curves
  3. Pipe embedment.
  4. Road base.
- C. Potholing Report:
  1. Submit report to Engineer with potholing results for utilities showing:
    - a. Utility location in Plan.
    - b. Material type.
    - c. Material size (diameter)
    - d. Utility depth, IE.
  2. Submit potholing report to Engineer at least 4 weeks in advance of desired work by Contractor for excavation pipeline installation.

#### PART 2 - PRODUCTS

##### 2.01 MATERIALS

- A. Classification of Excavated Materials:
  1. Unclassified
  2. Contractor shall make own estimate of soil conditions, extent various materials may occur and complete excavations for all soil types. The Contractor shall be responsible for the stability of all temporary excavations and shall comply with applicable CalOSHA regulations (California Construction Safety Orders). The Contractor shall determine the soil type and requirements for temporary cutslope inclinations during excavation. All open cuts should be regularly monitored for evidence of incipient stability failures. Permanent cutslopes up to 10 feet high may be constructed with inclinations as steep as 2:1 (H:V).
  3. It is assumed that rock and cobble is commonly encountered in local geology and occurs within the designated project area. No extra payment will be made for changed soil conditions for mechanical excavation unless hydraulic hammering is shown to be infeasible and controlled blasting must be used for removal.
- B. Fills and Embankments:
  1. Crushed rock: clean natural material, 1" x No.4 grading conforming to State Standards Section 90 or other acceptable material approved by District.
  2. Aggregate base shall consist of Class 2 Aggregate Base requirements of Section 26 of Stage Standards for 3/4 inch maximum grading, 25 min. sand equivalent, 35 min. durability index, 78 min. R-value; no recycled materials.
  3. Earth:
    - a. Backfill shall be Class 2 AB.
    - b. Obtain additional material from offsite locations providing material complying with Specifications for respective types of fills.
    - c. Free from rocks or stones larger than three (3) inches in greatest dimension and free from brush, stumps, logs, roots, debris, and other deleterious materials.
    - d. Organic content: 2 percent maximum.
    - e. Acceptable to Engineer.
    - f. Screen and remove all rocks in excess of 3-inch maximum diameter.

- g. All rocks and stones greater than three (3) inches in greatest dimension shall be removed from earth fill.
- 4. Imported fill:
  - a. Free of vegetation, debris, and other deleterious material.
  - b. Organic content: Two (2) percent maximum.
  - c. Plasticity index no greater than 12 when tested in accordance with ASTM D4318.
  - d. "R" value no less than 25.
  - e. Non-expansive.
  - f. Gradation as determined in accordance with ASTM D 422 as follows:

Sieve Size (Sq. Openings)	% Passing by Weight
4 inches	100
2.5 inches	85 - 100
No. 4	70 - 100
No. 200	0 - 15

- g. Optimum moisture content uniformly distributed such that maximum density of soil will be obtained per ASTM D1557.
- h. Furnish all fill as necessary to complete the project.
- 5. Geotextile Fabric - Mirafi 160N, nonwoven, 160-lbs grab tensile strength per ASTM D4632 and 410-lbs puncture strength per ASTM D6241 .
- C. Topsoil:
  - 1. Native material removed and stockpiled before excavation.
  - 2. Free from trash, debris, roots, and surface vegetation.
- D. Pipe Zone Embedment:
  - 1. Bedding/Embedment Materials:
    - a. Electrical Conduits: Sand, clean with 100 percent passing No. 4 sieve and less than 5 percent passing No. 200 sieve. Sand equivalent of 30.
    - b. Buried Piping: Class 2 Aggregate Base.
    - c. Sand: Clean sand with 100 percent passing No. 4 sieve and less than 5 percent passing No. 200 sieve and effective size 0.10-0.30 mm. Sand equivalent of 30.
  - 2. Bedding and Pipe Zone Embedment Limits:
    - a. Compact minimum 6 inch bedding in bottom of trench under pipe
    - b. Continue placement of pipe zone embedment continuous around pipe (under haunches, through springline, to top of pipe) and extend at least 12 inches above top of pipe.
    - c. Compact all bedding and pipe zone backfill to minimum 95 percent relative compaction.
    - d. Bedding material shall be clean material, free of organic matter and clay; with a chloride content of <300 ppm.
- E. Trench Backfill: (above pipe embedment)
  - 1. Compacted backfill (1.5" Minus):
    - a. Class 2 Aggregate Base.
    - b. Finely divided, free of debris organic material, and stones larger than 1 inch in greatest dimension.
    - c. Liquid limit <40.
    - d. Plasticity Index <20.
    - e. Passing No. 200 sieve <5% by weight.
    - f. 100% passing 1 inch sieve.
    - g. Compact backfill material to 95% relative compaction in roadways and 90% relative compaction outside of roadways.
    - h. Conform to County of Calaveras Standard Trench Cuts and Street Resurfacing

2. Cover:
  - a. Free of brush, debris, and roots.
  - b. May contain rubble and detritus from rock excavation, stones and boulders if well separated and arranged to not interfere with backfill settlement.
  - c. In upper 18 inches no rock or excavated detritus except with specific approval of Engineer.
  - d. No stones larger than three (3) inches in greatest dimension within three (3) feet of top of pipe.

F. Road Base:

1. ASTM specification for Class II aggregate base.

Sieve Size	% Passing Sieve
1"	100
3/4"	90 - 100
#4	35 - 60
#30	10 - 30
#200	2 - 9
(CalTrans Class II gradation)	

2. Compact to at least 95 percent of the relative compaction based on the California Test Method No. 216, 312, or 213E. ASTM D1557-92 test method.

**PART 3 - EXECUTION**

**3.01 INSPECTION**

- A. Field verify the location of all underground utilities, pipelines, and structures. Special attention is directed to existing pipes and electrical conduits on site, which must remain in service throughout construction.
  1. Clear sites to be occupied by permanent construction of logs, trees, roots, brush, tree trimmings, and other objectionable material and debris.
  2. Grub stumps.
  3. Clean and strip subgrade for fills and embankments of surface vegetation, sod, and organic topsoil.
  4. Remove waste materials from site and dispose weekly.
  5. No burning onsite is allowed.

**3.02 EXISTING UTILITIES**

- A. General: The known existing buried utilities and pipelines are shown on the Contract Drawings in their approximate location. The Contractor shall exercise care in avoiding damage to all utilities and will be held responsible for repair if damaged. There is no guarantee that all utilities or obstructions are shown, or that locations indicated are accurate. Utilities are piping, conduits, wire, cable, ducts, maintenance holes, pull boxes and the like, located at the project site and adjoining construction locations.
- B. Check on Locations (Potholing): Contact all affected utility owners and request them to locate their respective utilities prior to the start of "potholing" procedures (contact Underground Service Alert). The utility owner shall be given 7 days written notice prior to commencing potholing. If a utility owner is not equipped to locate its utility, the Contractor shall locate it.
- C. Clearly paint the location of all affected utility underground pipes, conduits and other utilities on the pavement or identify the location with suitable markers if not on pavement. In addition to the location of metallic pipes and conduits, non-metallic pipe, ducts and conduits shall also be similarly located using surface indicators, and detection tape if present and shall then be similarly marked.

- D. After the utility survey is completed, commence "potholing" to determine the actual location and elevation of all utilities where crossings, interferences, or connections to new pipelines or other facilities are shown on the Contract Drawings, marked by the utility companies, or indicated by surface signs. Prior to the preparation of piping shop drawings, or the excavating for any new pipelines or structures, the Contractor shall locate and uncover these existing utilities to a point 1 foot below the utility. Submit a report identifying each underground utility and its depth and location. Any variation in the actual elevations and the indicated elevations shall be brought to the Resident Engineer's attention.
- E. Excavations around underground electrical ducts and conduits shall be performed using extreme caution to prevent injury to workmen or damage to electrical ducts or conduits. Similar precautions shall be exercised around gas lines and telephone cables.
  - 1. Backfill after completing potholing:
    - a. In existing pavement, pave with 3 inch of cold mix asphalt concrete.
    - b. In existing concrete pavement, repair with 9 inches of 4000 psi concrete.
- F. Interferences: If interferences occur at locations other than shown on the Contract Drawings, the Contractor shall notify the Engineer. The Contractor may be requested to submit a method to correct the interferences. The Engineer will provide the selected method for correcting said interferences to the Contractor. Payment for interferences that are not shown on the Contract Drawings, nor which may be inferred from surface indications, shall be in accordance with the provisions of the Special Provisions. If the Contractor does not expose all required utilities prior to shop drawing preparation, he shall not be entitled to additional compensation for work necessary to avoid interferences, nor for repair to damaged utilities.
- G. Any necessary relocations of utilities, whether shown on the Contract Drawings or not, shall be coordinated with the affected utility. The Contractor shall perform the relocation only if instructed to do so in writing from the utility and the Resident Engineer.
- H. Shutdowns: Planned utility service shutdowns shall be accomplished during period of minimum use. All proposed utility service shutdowns shall be noted in the regular 3 week look ahead schedules presented during weekly project meetings. Such work shall be at no additional cost to the District. Program work so that service will be restored in the minimum possible time and shall cooperate with the utility companies in reducing shutdowns of utility systems to a minimum.
  - 1. Disconnections: No utility shall be disconnected without prior written approval from the utility owner. When it is necessary to disconnect a utility, the Contractor shall give the utility owner not less than 72 hours written notice when requesting service shutdown approval. The Contractor shall program his work so that service will be restored in the minimum possible time.
- I. Overhead Facilities: There are existing overhead electric and telephone transmission lines at the site. Extreme caution shall be used when working in the vicinity of overhead utilities so as to prevent injury to workmen or damage to the utilities. The Contractor shall be required to comply with the applicable provisions of the California Construction Safety Orders when working anywhere on this project.

### **3.03 OBSERVATION OF STAINED OR ODOROUS SOIL**

- A. Contractor shall notify District and immediately stop work in an area if soil, debris, water or other substances at an area of the Site ("Affected Area") are observed, uncovered, or otherwise discovered because the soil, concrete or debris is discolored, oily or exhibits an odor. Promptly confirm this oral notice in writing. The District will consider such conditions and determine a course of action. The Contractor shall continue to work in areas not affected and shall resume work in the Affected Area only after being notified by the District Resident Engineer.

### **3.04 PERFORMANCE - GENERAL**

- A. General:

CIP 11122

Copper Cove

C-Tank BPS and T-Main Line

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Earthwork



1. Perform Work in a safe and proper manner with appropriate precautions against hazard.
  2. Provide adequate working space and clearances for Work performed within excavations and for installation and removal of concrete forms.
  3. Do not undercut excavation faces for extended footings.
  4. Clean subgrades of loose material before concrete is placed thereon.
  5. Preservation of trees:
    - a. Do not remove trees outside fill or excavated areas, except as authorized by Engineer.
    - b. Protect trees left standing from permanent damage by construction operation.
    - c. Trim standing trees as directed by Engineer.
  6. Except as otherwise authorized, indicated, or specified, replace all material excavated below the bottom of concrete walls, footings, slabs on grade and foundations with concrete placed at the same time and monolithic with the concrete above.
  7. Remove soft soil materials, loose materials, wood, debris and deleterious substances encountered within excavated areas.
- B. Blasting: Not permitted.
- C. Pavement
1. Bituminous or concrete pavements, regardless of thickness, and curbs and sidewalks shall be saw cut prior to removal in according to encroachment permit requirements or otherwise as required by the District.
  2. Pavement and concrete waste materials shall be removed from the site.
- D. Topsoil:
1. Remove and stockpile sufficient topsoil to surface to a minimum depth of 4 inches fill, embankment and other areas where the original topsoil will be removed or damaged.
  2. At the completion of other Work in each area, place and grade topsoil to Engineer's satisfaction.
- E. Dewatering:
1. Obtain all required local and State permits required to discharge water pumped from the excavations.
  2. Contractor shall remove all sediment from water pumped or otherwise removed from excavations or trenches before disposing of it in a natural stream or water course (flowing or not).
  3. All dewatering activities to be in accordance with local codes and regulations.
  4. Provide and maintain adequate dewatering equipment to remove and dispose of surface and groundwater entering excavations, trenches, and other parts of the Work.
  5. Keep each excavation dry during subgrade preparation and continually thereafter until the structure to be built or the pipe to be installed is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.
  6. Dewater excavations which extend to or below groundwater by lowering and keeping the groundwater level beneath such excavation at least 12 inches below the bottom of the excavation.
  7. Divert surface water or otherwise prevent it from entering excavated areas or trenches to the extent practical without damaging adjacent property.
  8. Contractor is responsible for the condition of any pipe or conduit he uses for drainage; all drainage pipes shall be left clean and free of sediment.
  9. Contractor shall comply with Waste Discharge Requirements, General Order for Dewatering and other Low Threat Discharges to Surface Waters as issued by the Central Valley Regional Water Quality Control Board.
- F. Sheeting, Shoring and Bracing:
1. Reference General Conditions.

2. Provide proper and substantial sheeting, shoring and bracing, for any trench 5 feet in depth or where required, to prevent caving or sliding, to protect workmen and the Work, and to protect existing structures and facilities.
  3. Design and build sheeting, shoring and bracing to withstand all loads that might be caused by earth movement or pressure, and to be rigid, maintaining shape and position under all circumstances.
  4. Submit sheet pile cut-off wall design calculations, stamped by a California registered professional engineer.
  5. Do not pull trench sheeting before backfilling.
  6. All sheeting, shoring and bracing in accordance with OSHA Sections 1539-1543 and UBC requirements.
  7. All sheet pile cut-off walls to be removed at the end of the Project.
- G. Stabilization:
1. Thoroughly compact and consolidate subgrades for concrete structures and trench bottoms so they remain firm, dense and intact during required construction activities.
  2. Remove all mud and muck during excavation.
  3. Reinforce subgrades with crushed rock or gravel if they become mucky during construction activities, as directed by Engineer.
  4. Finished elevation of stabilized subgrades are to be at or below subgrade elevations indicated on Contract Drawings.
  5. Scarify subgrade to a depth of 6 to 8 inches and prior to subgrade compaction.
- H. General Fill Requirements:
1. Maximum uncompacted lift of all fill areas: 6 inches.
  2. Compact with mechanical tampers approved by the Soils Consultant or Engineer.
  3. Compaction by inundation by water is not permitted.
  4. Use small hand operated compactor within 3 feet of walls.
- I. Trench Excavation:
1. Except as approved and authorized by the encroachment permit (Caltrans and Public Works), no open trench will be permitted to remain open within the highway pavement and/or paved roads or adjacent highway and road shoulders that are accessible to traffic and public. If excavations are permitted, by encroachment permit or permitting agency, to remain open within the right-of-way, the Contractor shall provide all necessary barricades, k-rails, traffic rated plates, signage and other traffic controls (meeting Caltrans standards and requirements) to protect traffic, the public and worker safety. Otherwise, in areas not readily accessible to traffic or public access, the maximum length of open trench shall be 500 feet or the distance necessary to accommodate daily work, whichever is less. The distance is the collective length of any location, including open excavation, pipe laying, and appurtenant construction and backfill that has not been temporarily resurfaced. Unless otherwise authorized by the District, all open trench shall be closed within 24-hours. No open trench will be allowed to remain open in wet weather from November to April. Any/all open trenches that are unattended by the Contractor shall be properly secured and covered with steel trench plates, barricaded and fenced off including appropriate temporary signage, cones, and other warning devices to assure public safety. Failure by the Contractor to comply with requirements herein may result in an order to stop work until compliance has been achieved.
  2. Except where tunneling is indicated on the Contract Drawings, specified, or permitted by Engineer, excavate trenches by open cut from the surface.
  3. Alignment, grade and minimum cover:
    - a. Excavate trenches so pipes can be laid straight at uniform grade without dips or bumps, between the terminal elevations indicated on the Contract Drawings.
    - b. Comply with pipe specification sections regarding vertical and horizontal alignment and maximum joint deflection.

- c. Where grades or elevations are not fixed on the Contract Drawings, excavate trenches to provide a minimum depth of backfill cover over top of the pipe:
  - 1) 36 inches for water piping.
  - 2) Increase depth as required at vertical curves and for clearance beneath existing pipes, conduits, drains, drainage structures, or other obstructions encountered at normal pipe grades.
  - 3) Measure pipe cover depth vertically from top of pipe to finished ground or surface elevation, or to future lower surface elevations where indicated on Contract Drawings.
- 4. Maintain excavation spoils on uphill side of trench and provide erosion containment measures on downhill side.
- 5. Limiting trench widths:
  - a. Excavate to a width which will provide adequate working space and pipe clearances for proper pipe installation, jointing, and placement of embedment.
  - b. If needed to reduce earth loads to prevent sliding, cut banks back on slopes which extend not lower than one (1) foot above the top of the pipe.
  - c. Stipulated minimum clearances are minimum clear distances, not minimum average distances.
  - d. Maximum trench width six (6) inches above the top of the installed pipe: Pipe O.D. plus 24 inches.
  - e. Minimum trench width: Three (3) pipe diameters of pipe to be installed.
  - f. T-Section: When the trench is in an existing paved area (road, parking lot, etc.), saw cut edges of trench; vacuum/contain all waste slurry/water discharge from activity. T-Section must be 12-inches wider than final trench width and completed excavation limits. For pavement thickness less than 4-inches, fully remove/replace T-Section; for thicker pavements, plug pave trench then cold plane/grind and overlay T-Section.
- 6. If the width of the lower portion of the trench exceeds the maximum permitted, provide pipe of adequate strength, special pipe embedment, or arch concrete encasement as required by loading conditions and as determined by Engineer.
- 7. Mechanical excavation:
  - a. Do not use where its operation would damage trees, buildings, culverts, or other existing property, structures, or utilities above or below ground; hand excavate only in such areas.
  - b. Use mechanical equipment of a type, design, and construction and operated so that:
    - 1) Rough trench bottom elevation can be controlled.
    - 2) Uniform trench widths and vertical sidewalls are obtained from one (1) foot above the top of the installed pipe to the bottom of the trench.
    - 3) Trench alignment is such that pipe is accurately laid to specified alignment and is centered in the trench with adequate clearance between pipe and trench sidewalls.
  - c. Do not undercut trench sidewalls.
- 8. Excavation below pipe subgrade:
  - a. Except as otherwise required, excavate trenches below the underside of pipes as indicated on Contract Drawings, according to pipe and soil type, to provide for installation of embedment pipe foundation material.
  - b. Where in earth, trench bottoms for six (6) inches and smaller pipe may be excavated below pipe subgrade and embedment provided or the trench may be graded to provide uniform and continuous support (between bell holes or end joints) of the installed pipe, Contractor's option.
  - c. Pipe may not be laid directly on trench bottom.

J. Pipe Embedment (Bedding and Pipe Zone Backfill):

1. Embed pipes above and below the bottom of pipe as indicated on Contract Drawings and as specified.
  2. Spread and surface grade embedment to provide continuous and uniform support beneath pipe at all points between bell holes or pipe joints.
  3. Slightly disturbing finished subgrade surface during withdrawal of slings and lifting tackle is permissible.
  4. After grading, aligning and placing pipe in final position, and shoring home, deposit and compact sufficient embedment under and around each side of the pipe and back of the bell or end thereof to hold the pipe in proper position and alignment during subsequent operations.
  5. Place and compact embedment material uniformly and simultaneously on both sides of pipe to prevent lateral displacement.
  6. Compaction:
    - a. After completion of the trench excavation and proper foundation preparation, 6-inches of bedding shall be placed on the trench bottom for support under the pipe. Bell holes shall be dug to provide adequate clearance between the pipe bell and bedding material. All pipes shall be installed in such a manner as to ensure full support of the pipe barrel over its entire length. After the pipe is adjusted for line and grade and joint is made, the remainder of pipe bedding shall be paced to the limits as specified in the Contract Documents. All bedding material shall be compacted 95% relative compaction. The bedding and backfill shall be brought to optimum moisture content and placed by hand in layers not exceeding 6 inches in thickness to the centerline (springline) of the pipe. Each layer shall be solidly tamped with the proper tools so as not to injure, damage, or disturb the pipe. Backfilling shall be carried on simultaneously on each side of the pipe to assure proper protection of the pipe. Each lift shall be "walked on" and supplemented by slicing with a shovel to ensure that all voids around the pipe and under haunches have been completely filled. Light-weight mechanical hand operated equipment (under 125 lbs) such as "pogo sticks" or "wackers", as approved, shall be used for pipe zone compaction.
  7. Jetting and ponding not permitted.
- K. Trench Backfill:
1. Compacted backfill: Consists of "initial backfill" placed above "pipe zone" starting 12-inches above top of pipe and continued to road or surface subgrade.
    - a. Provide for the full depth of trench above embedment at all locations.
    - b. Where the trench for one (1) pipe passes beneath the trench of another pipe, compact the backfill for the lower trench to the bottom of the upper trench.
    - c. Finish the top portion beneath established sodded areas with 12 inches minimum, topsoil corresponding to, or better than, underlying adjacent sodded areas.
    - d. Job excavated materials:
      - 1) Place in eight (8)-inch maximum uncompacted thickness, uniform layers.
      - 2) Increased layer thickness may be permitted for non-cohesive material if Contractor demonstrates to Engineer's satisfaction that specified compacted density will be achieved.
      - 3) Use methods and equipment appropriate to the material to be compacted to prevent transmission of damaging shocks to pipe.
      - 4) Roadways (paved/dirt/gravel) and Under Structures: Compact to 95 percent of maximum density at optimum moisture content per ASTM D1557 or to 70 percent relative density per ASTM D4253 and D4254 when appropriate. Roadways shall conform to County of Calaveras standards.
      - 5) Other locations: compact to 90 percent of maximum density at optimum moisture content per ASTM D1557 or to 70 percent of relative density per ASTM D4253 and D4254. Unpaved areas shall conform to County of Calaveras standards.

- e. Graded gravel:
  - 1) Deposit in uniform layers of 12 inches maximum uncompacted thickness.
  - 2) Compact with suitable vibrating roller or platform vibrator to not less than 70 percent relative density per ASTM D4253 and D4254.
- 2. Water settled backfill: Not allowed.
- 3. Replacement of Topsoil: Where directed by Engineer to do so or noted in Contract Documents to replace topsoil for purposes of site restoration and re-vegetation. Finish the top portion of backfill with at least 12 inches of topsoil corresponding to, or better than, that adjoining areas.
- L. Drainage Maintenance:
  - 1. Do not backfill trenches across roadways, driveways, walks, or other trafficways adjacent to drainage ditches or water courses prior to backfilling the trench on the upstream side of the traffic-way to prevent impounding water after pipe is laid.
  - 2. Backfill so that water does not accumulate in unfilled or partially filled trenches.
  - 3. Remove materials deposited in roadway ditches or other water courses crossed by the trench line immediately after backfilling is completed and restore ditches and water courses to original section, grade, and contours.
  - 4. Do not obstruct surface drainage any longer than necessary.
- M. Protection of Trench Backfill:
  - 1. Where trenches are constructed in ditches or other water courses, protect backfill from erosion.
  - 2. Install ditch checks where the ditch grade exceeds one (1) percent.
  - 3. Minimum depth: Two (2) feet below the original ditch or water course bottom for the full bottom width.
  - 4. Minimum width: 18 inches into the side slopes.
  - 5. Minimum thickness: 12 inches.
- N. Disposal of Excess Excavated Materials:
  - 1. Contractor shall remove and dispose of all excess excavated material; all surplus/waste excavated material shall be property of Contractor and disposed of offsite.
  - 2. No excavated material shall be deposited on private property unless written permission from the owner(s) thereof is secured by the Contractor; a County grading permit is required for placement of material on private property. The Contractor shall submit a written release signed by all property owners with whom Contractor has entered into agreements for disposal of material, absolving the District from any liability connected therewith.
  - 3. Contractor shall prepare and submit grading permit for disposal site.
- O. Final Grading and Backfill:
  - 1. Place and compact Class 2 A.B. to 95 percent relative compaction as final backfill for roads, paved areas, and other areas designated on Contract Documents.
  - 2. Finish A.C. paving and other finished surfaces per Contract Documents.
  - 3. Plug pave, grind out and overlay trench T-Section for existing pavement thickness 4-inches or greater. Saw-cut and fully remove/replace T-Section, if existing pavement thickness is less than 4-inches thick.
  - 4. After completion of all other outside Work and after backfilling is completed and consolidated/compacted to specified requirements, bring to grade at the indicated elevations, slopes and contours, all areas of the site to be graded.
  - 5. Graders and other power equipment may be used for final grading and slope dressing if the result is uniform and equivalent to hand Work.
  - 6. Grade all surfaces for effective drainage.
  - 7. Provide a one (1) percent minimum slope except as otherwise required.
  - 8. Place topsoil at locations and to limits indicated on Contract Drawings.

9. Grade and surface to Engineer's satisfaction.
10. Unless other specific surface improvements are shown on the plans or specified, the right-of-way shall be thoroughly cleaned and restored to pre-construction condition or better and left in a neat and presentable condition according to encroachment permit requirements and satisfaction of the Owner's representative and/or the District.

### **3.05 FIELD QUALITY CONTROL**

- A. District will pay for the first set of laboratory and field tests to determine compliance of in-place and backfill materials and compaction with the Specifications. If materials fail to meet specifications or compaction requirements, Contractor will pay for re-tests required until materials are in compliance with specifications or compaction requirements. Contractor to coordinate field sampling schedule with Resident Inspector to provide the specified number of locations for tests.
- B. Pipe Embedment and Backfill:
  1. Two initial gradation tests for each type of material plus one (1) additional test for each 500 cubic yards of each material.
  2. Two modified Proctor compaction tests, ASTM D1557, or two (2) relative density tests, ASTM D4253 and D4254, as appropriate, for each type of embedment on backfill material proposed, except granular embedment material.
  3. Minimum of one (1) in-place compaction test for every two (2)-foot depth of backfill per 100-foot interval will be required.
  4. Contractor shall, when requested, excavate to the required depth so density tests may be taken and bring such excavations to required density after testing at no additional cost to the District.
- C. Retests of failed compaction shall be performed by the District, but shall be paid for by the Contractor.

**END OF SECTION 31 20 00**

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**SECTION 31 25 00  
EROSION AND SEDIMENTATION CONTROLS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Erosion and sediment control.

**1.02 PRICE AND PAYMENT PROCEDURES**

- A. See Section 01 22 00 - Unit Prices for additional unit price requirements.

**1.03 REFERENCE STANDARDS**

- A. ASTM D5338 - Standard Test Method for Determining Aerobic Biodegradation of Plastic Materials Under Controlled Composting Conditions, Incorporating Thermophilic Temperatures; 2015 (Reapproved 2021).
- B. ASTM D7367 - Standard Test Method for Determining Water Holding Capacity of Fiber Mulches for Hydraulic Planting; 2019, with Editorial Revision.
- C. ASTM D8298/D8298M - Standard Test Method for Determination of Erosion Control Products (ECP) Performance in Protecting Slopes from Continuous Rainfall-Induced Erosion Using a Tilted Bed Slope; 2020.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.
- C. Maintenance Instructions: Provide instructions covering inspection and maintenance for preventive measures that must remain after Substantial Completion.

**PART 2 - PRODUCTS**

**2.01 PERFORMANCE REQUIREMENTS**

- A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP), whether the project is required by law to comply or not.
- B. Comply with more stringent requirements of State of California Erosion and Sedimentation Control Manual.

**2.02 MATERIALS**

- A. High Performance - Flexible Growth Medium (HP-FGM):
  - 1. Physical Properties:
    - a. Water Holding Capacity: Greater than or equal to 1,700 percent when tested in accordance with ASTM D7367.
    - b. Material Color: Green.
    - c. Cure Time: Zero to 2 hours.
    - d. Functional Longevity: Less than or equal to 18 months when tested in accordance with ASTM D5338.
    - e. Cover Factor: Less than or equal to 0.01 when tested in accordance with ASTM D8298/D8298M.
    - f. Application Rate: 3,500 lb per acre.
- B. Bonded Fiber Matrix (BFM):
  - 1. Physical Properties:
    - a. Water Holding Capacity: Greater than or equal to 1,200 percent when tested in accordance with ASTM D7367.
    - b. Material Color: Green.



- c. Cure Time: 4 to 24 hours.
- d. Functional Longevity: Observed, less than or equal to 6 months.
- e. Cover Factor: Less than or equal to 0.05 when tested in accordance with ASTM D8298/D8298M.
- f. Application Rate: 3,500 lb per acre.

### **2.03 ACCESSORY MATERIALS**

- A. Fill Material: Soil, granular fill, or sand used to raise an existing grade, acceptable to authorities having jurisdiction, and in compliance with specified performance requirements.
- B. Geotextiles: Permeable, synthetic fabric used to stabilize loose soil and prevent erosion.
- C. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- D. Grass Seed for Permanent Cover: Mixture of grass seeds compatible with soil composition in the locality of the work.
- E. Sod for Permanent Cover: Cultivated grass sod, type as indicated; with strong fibrous root system, free of stones, burned or bare spots.
- F. Plants for Permanent Cover: Specie and sizes identified in plant schedule, grown in climatic conditions similar to those in locality of the work.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

### **3.02 PREPARATION**

- A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.
- B. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish documentation required to obtain applicable permits.
  - 1. Obtain and pay for permits and provide security required by authority having jurisdiction.
  - 2. District will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.
- C. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

### **3.03 FIELD QUALITY CONTROL**

- A. Provide analysis of topsoil fill; see Section 01 40 00 - Quality Requirements.
- B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
- C. Submit minimum 10 oz sample of proposed topsoil. Forward sample to approved testing laboratory in sealed containers to prevent contamination.
- D. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

### **3.04 INSTALLATION**

- A. Hydroseeding: Apply seeded slurry with a hydraulic seeder at a rate of recommended by manufacturer evenly in two intersecting directions.
  - 1. Soil Amendment: Provide soil amendments for application with hydroseeding slurry at manufacturer's recommended rates based on soil test results.
- B. Do not seed areas in excess of that which can be mulched on same day.

- C. Immediately following seeding, apply mulch to a thickness of 1/8 inch. Maintain clear of shrubs and trees.
- D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.
- E. Following germination, immediately reseed areas without germinated seeds that are larger than 4 by 4 inches.

### **3.05 PROTECTION**

- A. Cover seeded slopes where grade is 4 inches per foot or greater with geotextile fabric. Roll fabric onto slopes without stretching or pulling.
- B. Lay fabric smoothly on surface, bury top end of each section in 6-inch deep excavated topsoil trench. Provide 12-inch overlap of adjacent rolls. Backfill trench and rake smooth, level with adjacent soil.
- C. Secure outside edges and overlaps at 36-inch intervals with stakes.
- D. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.
- E. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.

### **3.06 MAINTENANCE**

- A. Provide maintenance of seeded areas for three months from Date of Substantial Completion.
- B. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.
- C. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- D. Immediately reseed areas that show bare spots.
- E. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.
- F. Repair deficiencies immediately.
- G. Place sediment in appropriate locations on site; do not remove from site.
- H. Protect seeded areas with warning signs during maintenance period.

### **3.07 CLEAN UP**

- A. Clean out sediment control structures that are to remain as permanent measures.

**END OF SECTION 31 25 00**

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**SECTION 32 12 16  
PAVING AND SURFACING**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Scope:
  - 1. Asphalt concrete paving at project site as shown on the Contract Drawings.

**1.02 QUALITY ASSURANCE**

- A. General:
  - 1. Test in-place for density, thickness and surface smoothness.
  - 2. Final surfaces of uniform texture, conforming to required grades and cross sections.
- B. Density:
  - 1. Minimum acceptable density of in-place course materials is 97 percent of the recorded laboratory specimen density.
- C. Thickness: Variations from Contract Drawings:
  - 1. Base course: 1/2 inch,  $\pm$ .
  - 2. Surface course: 1/2 inch,  $\pm$ .
- D. Surface Smoothness:
  - 1. Test using a 10-foot straightedge applied parallel to direction of drainage.
  - 2. 1/4 inch per foot from nearest point of contact.
  - 3. Do not permit pockets or depressions where water may pool.
- E. Reference Standards:
  - 1. CalTrans Construction Manual, Section 39 and 92.
  - 2. ASTM C29: Unit Weight and Voids in Aggregate.
  - 3. ASTM C88: Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
  - 4. ASTM C117: Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing.
  - 5. ASTM C128: Specific Gravity Test and Absorption of Fine Aggregate.
  - 6. ASTM C126: Sieve or Screen Analysis of Fine and Coarse Aggregates.
  - 7. ASTM D4: Bitumen Content.
  - 8. ASTM D5: Penetration of Bituminous Materials.
  - 9. ASTM D70: Specific Gravity of Semi-Solid Bituminous Materials.
  - 10. ASTM D93: Flash Point by Density-Martens Closed Tester.
  - 11. ASTM D113: Ductility of Bituminous Materials.
  - 12. ASTM D1188: Bulk Specific Gravity of Compacted Bituminous Mixtures.
  - 13. ASTM D2041: Theoretical Maximum Specific Gravity of Bituminous Paving Mixtures.
  - 14. ASTM D2172: Quantities Extraction of Bitumen From Bituminous Paving Mixtures.
  - 15. ASTM D2419: Sand Equivalent Value of Soils and Fine Aggregate.
  - 16. ASTM D290: Bituminous Mixing Plant Inspection.
  - 17. ASTM D946: Asphalt Cement for Use in Pavement Construction.
  - 18. ASTM D692: Course Aggregate for Bituminous Paving.
  - 19. ASTM D1073: Fine Aggregate for Bituminous Paving Mixtures.
  - 20. A.I. MS-Z: Mix Design Method for Asphalt Concrete.
  - 21. Standard Specifications, Aggregate Bases, Class 6 Aggregate Base (Table 703-2).
  - 22. Standard Specifications, Asphalt Concrete, Aggregate (Table 703-3).
  - 23. CalTrans Standard Specification, Road and Bridge Construction (Grading S or SX).

**1.03 SUBMITTALS**

- A. Samples: Provide asphalt job-mix design.

- B. Test Reports: Submit laboratory reports for following material tests where called for by the Engineer.
1. Coarse and fine aggregate from each material source and each required grading:
    - a. Sieve analysis: ASTM C136 (AASHTO T19).
    - b. Unit weight of slag: ASTM C29 (AASHTO T19).
    - c. Soundness: ASTM C89 (AASHTO T104) for surface coarse aggregates only.
    - d. Sand equivalent: ASTM D2419 (AASHTO T176).
    - e. Abrasion of coarse aggregate: ASTM C131 (AASHTO T96), for surface coarse aggregates only.
  2. Asphalt cement for each penetration grade:
    - a. Penetration: ASTM D5 (AASHTO T49).
    - b. Viscosity (Kinematic): ASTM D2170 (AASHTO T201).
    - c. Flash point: ASTM D92 (AASHTO T48).
    - d. Ductility: AASTM D113 (AASHTO T44).
    - e. Solubility: ASTM D4 (AASHTO T44).
    - f. Specific gravity: ASTM D70 (AASHTO T43).
  3. Job-mix design mixtures for each material or grade:
    - a. Bulk specific gravity for fine aggregate: ASTM C128 (AASHTO T84).
    - b. Bulk specific gravity for fine aggregate: ASTM C128 (AASHTO T84).
  4. Uncompacted asphalt concrete mix: Maximum specific gravity ASTM D2041 (AASHTO T209).
  5. Compacted asphalt concrete mix:
    - a. Bulk density: ASTM D1188 (AASHTO T166).
    - b. Marshall stability and flow: ASTM D1559.
  6. Density and voids analysis:
    - a. Provide each series of asphalt concrete mixture test specimens, in accordance with A.I., MS-2 "Mix Design Methods for Asphalt Concrete".
    - b. Use Marshall method of mix design unless otherwise directed or acceptable to Engineer.
  7. Sampling and testing of asphalt concrete mixtures for quality control during paving operations:
    - a. Uncompacted asphalt concrete mix:
      - 1) Asphalt cement content: ASTM D2172 (AASHTO T164).
      - 2) Penetration of recovered asphalt cement: ASTM D5 (AASHTO T49).
      - 3) Ductility of recovered asphalt cement: ASTM D113 (AASHTO T51).
    - b. Compacted asphalt concrete mix:
      - 1) Bulk density: ASTM D1188 (AASHTO T166).
    - c. Asphalt plant inspection: ASTM D290.

#### 1.04 JOB CONDITIONS

- A. Weather Limitations:
1. Do not apply when underlying surface is muddy, frozen or wet.
  2. Spreading and finishing machine:
    - a. Do not place tack coat or asphaltic cement when temperature is below 45 Degrees F and falling. Place when above 40 Degrees F and rising.
    - b. Place when above 40 Degrees F and rising.
  3. By hand or motor grader:
    - a. Do not place asphaltic concrete courses when temp is below 60 Degrees F.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. Aggregate Base:

CIP 11122

Copper Cove

C-Tank BPS and T-Main Line

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Paving and Surfacing

1. Per Section 02200 – CalTrans Class II.
- B. Aggregate for Asphalt Concrete, General:
  1. Sound, angular crushed stone, crushed gravel, or crushed slag: ASTM D692.
    - a. Sand, stone, or slag screening: ASTM D1073.
  2. Provide aggregate in gradations for various courses to comply with CalTrans and local highway standards.
- C. Asphalt concrete: Type A Hot Mix Asphalt (HMA) concrete, consisting of a mixture of mineral aggregate and paving asphalt conforming to Section 92 of the Caltrans Standard Specifications, PG 64-16.
- D. Prime Coat:
  1. Cut-back liquid asphalt.
  2. SC-70.
- E. Tack Coat:
  1. Section 94 of the Caltrans Standard Specifications.
- F. Seal Coat:
  1. Section 37 of the Caltrans Standard Specifications.

## **2.02 MIXES**

- A. Design Mix:
  1. Determine design mix based upon aggregates furnished.
  2. Grade dependent on temperature.
  3. Acceptable to Engineer.

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. Traffic Control:
  1. In accordance with all applicable specification sections and laws.
  2. Minimize inconvenience to traffic, but keep vehicles off freshly treated or paved surfaces to avoid pickup and tracking of asphalt. Do not open new HMA pavement to traffic until its mid depth temperature is below 160-deg F.
- B. Driveways: Repave driveways from which pavement was removed. Leave driveways in as good or better condition than before start of construction.
- C. Overlay in accordance with Calaveras County Public Works Pavement Restoration Options.
  1. Little John Road from STA 2+35 to STA 27+00 has a PCI of 30 and is classified as street category C in accordance with Calaveras County Public Works Table 8.1. Pavement restoration shall occur over the extents of the trench.
  2. Little John Road from STA 27+00 to STA 94+50 has a PCI between 88 and 92 and is classified as street category A in accordance with Calaveras County Public Works Table 8.1. Pavement restoration shall include a 2" overlay of the entire width of the lane that the pipeline is being constructed.
  3. Charmstone Way from STA 101+42 to STA 120+12 has a PCI between 33 and 40 and is classified as street category C in accordance with Calaveras County Public Works Table 8.1. Pavement restoration shall occur over the extents of the trench.

### **3.02 LINE AND GRADE**

- A. Provide and maintain intermediate control of line and grade, independent of underlying base, to meet finish surface grades and minimum thickness. Construct shoulders to line, grade, and cross section shown.

### 3.03 PREPARATION

- A. Saw-cut all edges of pavement to be removed to be square with clean lines relative to trench and excavation limits; during saw cutting all water and slurry waste must be immediately vacuumed from the ground surface and not be allowed to flow off pavement or into ditches, curbs or drains.
- B. When paving thickness permits grinding, grind out asphalt T-section adjacent to each side of trench, grind out all pavement transitions between new and existing pavement, and grind out other areas as required by encroachment with Public Works and/or Caltrans. Where permit requires full lane or full road width to be overlaid, grind out entire lane and/or road to 2-inches or other required depth to receive overlay.
- C. Aggregate Base:
  - 1. Check subgrade for conformity with elevations and section immediately before placing aggregate base material.
  - 2. Scarify 8 inches minimum and compact subgrade to 95% standard Proctor (ASTM D-15573).
  - 3. Place aggregate base material in compacted layers not more than 6 inches thick, unless continuing tests indicate the required results are being obtained with thicker layers.
  - 4. In no case will more than 6 inches of compacted base be placed in one lift.
  - 5. Spread, shape, and compact all aggregate base material deposited on the subgrade during the same day.
  - 6. Compact aggregate base course material to not less than 95 percent of maximum density: ASTM D1557, Method D.
  - 7. Agency will test density of compacted aggregate base course: ASTM D2167.
  - 8. Agency will conduct 1 test for each 500 sq yards of in-place material, but in no case not less than 1 for each layer.
- D. Loose and Foreign Material:
  - 1. Remove loose and foreign material from compacted subbase surface immediately before application of paving.
- E. Prime Coat:
  - 1. Uniformly apply at rate of 0.25 gallons/sq yard over compacted and cleaned subbase surface.
  - 2. Apply enough material to penetrate and seal, but not flood the surface.
  - 3. Allow to cure and dry as long as required to attain penetration and evaporation of volatile, and in no case less than 24 hours unless otherwise acceptable to the Engineer.
  - 4. Blot excess asphalt with just enough sand to prevent pick-up under traffic.
  - 5. Remove loose sand before paving.
- F. Tack Coat:
  - 1. Dilute material with equal parts of water and apply to contact surfaces of previously constructed asphalt concrete or Portland cement concrete and surfaces.
  - 2. Apply at rate of 0.10 gallons/sq. yard of surface, to dry surface, and no threat of rain.
  - 3. Apply tack coat to contact surfaces of curbs, gutters, manholes, and other structures projecting into or abutting asphalt concrete pavement.
  - 4. Allow surfaces to dry until material is at condition of tackiness to receive pavement.
- G. Seal Coat:
  - 1. Apply a seal coat at a rate of 0.15 to 0.30 gal/cy per Section 37 of the CalTrans Standard Specifications.
- H. Prior to Paving:
  - 1. Sweep primed surface free of dirt, dust, or other foreign matter.
  - 2. Patch holes in primed surface with asphalt concrete pavement mix.

### 3.04 PREPARING THE MIXTURE

- A. Comply with ASTM D995 for material storage, control, and mixing, and for plant equipment and operation.
- B. Stockpiles:
  - 1. Keep each component of the various-sized combined aggregates in separate stockpiles.
  - 2. Maintain stockpiles so that separate aggregate sizes will not be intermixed and to prevent segregation.
- C. Heating:
  - 1. Heat the asphalt cement at the mixing plant to viscosity at which it can be uniformly distributed throughout mixture.
  - 2. Use lowest possible temp to suit temperature-viscosity characteristics of asphalt.
  - 3. Do not exceed 325 Degrees F per Section 39 of the Caltrans State Standards.
- D. Aggregate:
  - 1. Heat-dry aggregates.
  - 2. Deliver to mixer at recommended temperature to suit penetration grade and viscosity characteristics of asphalt cement, ambient temperature, and workability of mixture.
  - 3. Accurately weight or measure dry aggregates and weigh or meter asphalt cement to comply with job-mix formula requirements.
- E. Mix aggregate and asphalt cement to achieve 90-95 percent coated particles for base mixtures and 85-90 percent coated particles for surface mixture, per ASTM D2489.
- F. Transporting:
  - 1. From mixing site in trucks having tight, clean compartments.
  - 2. Coat hauling compartments with lime-water mixture to prevent sticking.
  - 3. Elevate and drain compartment of excess solution before loading mix.
  - 4. Provide covers over asphalt concrete mixture to protect from weather and to prevent loss of heat.
  - 5. During periods of cold weather or for long distance deliveries, provide insulation around entire truck bed surfaces.

### 3.05 EQUIPMENT

- A. Bituminous Pavers: Self-propelled, spreads without tearing, surfaces, and controls pavement edges to true lines without use of stationary forms.
- B. Rolling Equipment:
  - 1. Pneumatic tired roller.
  - 2. Two or 3 wheeled steel roller.
- C. Hand Tools: Provide rakes, lutes, shovels, tampers, smoothing irons, pavement cutters, portable heaters, and other miscellaneous small tools.

### 3.06 PLACING THE MIX

- A. Place asphalt concrete mixture on prepared surface, spread and strike-off using paving machine.
- B. Complete Placement Over Full Width of Section on Each Days Run.
- C. Minimum Temperature of 225 Degrees F.
- D. Inaccessible and Small Areas May Be By Hand.
- E. Conform to the grade, cross section, finish thickness, and density indicated. The thickness of each lift placed shall not exceed 3-inches unless approved by the Engineer.
- F. Paver Placing:
  - 1. Unless otherwise directed, begin placing along centerline of areas on crowned section, and at high side on one-way slope, and in direction of traffic flow.



2. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.
    - a. Complete base courses before placing surface courses.
  3. Place mixture in continuous operation as practicable.
- G. Hand Placing:
1. Spread, tamp, and finish mixture using hand tools in areas where machine spreading is not possible, as acceptable to Engineer.
  2. Place mixture at a rate that will ensure handling and compaction before mixture becomes cooler than acceptable working temperature.
- H. Joints:
1. Construct transverse joint at right angles to centerline when operations are suspended long enough for mixture to chill.
  2. Construct joints to have same texture, density and smoothness as adjacent sections of asphalt concrete course.
    - a. Clean contact surfaces free of sand, dirt, or other objectionable material and apply tack coat.
  3. Offset transverse joints in succeeding courses not less than 24 inches.
  4. Cut back edge of previously placed course to expose an even, vertical surface for full course thickness.
  5. Offset longitudinal joints in succeeding courses not less than 6 inches.
  6. When the edges of longitudinal joints are irregular, honeycombed, or inadequately compacted, cut back unsatisfactory sections to expose an even, vertical surface for full course thickness.
  7. Wearing course constructed in even number of strips; place 1 longitudinal joint on centerline of road.
  8. Wearing course constructed in odd number of strips; place the centerline of 1 strip on centerline of road.
- I. Curbs: Finish surface high adjacent to curb so when compacted surface is slightly higher than edge of curb and flashing.

### **3.07 COMPACTING THE MIX**

- A. Provide Rollers to Obtain the Required Pavement Density.
- B. Begin rolling operations when the mixture will bear weight of roller without excess displacement.
- C. Do not permit heavy equipment, including rollers to stand on finished surface before it has thoroughly cooled or set.
- D. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- E. Start rolling longitudinally at extreme lower side of sections and proceed toward center of pavement. Roll to slightly different lengths on alternate roller runs.
- F. Do Not Roll Centers of Sections First Under Any Circumstances.
- G. Breakdown Rolling:
  1. Accomplish breakdown or initial rolling immediately following rolling of transverse and longitudinal joints and outside edge.
  2. Operate rollers as close as possible to paver without causing pavement displacement.
  3. Check crown, grade, and smoothness after breakdown rolling.
  4. Repair displaced areas by loosening at once with lutes or rakes and filling, if required, with hot loose material before continuing rolling.
- H. Second Rolling:

1. Follow breakdown rolling as soon as possible, while mixture is hot and in condition for compaction.
  2. Continue second rolling until mixture has been thoroughly compacted.
- I. Finish Rolling:
1. Perform finish rolling while mixture is still warm enough for removal of roller marks.
  2. Continue second rolling until roller marks are eliminated and course has attained 92.0% measured maximum density determined in accordance with ASTM D2041. In place density shall not be less than 91.0% nor greater than 97.0% for contract compliance.
- J. Patching:
1. Remove and replace defective areas.
  2. Cut-out and fill with fresh, hot asphalt concrete.
  3. Compact by rolling to specified surface density and smoothness.
  4. Remove deficient areas for full depth of course.
  5. Cut sides perpendicular and parallel to direction of traffic with edges vertical.
  6. Apply tack coat to exposed surfaces before placing new asphalt concrete mixture.
- K. Tolerances:
1. General: Conduct measurements for conformity with crown and grade immediately after initial compression. Correct variations immediately by removal or addition of materials and by continuous rolling.
  2. Completed Surface or Wearing Layer Smoothness:
    - a. Uniform texture, smooth, and uniform to crown and grade.
    - b. Maximum Deviation: 1/8 inch from lower edge of a 3.6 meter (12 foot) straightedge, measured continuously parallel and at right angle to centerline.
    - c. If surface of completed pavement deviates by more than twice specified tolerances, remove and replace wearing surface.
  3. Transverse Slope Maximum Deviation: 1/4 inch.
- L. Pavement Lines and Markings:
1. General: Contractor shall restore all center lines, fog lines, limit lines, and other pavement markings that are damaged by trenching, excavation and other Contractor's operations and construction activities.
  2. Paint: Unless otherwise required by the County and/or Caltrans, paint shall be 100% acrylic traffic and zone marking paint of required colors, PPG Zonline, USSC Techline, or equal. Paint shall be applied according to manufacturer's instructions and within required ambient and substrate temperatures to a wet film thickness of 15± mils.

### **3.08 CLEANING AND PROTECTION**

- A. Cleaning: After completion of paving operations, clean surfaces of excess or spilled asphalt materials to the satisfaction of Engineer.
- B. Protection:
1. After final rolling, do not permit vehicular traffic on asphalt concrete pavement until it has cooled and hardened, and in no case sooner than 6 hours.
  2. Provide barricades and warning devices as required to protect pavement and the general public.
  3. Cover openings of structure in the area of paving until permanent coverings are placed.

## **PART 4 - QUALITY CONTROL**

### **4.01 TESTING**

- A. Contractor to schedule and arrange for all tests with Agency employed independent testing laboratory to determine compliance of in-place materials and compaction with Specifications where required by the Engineer. Agency will pay for one set of independent testing. Re-tests will be performed by Agency laboratory, but paid for by the Contractor.

- B. Gravel Surfacing:
  - 1. Two initial gradation tests for each type of material plus one additional test for each 500 cubic yards of each material.
  - 2. Two standard compaction tests, ASTM D1557, Method D, for each type of surfacing material proposed.
  - 3. One in-place compaction test for each 1,000 sq feet of drive or road.
- C. Asphalt Surfacing:
  - a. One in-place compaction test for each 1,000 sq feet of drive or road.

**END OF SECTION 32 12 16**

**SECTION 32 31 13  
CHAIN LINK FENCES AND GATES**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Posts, rails, and frames.
- B. Wire fabric.
- C. Barbed wire.
- D. Concrete.
- E. Manual gates with related hardware.
- F. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete anchorage for posts.

**1.03 PRICE AND PAYMENT PROCEDURES**

- A. Unit Prices: See Section 01 20 00 - Price and Payment Procedures, for additional unit price requirements.
  - 1. Provide the work under the unit price method.
  - 2. Fencing: Measurement and payment by the linear foot, to the fence height specified, based on the specified post spacing. Includes posts, rails, tension wire, fabric, accessories, attachments.
  - 3. Post Footings: Measurement and payment by each unit of footing, to the depth specified. Includes excavation, concrete placed, finishing.
  - 4. Gates: Measurement and payment by specified type. Includes frame posts, fabric, accessories, and hardware.

**1.04 REFERENCE STANDARDS**

- A. ASTM A121 - Standard Specification for Metallic-Coated Carbon Steel Barbed Wire; 2022.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- D. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric; 2011a (Reapproved 2022).
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2022.
- F. ASTM F567 - Standard Practice for Installation of Chain-Link Fence; 2023.
- G. CLFMI CLF-FIG0111 - Field Inspection Guide; 2014.
- H. CLFMI CLF-PM0610 - Product Manual; 2017.
- I. CLFMI CLF-SFR0111 - Security Fencing Recommendations; 2014.
- J. CLFMI WLG 2445 - Wind Load Guide for the Selection of Line Post and Line Post Spacing; 2018.
- K. FS RR-F-191/1D - Fencing, Wire and Post Metal (Chain-Link Fence Fabric); 1990.
- L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.05 SUBMITTALS**

- A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

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Chain Link Fences and Gates

- B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.
- C. Design Calculations: For high wind load areas, provide calculations for fence fabric and accessory selection as well as line post spacing and foundation details. See CLFMI WLG 2445 for line post and spacing guidance.
- D. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components. See CLFMI CLF-SFR0111 for planning and design recommendations.
- E. Manufacturer's Qualification Statement.
- F. Fence Installer Qualification Statement.
- G. Field Inspection Records: Provide installation inspection records that include post settings, framework, fabric, barbed wire, fittings and accessories, gates, and workmanship.

### **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Fence Installer: Company with demonstrated successful experience installing similar projects and products, with not less than five years of documented experience.

### **1.07 WARRANTY**

- A. See Section 01 70 00 - Execution and Closeout Requirements, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.01 COMPONENTS**

- A. Line Posts: Minimum 2 inch inner diameter.
- B. Angled Outriggers: Minimum 2 inch inner diameter formed with a 45 degree angle in the direction of the climber.
  - 1. To accommodate 3 strands of barbed wire.
- C. Corner and Terminal Posts: Minimum 2.5 inch inner diameter.
- D. Angled Outriggers and Terminal Posts: Minimum 2.5 inch inner diameter formed with a 45 degree angle in the direction of the climber.
  - 1. To accommodate 3 strands of barbed wire.
- E. Gate Posts: Minimum 6 inch inner diameter for gate widths of 6 feet to 12 feet.
- F. Top and Brace Rail: Minimum 1.25 inch diameter, plain end, sleeve coupled.
- G. Bottom Rail: Minimum 1.25 inch diameter, plain end, sleeve coupled.
- H. Fabric: 2 inch diamond mesh interwoven wire, 9 gauge, 0.1483 inch thick, top selvage knuckle end closed, bottom selvage twisted tight.
- I. Tension Wire: 6 gauge, 0.1920 inch thick steel, single strand.
- J. Tie Wire: Aluminum alloy steel wire.

### **2.02 MATERIALS**

- A. Posts, Rails, and Frames:
  - 1. Formed from hot-dipped galvanized steel sheet, ASTM A653/A653M, HSLAS, Grade 50, with G90 (Z275) zinc coating.
  - 2. Line Posts: Type I round in accordance with FS RR-F-191/1D.
  - 3. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round in accordance with FS RR-F-191/1D.

- 4. Comply with CLFMI CLF-PM0610.
- B. Wire Fabric:
  - 1. ASTM A392 zinc coated steel chain link fabric.
  - 2. Comply with CLFMI CLF-PM0610.
- C. Barbed Wire:
  - 1. Zinc-coated steel, complying with ASTM A121 Type Z Coating Class 2; 2 strands of 0.099 inch diameter wire, with 4-pointed barbs at 4 inches on center.
- D. Concrete:
  - 1. Type specified in Section 03 30 00.

### **2.03 MANUAL GATES AND RELATED HARDWARE**

- A. Hardware for Double Swinging Gates: 180 degree hinges, 2 for gates up to 84 inches high, 3 for taller gates; drop bolt on inactive leaf engaging socket stop set in concrete, active leaf latched to inactive leaf preventing raising of drop bolt, padlock hasp; keepers to hold gate in fully open position.
- B. Hinges: Finished to match fence components.
  - 1. Brackets: Round.
  - 2. Mounting: Center.
  - 3. Closing: Manual.
- C. Latches: Finished to match fence components.
  - 1. Brackets: Round.
  - 2. Locking: Mechanical.

### **2.04 ACCESSORIES**

- A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.
- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.
- C. Victory Arms: Cast steel galvanized, to accommodate 3 strands of barbed wire, single arm, vertical.
- D. Footing Isolation Adapter: Polyvinyl chloride fitting to set fence post 3 inches above subgrade within footing excavation.

### **2.05 FINISHES**

- A. Components (Other than Fabric): Galvanized in accordance with ASTM A123/A123M, at 1.7 ounces per square foot.
- B. Hardware: Hot-dip galvanized to weight required by ASTM A153/A153M.
- C. Color(s): To be selected by Engineer from manufacturer's standard range.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verification of Conditions: Verify that areas are clear of obstructions or debris.
- B. Preinstallation Testing: Test areas for ledge.

### **3.02 PREPARATION**

- A. Removal: Obstructions or debris.

### **3.03 INSTALLATION**

- A. Install framework, fabric, accessories and gates in accordance with ASTM F567.
- B. Place fabric on outside of posts and rails.
- C. Set intermediate posts plumb . Slope top of concrete for water runoff.
- D. Line Post Footing Depth Below Finish Grade: ASTM F567.

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- E. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567.
- F. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.
- G. Provide top rail through line post tops and splice with 6 inch long rail sleeves.
- H. Install a 7 gauge, 0.1770 inch coil spring wire in place of top rail.
- I. Install center brace rail on corner gate leaves.
- J. Do not stretch fabric until concrete foundation has cured 28 days.
- K. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
- L. Position bottom of fabric 2 inches above finished grade.
- M. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
- N. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- O. Install bottom tension wire stretched taut between terminal posts.
- P. Install support arms sloped inward and attach barbed wire; tension and secure.
- Q. Do not attach the hinged side of gate to building wall; provide gate posts.
- R. Install hardware and gate with fabric and barbed wire overhang to match fence.
- S. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.
- T. Peen all bolts upon installation.
- U. Perform three random field inspections confirming proper installation.
- V. Install operator in accordance with manufacturer's instructions and in accordance with NFPA 70.

### **3.04 TOLERANCES**

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Position: 1 inch.
- C. Do not infringe on adjacent property lines.

### **3.05 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.
- C. Post Settings: Randomly inspect three locations against design for:
  - 1. Hole diameter.
  - 2. Hole depth.
  - 3. Hole spacing.
- D. Fence Height: Randomly measure fence height at three locations or at areas that appear out of compliance with design.
- E. Barbed Wire: Randomly inspect three locations against design for:
  - 1. Spacing of barb wire.
  - 2. Diameter of loops.
  - 3. Quantity of loops per length of fence.
- F. Gates: Inspect for level, plumb, and alignment.
- G. Workmanship: Verify neat installation free of defects. See CLFMI CLF-FIG0111 for field inspection guidance.

### **3.06 CLEANING**

- A. Leave immediate work area neat at end of each work day.
- B. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.
- C. Clean fence with mild household detergent and clean water rinse well.
- D. Remove mortar from exposed posts and other fencing material using a 10 percent solution of muriatic acid followed immediately by several rinses with clean water.
- E. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.
- F. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

### **3.07 CLOSEOUT ACTIVITIES**

- A. See Section 01 70 00 - Execution and Closeout Requirements, for closeout submittals.
- B. Demonstrate proper operation of equipment to District's designated representative.
- C. Demonstration: Demonstrate operation of system to District's personnel.
  - 1. Use operation and maintenance data as reference during demonstration.
  - 2. Conduct walking tour of project.
  - 3. Briefly describe function, operation, and maintenance of each component.

**END OF SECTION 32 31 13**



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**SECTION 33 01 10.58**  
**DISINFECTION OF WATER UTILITY PIPING SYSTEMS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Disinfection of site domestic water lines and site fire water lines specified in Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.

**1.02 RELATED REQUIREMENTS**

- A. Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.

**1.03 REFERENCE STANDARDS**

- A. AWWA B300 - Hypochlorites; 2024.
- B. AWWA B301 - Liquid Chlorine; 2024.
- C. AWWA B302 - Ammonium Sulfate; 2023.
- D. AWWA B303 - Sodium Chlorite; 2024.
- E. AWWA C651 - Disinfecting Water Mains; 2014, with Addendum (2020).
- F. AWWA C652 - Disinfection of Water-Storage Facilities; 2019.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Test Reports: Indicate results comparative to specified requirements.
- C. Certificate: From authority having jurisdiction indicating approval of water system.
- D. Certificate: Certify that cleanliness of water distribution system meets or exceeds specified requirements.
- E. Disinfection report:
  - 1. Type and form of disinfectant used.
  - 2. Date and time of disinfectant injection start and time of completion.
  - 3. Test locations.
  - 4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
  - 5. Date and time of flushing start and completion.
  - 6. Disinfectant residual after flushing in ppm for each outlet tested.
- F. Bacteriological report:
  - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
  - 2. Time and date of water sample collection.
  - 3. Name of person collecting samples.
  - 4. Test locations.
  - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
  - 6. Coliform bacteria test results for each outlet tested.
  - 7. Certification that water complies, or fails to comply, with bacterial standards of AWWA C651.
- G. The Contractor shall notify the District a minimum of seven (7) business days in advance of its proposed testing schedule for review and concurrence. If requested, the Contractor's proposed plans for water conveyance, disinfection, control, and disposal, shall also be submitted in writing.

## **PART 2 - PRODUCTS**

### **2.01 DISINFECTION CHEMICALS**

- A. Chemicals: AWWA B300 Hypochlorite, AWWA B301 Liquid Chlorine, AWWA B302 Ammonium Sulfate, and AWWA B303 Sodium Chlorite.
- B. Hydrostatic Testing:
  - 1. The Contractor shall be responsible for supplying and operating all testing equipment. The District may furnish a test gauge at its option.
  - 2. Temporary piping connecting to an existing main for water supply shall be protected with an adequately sized certified reduced pressure backflow device and pressure reducing valve.
  - 3. All water shall be metered by Contractor using a fire hydrant meter (rented from District) or other acceptable means.
- C. Chlorine:
  - 1. Chlorine for disinfection shall be in the form of sodium hypochlorite solution complying with ANSI/AWWA B300. Both disinfectants are to comply with NSF/ANSI60.

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. The Contractor shall correct all defects in workmanship or materials, which become evident by inspection or testing at any time during the work.
- B. As outlined in AWWA C651-14, Sec. 4.8, all preventative and corrective measures shall be observed/used during construction including special provisions for wet trench construction or if water mains become flooded by storm water or groundwater.
- C. In the presence of the District, all pressure pipelines shall be tested and all potable water components shall be disinfected.
- D. Disinfection operations shall be scheduled by the Contractor as late as possible during the contract time period so as to assure the maximum degree of sterility of the facilities before the District accepts the Work. The District shall perform bacteriological testing.
- E. Release of water from pipelines, after testing and disinfection have been completed, shall be in accordance with a written disposal plan reviewed by the District.

### **3.02 EXAMINATION**

- A. Verify that piping system has been cleaned, inspected, and pressure tested.
- B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

### **3.03 HYDROSTATIC TESTING**

- A. Only potable water shall be used for testing. The purpose of the hydrostatic test is both to test the ability of the pipeline to withstand pressure and test for allowable leakage. These tests shall run simultaneously. All valves and appurtenances shall be operated during the test period. Thrust blocks shall have been in place for at least thirty-six (36) if high-early-strength cement was used or at least seven (7) days if standard cement was utilized.
- B. Preparation
  - 1. Prior to testing, the water main shall be slowly (velocity  $\leq 1.0$ -ft/sec) and carefully filled with potable water at the low end of the section being tested. All air shall be expelled slowly from the pipe and appurtenances in a manner so as not to create excessive surge pressures. The release of air can be accomplished by opening services, fire hydrants, blow-offs, and air release valves. Where air valves or other suitable outlets are not available for releasing air before applying the test, approved taps and fittings shall be installed and later securely plugged.

2. All appurtenances shall be left on during the testing procedure. The valve controlling the admission of water into the section of pipe should be opened wide before shutting the hydrants or blow-offs. After the system has been filled with water and all air expelled, all valves controlling the section to be tested shall be closed; and the line shall remain in this condition under a slight pressure for a period of not less than twenty-four (24) hours to allow the cement mortar to absorb water. For initial flushing, PRV's shall be removed, the pipeline flushed, then PRV's reinstalled once the pipeline is flowing clear and clean as directed by the Owner's inspector.
  3. The Contractor may, at its own risk, test against existing valves. Suspected leaking of these valves will not be accepted as a reason for having not passed the leakage test requirements. These valves shall either be repaired or replaced prior to the start of another testing sequence. All new valves shall be tested against a reduced pressure side. Butterfly valves shall be tested in both directions.
- C. Test section length
1. The length of pipe being tested at any one time shall not exceed 2,000 feet unless otherwise approved by the District.
- D. Test pressure
1. The test pressure shall be 350 psi measured at the lowest point of the section of the pressure zone being tested.
  2. Test pressure shall be maintained throughout the period of the test. Measurement of the amount of additional water pumped in during test provides a measurement of the amount of leakage, if any.
- E. Test Duration
1. The test duration shall be two (2) hours. Pressure in the water main shall be maintained within 2 psi of the calculated test pressure for the full two-hour duration. The individual testing of the valves may be of a shorter duration as approved by the District.
- F. Repairs
1. During the pressure and leakage test, all accessible appurtenances shall be inspected for visual signs of leakage. All visual leaks shall be corrected immediately, regardless of the amount of leakage and the test shall be run again for its full duration. All leaks detected shall be repaired to a watertight condition. All repairs made shall be retested in accordance with the specifications. All repairs shall be made, and a successful test accomplished prior to taking bacteriological samples.

### **3.04 DISINFECTION**

- A. Follow procedures of AWWA C651 and as directed by Engineer. Follow any direction given by the State Division of Drinking Water.
- B. Chlorination and dechlorination shall be performed by competent individuals knowledgeable and experienced in the operation and safety of disinfection procedures with the applicable Federal, State, and local laws and regulations. Transporting, storage, and handling of these materials shall be performed in accordance with Federal and State Hazardous Materials Regulations.
- C. The basic disinfection procedure consists of:
  1. Preventing dirt, mud, groundwater and contaminating materials from entering the water main during storage, construction, or repair.
  2. Chlorinating any residual contamination that may remain and flushing the chlorinated water from the main.
  3. Protecting the existing distribution system from backflow due to hydrostatic pressure test and disinfecting procedures using a certified reduced pressure backflow device.
  4. Disinfect the new main by chlorinating with a 25-mg/L hypochlorite solution for 24-hour period, then flushing with potable water.
  5. Determining the bacteriological quality by laboratory test after disinfecting.

6. Final connection of the approved new water main to the active distribution system.

### **3.05 SODIUM HYPOCHLORITE SOLUTION**

- A. Sodium hypochlorite can be used for swabbing as well as pipeline disinfecting. The solution shall be injected using a chemical feed pump designed for chlorine solutions. A backflow prevention device shall be installed at the point of connection to the potable water source. The District shall approve the point(s) of injection.

### **3.06 FILLING AND CONTACT**

- A. The main shall be filled at a rate no greater than one (1) foot/second with an initial chlorine concentration high enough to maintain a constant minimum residual concentration of 25 ppm throughout the system for a duration of at least twenty-four (24) hours. During this time, valves, hydrants, blowoffs, air valves, and other appurtenances shall be operated and flushed to move the chlorinated water throughout the system to ensure disinfection. After twenty four (24)-hr holding period there shall be a free chlorine residual of not less than 10-mg/L

### **3.07 FINAL FLUSHING**

- A. After the applicable retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed and dechlorinated from the main until chlorine measurements match the existing system chlorine levels, as approved by the District.
- B. Contract shall submit the method of dechlorination; chemicals for dechlorination are listed in Appendix C of AWWA C651.

### **3.08 BACTERIOLOGICAL TESTS**

- A. After completion of testing and sterilization, and before the new water main is connected to the distribution system, the District will take water samples for bacteriological examination. Should any of the samples fail to meet minimum State of California, Department of Public Health requirements, the Contractor will continue to chlorinate and flush the system, as directed, until a satisfactory sample is obtained.
- B. After final flushing and after the water has remained in the new main for at least sixteen (16) hours, two (2) consecutive sets of acceptable samples, taken at least twenty-four (24) hours apart, shall be collected from the new main. At least one (1) set of samples shall be collected from every 1,200 feet of new water main, plus one (1) set from the end of the line, and at least one (1) set from each branch. Bacteriological testing shall be per District Standards and AWWA C651, Section 5.1, whichever is more stringent, and shall be completed by the Contractor with District approval. A standard heterotrophic plate count may be required, at the option of District.
- C. If trench water has entered the new main during construction or if, in the opinion of District, excessive quantities of dirt or debris have entered the new main, bacteriological samples shall be taken at intervals of approximately two hundred (200) feet and shall be identified by location. Samples shall be taken of water that has stood in the new main for at least sixteen (16) hours after final flushing has been completed.

### **3.09 RE-DISINFECTION**

- A. If the initial disinfection fails to produce satisfactory bacteriological samples, the main shall be flushed again and shall be resampled. If check samples show the presence of coliform organisms, then the main shall be re-chlorinated until satisfactory results are obtained.
- B. NOTE: High velocities in the existing system, resulting from flushing the new main, may disturb sediment that has accumulated in the existing mains. When check samples are taken, it is well to also sample water entering the new main.

### **3.10 FIELD QUALITY CONTROL**

- A. Perform field inspection and testing in accordance with Section 01 40 00.
- B. Test samples in accordance with AWWA C651 and AWWA C652.

- C. District will submit test sample results for VOC to Division of Drinking Water for authorization to place transmission main into service.

**END OF SECTION 33 01 10.58**

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**SECTION 33 01 15**  
**PIPE AND PIPE FITTINGS: BASIC REQUIREMENTS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Piping systems.
  - 2. Disinfection requirements.

**1.02 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Iron and Steel Institute (AISI).
  - 2. American Society of Mechanical Engineers (ASME):
    - a. ASME B16.3, Malleable Iron Threaded Fittings.
    - b. ASME B16.5, Pipe Flanges and Flanged Fittings.
    - c. ASME B16.9, Factory-Made Wrought Steel Butt-Welding Fittings.
  - 3. ASTM International (ASTM):
    - a. ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
    - b. ASTM A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
    - c. ASTM A536, Standard Specification for Ductile Iron Castings.
  - 4. American Water Works Association (AWWA):
    - a. AWWA C200, Steel Water Pipe 6 Inch and Larger.
    - b. AWWA C207, Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 Inch through 144 Inch.
    - c. AWWA C208, Dimensions for Fabricated Steel Water Pipe Fittings.
  - 5. American Water Works Association/American National Standards Institute (AWWA/ANSI):
    - a. AWWA C110/A21.10, Ductile-Iron and Gray-Iron Fittings, 3 Inch through 48 Inch for Water and Other Liquids.
    - b. AWWA C111/A21.11, Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
    - c. AWWA C115/A21.15, Flanged Ductile-Iron Pipe with Threaded Flanges.
    - d. AWWA C151/A21.51, Ductile-Iron Pipe, Centrifugally Cast In Metal Molds or Sand-Lined Molds for Water or Other Liquids.
    - e. AWWA C153/A21.53, Ductile-Iron Compact Fittings, 3 Inch Through 16 Inch, for Water and Other Liquids.
- B. Coordinate flange dimensions and drillings between piping, valves, and equipment.

**1.03 SYSTEM DESCRIPTION**

- A. Piping Systems Organization and Definition:
  - 1. Piping services are grouped into designated systems according to the fluid conveyed, system pressure, piping size and system materials of construction.
  - 2. See Piping Specification Schedules in Part 3 PART 3.

**1.04 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Section 01 33 00 - Submittal Procedures for requirements for the mechanics and administration of the submittal process.
  - 2. Fabrication and/or layout drawings:
    - a. Exterior yard piping drawings (minimum scale 1 inch equals 10 feet) with information including:
      - 1) Dimensions of piping lengths.



- 2) Invert or centerline elevations of piping crossings.
- 3) Acknowledgement of bury depth requirements.
- 4) Details of fittings, tapping locations, thrust blocks, restrained joint segments, harnessed joint segments, hydrants, and related appurtenances.
- 5) Acknowledge designated valve or gate tag numbers, manhole numbers, instrument tag numbers, pipe and line numbers.
- 6) Line slopes and vents.
- b. Schedule of interconnections to existing piping and method of connection.
3. Product technical data including:
  - a. Acknowledgement that products submitted meet requirements of standards referenced.
  - b. Copies of manufacturer's written directions regarding material handling, delivery, storage and installation.
  - c. Separate schedule sheet for each piping system scheduled in this Section showing compliance of all system components.
    - 1) Attach technical product data on gaskets, pipe, fittings, and other components.

### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Protect pipe coating during handling using methods recommended by manufacturer.
  1. Use of bare cables, chains, hooks, metal bars or narrow skids in contact with coated pipe is not permitted.
  2. Pipe consisting of lining systems shall utilize wooden bulkheads or plastic caps at both ends of each pipe segment in order to protect the interior lining system.
- B. Prevent damage to pipe during transit.
  1. Repair abrasions, scars, and blemishes.
  2. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.

## **PART 2 - PRODUCTS**

### **2.01 PIPING SPECIFICATION SCHEDULES**

- A. Piping system materials, fittings and appurtenances are subject to requirements of specific piping specification schedules located at the end of Part 3 of this Section and as specified in the Division 33 piping sections.

### **2.02 COMPONENTS AND ACCESSORIES**

- A. Reducers:
  1. Furnish appropriate size reducers and reducing fittings to mate pipe to equipment connections.
  2. Connection size requirements may change from those shown on Contract Drawings depending on equipment furnished.
- B. Protective Coating and Lining:
  1. Include pipe, fittings, and appurtenances where coatings, linings, paint, tests and other items are specified.
  2. Field paint pipe in accordance with Section 09 96 00 - High-Performance Coatings.
- C. Valves:
  1. See Section 33 14 19 - Valves and Hydrants.

## **PART 3 - EXECUTION**

### **3.01 EXTERIOR BURIED PIPING INSTALLATION**

- A. Unless otherwise shown on the Contract Drawings, provide a minimum earth cover over exterior buried piping systems and appurtenances as follows:
  1. 36 inches in unpaved areas.
  2. 36 inches in paved areas.

- B. Laying Pipe In Trench:
  1. Excavate and backfill trench in accordance with Section 31 20 00 - Earthwork.
  2. Clean each pipe length thoroughly and inspect for compliance to Specifications.
  3. Grade trench bottom and excavate for pipe bell, place bedding, and lay pipe on trench bottom.
  4. Install gasket or joint material according to manufacturer's directions after joints have been thoroughly cleaned and examined.
  5. Except for first 2 joints, before making final connections of joints, install 2 full sections of pipe with earth tamped along side of pipe or final with bedding material placed.
  6. Lay pipe in only suitable weather with good trench conditions.
    - a. Never lay pipe in water except where approved by Engineer.
  7. Seal open end of line with watertight plug if pipe laying stopped.
  8. Remove water in trench before removal of plug.
- C. Lining Up Push-On Joint Piping:
  1. Lay piping on route lines shown on Contract Drawings.
  2. Provide restrained joints where shown on Contract Drawings.
  3. Deflect from straight alignments or grades by vertical or horizontal curves or offsets.
  4. Observe maximum deflection values stated in manufacturer's written literature.
  5. Provide special bends when specified or where required alignment exceeds allowable deflections stipulated.
  6. Install shorter lengths of pipe in such length and number that angular deflection of any joint, as represented by specified maximum deflection, is not exceeded.

### **3.02 EXPOSED PIPING INSTALLATION**

- A. Install piping in vertical and horizontal alignment as shown on Contract Drawings.
- B. Install vertical piping runs plumb and horizontal piping runs parallel with structure walls.
- C. Pipe Support:
  1. Use methods of piping support as shown on Contract Drawings.
- D. Use reducing fittings throughout piping systems.
  1. Bushings will not be allowed unless specifically approved.
- E. Install expansion devices as necessary to allow expansion/contraction movement.
- F. Provide full face gaskets on all systems.
- G. Anchorage and Blocking:
  1. Block, anchor, or harness exposed piping subjected to forces in which joints are installed to prevent separation of joints and transmission of stress into equipment or structural components not designed to resist those stresses.

### **3.03 CONNECTIONS WITH EXISTING PIPING**

- A. Coordinate any necessary outages for connections with District per Section 01 14 00 - Work Restrictions.
- B. Where connection between new work and existing work is made, use suitable and proper fittings to suit conditions encountered. See Contract Drawings for connection details.
- C. Perform connections with existing piping at time and under conditions which will least interfere with service to customers affected by such operation.
- D. Undertake connections in fashion which will disturb system as little as possible.
- E. Provide suitable equipment and facilities to dewater, drain, and dispose of liquid removed without damage to adjacent property.
- F. Where connections to existing systems necessitate employment of past installation methods not currently part of trade practice, utilize necessary special piping components.

- G. Once tie-in to each existing system is initiated, continue work continuously until tie-in is made and tested.

### **3.04 FIELD QUALITY CONTROL**

- A. Pipe Testing - General:
  - 1. Test piping systems as follows:
    - a. Test exposed, non-insulated piping systems upon completion of system.
    - b. Test exposed, insulated piping systems upon completion of system but prior to application of insulation.
    - c. Test buried piping prior to backfilling.
  - 2. Utilize pressures, media and pressure test durations as specified on Piping Specification Schedules.
  - 3. Perform pressure test using calibrated pressure gages and calibrated volumetric measuring equipment to determine leakage rates.
    - a. Select each gage so that the specified test pressure falls within the upper half of the gage's range.
    - b. Notify the Engineer 24 hours prior to each test.
    - c. Pressure test shall be witnessed by District Inspector.
  - 4. Completely assemble and test new piping systems prior to connection to existing pipe systems.
  - 5. Acknowledge satisfactory performance of tests and inspections in writing to Engineer prior to final acceptance.
  - 6. Bear the cost of all testing and inspecting, locating and remedying of leaks and any necessary retesting and re-examination.
- B. Pressure Testing:
  - 1. Hydrostatic pressure testing methodology:
    - a. General:
      - 1) Test pressure measured at lowest elevation in tested pipe.
      - 2) Provide additional temporary supports for piping systems designed for vapor or gas to support the weight of the test water.
      - 3) Provide temporary restraints for expansion joints for additional pressure load under test.
      - 4) Isolate equipment in piping system with rated pressure lower than pipe test pressure.
      - 5) Do not paint or insulate exposed piping until successful performance of pressure test.

### **3.05 CLEANING AND DISINFECTION**

- A. See Section 33 01 10.58 - Disinfection of Water Utility Piping Systems.
- B. Cleaning:
  - 1. Clean interior of piping systems thoroughly before installing.
  - 2. Maintain pipe in clean condition during installation.
  - 3. Before jointing piping, thoroughly clean and wipe joint contact surfaces and then properly dress and make joint.
  - 4. Immediately prior to pressure testing, clean and remove grease, metal cuttings, dirt, or other foreign materials which may have entered the system.
  - 5. At completion of work and prior to Final Acceptance, thoroughly clean work installed under these Specifications.
    - a. Clean equipment, fixtures, pipe, valves, and fittings of grease, metal cuttings, and sludge which may have accumulated by operation of system, from testing, or from other causes.

- b. Repair any stoppage or discoloration or other damage to parts of building, its finish, or furnishings, due to failure to properly clean piping system, without cost to Owner.
- C. Disinfection of Potable Water Systems:
  1. After favorable performance of pressure test and prior to Final Acceptance, thoroughly flush entire potable water piping system including supply, source and any appurtenant devices and perform disinfection as prescribed.
  2. Perform work, including preventative measures during construction, in full compliance with AWWA C651.
  3. Perform disinfection using sodium hypochlorite complying with AWWA B300.
  4. Flush each segment of system to provide flushing velocity of not less than 2.5 FT per second.
  5. Drain flushing water to sanitary sewer or approved receiving ponds at the WTP. Do not drain flushing water to receiving stream. Water shall be dechlorinated prior to draining.
  6. Use continuous feed method of application. Tag system during disinfection procedure to prevent use.
  7. After required contact period, flush system to remove traces of heavily chlorinated water.
  8. After final flushing and before placing water in service, obtain an independent laboratory approved by the Owner to collect samples and test for bacteriological quality. Repeat entire disinfection procedures until satisfactory results are obtained.
  9. Secure and deliver to District, satisfactory bacteriological reports on samples taken from system. Ensure sampling and testing procedures are in full compliance to AWWA C652, local water purveyor and applicable requirements of Department of Water Resources, Division of Drinking Water.

**3.06 LOCATION OF BURIED OBSTACLES**

- A. Furnish exact location and description of buried utilities encountered and thrust block placement.
- B. Reference items to definitive reference point locations such as found property corners, entrances to buildings, existing structure lines, fire hydrants and related fixed structures.
- C. Include such information as location, elevation, coverage, supports and additional pertinent information.
- D. Incorporate information on "As-Recorded" Drawings.

**3.07 SCHEDULES**

System	Service	Restrained Joint	Spec Section
1	Transmission Pipeline - High Pressure	Y, where required on drawings	33 01 22

- A. System 1
  1. General:
    - a. Piping and Symbol service:
      - 1) TP - Transmission Pipeline - High Pressure
    - b. Test requirements:
      - 1) Test medium: Water
      - 2) Pressure: 350 psig
      - 3) Duration: 2 hours.
    - c. Gaskets:
      - 1) Flanged, push-on, mechanical joints (ductile iron): Rubber, AWWA C111.
  2. System 1 Components:
    - a. Pipe size: 20 IN.
      - 1) Buried Service:
        - (a) Material: Ductile iron, Class 350

- (b) Reference: ANSI/AWWA C151.
- (c) Lining: Cement mortar.
- (d) Coating: Zinc.
- (e) Fittings: ANSI/AWWA C110 or ANSI C153.
  - (1) U.S. Pipe
  - (2) Tyler Union
  - (3) Sigma Corp
  - (4) Star Pipe Products
  - (5) Or equal
- (f) Joints:
  - (1) See Section 33 01 22 Ductile Iron Pipe.
  - (2) Valves connections, Flanged

**END OF SECTION 33 01 15**

**SECTION 33 01 21**  
**STEEL PIPE**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Steel pipe, fittings, and appurtenances.
- B. No field welding will be allowed.
- C. Coatings on steel pipe shall be factory-applied

**1.02 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American National Standards Institute (ANSI):
    - a. ASME B1.1, Unified Inch Screw Threads (UN and UNR Thread Form).
    - b. B2.1, Gages and Gaging for Unified Inch Screw Threads.
    - c. ASME B16.3, Malleable Iron Threaded Fittings.
    - d. ASME B16.5, Pipe Flanges and Flanged Fittings.
    - e. ASME B16.9, Factory-Made Wrought Steel Butt-Welding Fittings.
    - f. ASME B16.11, Forged Steel Fittings, Socket Welding and Threaded.
    - g. ASME B31.1, Power Piping.
    - h. ASME B31.3, Chemical Plant and Petroleum Refinery Piping.
    - i. ASME B31.9 B31.9, Building Services Piping.
  - 2. American Society for Testing and Materials (ASTM):
    - a. ASTM A36/A36M, Standard Specification for Carbon Structural Steel.
    - b. ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
    - c. ASTM A106/A106M, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
    - d. ASTM A181/A181M, Standard Specification for Forgings, Carbon Steel, for General-Purpose Piping.
    - e. ASTM A234/A234M, Standard Specification for Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
    - f. AASTM A283/A283M, Low and Intermediate Tensile Strength Carbon Steel Plates.
    - g. ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
    - h. A570, Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
    - i. ASTM A572/A572M, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
    - j. B6, Standard Specification for Zinc.
    - k. D1330, Rubber Sheet Gaskets.
  - 3. American Water Works Association (AWWA):
    - a. AWWA C200 , Steel Water Pipe 6 IN and Larger.
    - b. AWWA C203, Coat Tar Protective Coatings and Linings for Steel water Pipeline - Enamel and Tape - Hot Applied.
    - c. AWWA C205, Standard for Cement-Mortar Lining and Coating for Steel Water Pipe 4 IN and Larger Shop Applied.
    - d. AWWA C206, Field Welding of Steel Water Pipe.
    - e. AWWA C207, Steel Pipe Flanges for Waterworks Service, Sizes 4 IN through 144 IN.
    - f. AWWA C208, Dimensions for Fabricated Steel Water Pipe Fittings.

- g. AWWA C209, Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
- h. AWWA C210, Standard for Liquid Epoxy Coating Systems for Interior and Exterior of Steel Water Pipelines.
- i. AWWA C213, Fusion-Bonded Epoxy for Interior and Exterior Steel Water Pipelines.
- j. AWWA C606, Grooved and Shouldered Joints.
- k. AWWA M11, Steel Pipe - A Guide for Design and Installation.
- 4. Military Specifications:
  - a. QQ-P-416F, Plating, Cadmium Electro Deposited.
- B. Qualifications:
  - 1. Application of lining and coating materials including preparation of surfaces, priming, and lining and coating of pipe, fittings, and specials, in shop, repairs of any damage to lining or coating occurring during shipment or any other time, and field lining and coating of ends where linings or coatings have been held back for welded field joints, shall be done by established and recognized pipe company acceptable to Engineer.
  - 2. Use only certified welders meeting procedures and performance outlined in Section 9 of the ASME, Section 3.3.3 of AWWA C200 and other codes and requirements per local building and utility requirements.

### 1.03 SUBMITTALS

- A. Shop Drawings:
  - 1. See Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.
  - 2. Factory test reports.
  - 3. If mechanical grooved type coupling system is used, submit piping, fittings, and appurtenant items which will be utilized.
  - 4. Coating manufacturer's qualifications.
  - 5. Welders certificates.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Flanged adaptors:
    - a. Rockwell Style 913 steel or Style 912 cast.
    - b. Dresser Style 128 steel or Style 127 cast.
    - c. Or approved equal.
  - 2. Insulating couplings:
    - a. Rockwell (Style 416).
    - b. Dresser (Style 39).
    - c. Or approved equal.
  - 3. Reducing couplings:
    - a. Rockwell (Style 415).
    - b. Dresser (Style 62).
    - c. Or approved equal.
  - 4. Transition coupling:
    - a. Rockwell (Style 413).
    - b. Dresser (Style 62).
    - c. Or approved equal.
  - 5. Compression sleeve coupling:
    - a. Rockwell (Style 411 steel or (Style 431 cast).
    - b. Dresser (Style 38 steel) or Style 53 cast).
    - c. Or approved equal.

6. Mechanical couplings and fittings:
    - a. Victaulic (Style 07 or 77).
    - b. S.P. Fittings.
    - c. Or approved equal.
  7. Factory-applied plastic or epoxy coatings:
    - a. "Encoat" Division of Energy Coating Company.
    - b. "Scotchkote" Division of 3M Company.
    - c. Or approved equal.
- B. Submit requests for substitution in accordance with Section 01 33 00 - Submittal Procedures.
- C. All flange adaptors and couplings to have manufacturer shop applied epoxy lining and coating.
- D. All flange adaptors and couplings to be working pressure rated for the maximum field test pressure applied to the piping segment.

## 2.02 MATERIALS

- A. All materials used in steel piping systems defined in Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements shall meet or exceed pressure test requirements specified for each respective system.
- B. Steel Pipe (Fabricated Type):
1. AWWA C200:
    - a. ASTM A36/A36M, Grade C Steel Plate.
    - b. ASTM A283/A283M, Grade D Steel Plate.
    - c. ASTM A570, Steel Sheet.
    - d. ASTM A572/A572M, Steel Plate.
- C. Steel Pipe (Mill Type):
1. ASTM A53/A53M, Type E or S.
- D. Fittings (For Fabricated Pipe):
1. AWWA C208.
- E. Fittings (For Mill Type Pipe):
1. ASTM A234/A234M.
  2. ASME B16.3.
  3. ASME B16.5.
  4. ASME B16.9.
  5. ASME B16.11.
- F. Flanges (Fabricated Pipe):
1. Flange material: ASTM A283/A283M, Grade C or D, ASTM A181/A181M Grade 1.
  2. Flange finish: Flat faced.
- G. Flanges (Mill Type Pipe):
1. ASME B16.5.
  2. Flat faced.
  3. Slip-on, Weld-neck, or Butt-weld flanges.
- H. Nuts and Bolts:
1. Buried: Cadmium-plated meeting Military Specification QQP416F, Type 1, Class 2 (Cor-Ten) for buried application.
  2. Exposed: Mechanical galvanized ASTM B695, Class 40.
  3. Heads and dimensions per ANSI ASME B1.1.
  4. Threaded per ANSI B1.1.
  5. Project ends 1/4 to 1/2 inch beyond nuts.
- I. Gaskets: See individual piping systems in Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.



## 2.03 MANUFACTURED UNITS

- A. Couplings:
  - 1. Flanged adaptors:
    - a. Steel or carbon steel body sleeve, flange, followers and Grade 30 rubber gaskets.
    - b. Provide units equal to those specified in Section 2.01.
    - c. Flanges meeting standards of adjoining flanges.
    - d. Entire assembly to be rated for test pressure specified on Piping Schedule for each respective application.
  - 2. Compression sleeve coupling:
    - a. Steel sleeve, followers Grade 30 and rubber gaskets.
    - b. Provide units equal to those specified in Section 2.01.
    - c. Flanges meeting standards of adjoining flanges.
    - d. Entire assembly to be rated for test pressure specified on Piping Schedule for each respective application.
    - e. Provide field coating for buried couplings per AWWA C203.
  - 3. Mechanical coupling joint:
    - a. Use of mechanical grooved (AWWA C606) type couplings and fittings in lieu of flanged joints is acceptable where specifically specified in Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.
    - b. Utilize units defined in Section 2.01 or shown on the Contract Drawings.

## 2.04 FABRICATION

- A. Provide piping (mill or fabricated) for use in this Project with minimum wall thicknesses as follows:
  - 1. 1/8 - 5 inch diameter pipe: Schedule 40.
  - 2. 6 - 10 inch diameter pipe: 3/16 inch.
  - 3. 12 - 14 inch diameter pipe: 7/32 inch.
  - 4. 16 - 48 inch diameter pipe: 1/4 inch
  - 5. Sizes are ID.
  - 6. Wall thicknesses indicated are for standard weight pipe. Design pipe in accordance with operating pressures shown in Piping Schedules for a design stress limited to 50 percent of yield.
- B. Furnish cast parts with lacquer finish compatible with finish coating.
- C. Furnish without outside coating for any exposed pipe scheduled to be painted.
- D. Fabricated Fittings:
  - 1. AWWA C208.
  - 2. Assure ratio of radius of bend to diameter of pipe equal to or greater than 1.0.
- E. Taper cement mortar linings as required for valve interfacing.
- F. Protective Coatings and Linings:
  - 1. Provide fusion-bonded epoxy lining and coating in accordance with AWWA C213.
  - 2. Wrap pipe in accordance with AWWA C209.
  - 3. Field paint pipe in accordance with Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.

## 2.05 SOURCE QUALITY CONTROL

- A. Testing:
  - 1. Shop hydrostatic test fabricated steel pipe and fittings.
  - 2. Field hydrostatic test all pipe as specified in Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Joining Methods - Flanges:
  - 1. Facing method:
    - a. Insert slip-on flange on pipe.
    - b. Assure maximum tolerances for flange faces from normal with respect to axis of pipe is 0.005 inch per foot of flange diameter.
    - c. Test flanges after welding to pipe for true to face condition and reface, if necessary, to bring to specified tolerance.
  - 2. Joining method:
    - a. Leave 1/8 to 3/8 inch of flange bolts projecting beyond face of nut after tightening.
    - b. Coordinate dimensions and drillings of flanges with flanges for valves, pumps, equipment, tank, and other interconnecting piping systems.
    - c. When bolting flange joints, exercise extreme care to assure that there is no restraint on opposite end of pipe or fitting which would prevent uniform gasket compression or cause unnecessary stress, bending or torsional strains being applied to cast flanges or flanged fittings. Allow one flange free movement in any direction while bolts are being tightened.
    - d. Do not assemble adjoining flexible coupled, mechanical coupled or welded joints until flanged joints in piping system have been tightened.
    - e. Gradually tighten flange bolts uniformly to permit even gasket compression.
    - f. Do not overstress bolts to compensate for poor installation.
- C. Joining Method - Welded Joints:
  - 1. Perform welding in accordance with AWWA C206 and this Section.
  - 2. For flange attachment perform in accordance with AWWA C207.
  - 3. Have each welding operator affix an assigned symbol to all his welds. Mark each longitudinal joint at the extent of each operator's welding. Mark each circumferential joint, nozzle, or other weld into places 180 degrees apart.
  - 4. Welding for all process piping shall conform with ASME B31.3. Welding of utility piping 125 psi and less shall be welded per ASME B31.9. Utility piping above 125 psi shall conform to ASME B31.1.
  - 5. Provide caps, tees, elbows, reducers, etc. manufactured for welded applications.
  - 6. Weldolets may be used for 5 inch and larger pipe provided all slag is removed from inside the pipe.
  - 7. Weld-in nozzles may be used for branch connections to mains and where approved by Engineer.
  - 8. Use all long radius welding elbows for expansion loops and bends.
  - 9. Use long radius reducing welding elbows 90 degree bends and size changes are required.
- D. Joining Method-Couplings:
  - 1. Mechanical Coupling (Compression Sleeve):
    - a. Install coupling to allow space of not less than 1/4 inch but not more than 1 inch.
    - b. Provide harnessed joint. Use joint harness arrangements detailed in AWWA M11.
    - c. Design harness assembly with adequate number of tie rods for test pressures indicated in Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements and allow for expansion of pipe.
    - d. Provide ends to be joined or fitted with compression sleeve couplings of the plain end type.
    - e. Grind smooth welds the length of one coupling on either side of joint to be fitted with any coupling.

- f. Assure that outside diameter and out-of-round tolerances are within limits required by coupling manufacturer.
  - 2. Grooved coupling:
    - a. For pipe requiring solid joint for free span, arrange piping so that pipe ends are in full contact.
    - b. For pipe requiring flexibility arrange pipe with gap per joint manufacturer recommendations.
    - c. Groove and shoulder ends of piping in accordance with manufacturer's recommendations.
    - d. Provide coupling and grooving technique assuring a connection which passes pressure testing requirements.
- E. Joining Method-Threaded and Coupled (T/C):
  - 1. Provide T/C end conditions that meet ANSI B2.1 requirements.
  - 2. Furnish pipe with factory-made T/C ends.
  - 3. Field cut additional threads full and clean with sharp dies.
  - 4. Leave not more than three pipe threads exposed at each branch connection.
  - 5. Ream ends of pipe after threading and before assembly to remove burrs.
  - 6. Use teflon thread tape on male thread in mating joints.
- F. Support exposed piping in accordance with Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.
- G. Install buried piping per Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.

### **3.02 FIELD QUALITY CONTROL**

- A. Test piping systems in accordance with Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.

**END OF SECTION 33 01 21**

**SECTION 33 01 22  
DUCTILE IRON PIPE**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
1. Ductile iron piping, fittings, and appurtenances.

**1.02 QUALITY ASSURANCE**

- A. Referenced Standards:
1. American National Standards Institute (ANSI):
    - a. ASME B1.1, Unified Inch Screw Threads (UN and UNR Thread Form).
    - b. ASME B16.1, Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.
    - c. ASME B16.21, Nonmetallic Flat Gaskets for Pipe Flanges.
  2. American Society for Testing and Materials (ASTM):
    - a. ASTM A183, Carbon Steel Track Bolts.
    - b. ASTM A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
    - c. ASTM A194/A194M, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.
    - d. ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
    - e. ASTM B695, Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
    - f. D1330, Rubber Sheet Gaskets.
  3. American Water Works Association (AWWA):
    - a. AWWA C104/A21.4, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
    - b. AWWA C105/A21.5, Polyethylene Encasement for Gray and Ductile Cast-Iron Piping for Water and Other Liquids.
    - c. AWWA C110/A21.10, Ductile Iron and Gray Iron Fittings, 3 IN through 48 IN for Water and Other Liquids.
    - d. AWWA C111/A21.11, Gasket Joints for Cast Iron and Ductile Iron Pressure Pipe and Fittings.
    - e. AWWA C115/A21.15, Flanged Ductile Iron Pipe with Threaded Flanges.
    - f. AWWA C150/A21.50, Thickness Design of Ductile Iron Pipe.
    - g. AWWA C151/A21.51, Ductile Iron Pipe, Centrifugally Cast-In-Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
    - h. AWWA C153/A21.53, Ductile-Iron Compact Fittings, 3 in. through 16 in. for Water and Other Liquids.
    - i. AWWA C203, Coal-Tar Protective Coatings and Linings for Steel Water Pipelines-Enamel and Tape-Hot Applied.
    - j. AWWA C606, Grooved and Shouldered Joints.
  4. Military Specification (Mil Spec):
    - a. QQ-P-416F, Plating, Cadmium Electro Deposited.

**1.03 SUBMITTALS**

- A. Shop Drawings:
1. See Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.
  2. Certification of factory hydrostatic testing.
  3. If mechanical coupling system is used, submit piping, fittings, and appurtenant items which will be utilized to meet system requirements.

## **PART 2 - PRODUCTS**

### **2.01 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents the following manufacturers are acceptable:
  - 1. Ductile Iron Pipe Class 350
    - a. American Ductile Iron Pipe, McWane Ductile, U.S. Pipe
    - b. TR Flex Ductile Iron Pipe, McWane Ductile
    - c. HDSS Pipe High Pressure Restrained Pipe With Deflection, U.S. Pipe
    - d. Tyton Joint Ductile Iron Pipe, U.S. Pipe
    - e. Flex-Ring Joint Ductile Iron Pipe, American Ductile Iron Pipe
    - f. Or Equal
  - 2. Flanged adapters:
    - a. Ductile iron conforming to AWWA C219, NSD 61 compliant.
    - b. On opposite end provide compatible joint type to match adjacent piping systems, such as Tyton, TR-Flex, Flex Rings, MJ
    - c. Must be working pressure rated minimum for field test pressure
    - d. ROMAC RFCA
    - e. Hymax Grip Coupling
    - f. EBAA 2100 MegaFlange
    - g. Or Equal
  - 3. Reducing couplings:
    - a. Rockwell (Style 415).
    - b. Dresser (Style 62).
    - c. Or approved equal.
  - 4. Transition coupling:
    - a. Rockwell (Style 413).
    - b. Dresser (Style 62).
    - c. Or approved equal.
  - 5. Polyethylene encasement tape:
    - a. Chase (Chasekote 750).
    - b. Kendall (Polyken 900).
    - c. 3 M (Scotchrap 50).
    - d. Or approved equal.
  - 6. Restrained joints:
    - a. American (Lock Fast) - 12 IN and below.
    - b. US Pipe (TR-Flex) - 4 IN to 54 IN.
    - c. American (Flex-Ring) - Above 12 IN.
    - d. Or approved equal.
- B. Submit requests for substitution in accordance with Section 01 33 00 - Submittal Procedures.
- C. All flange adaptors and couplings listed above are to be furnished with manufacturer's shop applied NSF 61 certified epoxy lining and coating. All nuts and bolts shall be stainless steel.
- D. All flange adapters and couplings shall have a working pressure rating exceeding the maximum field test pressure applied to the pipe segment.

### **2.02 MATERIALS:**

- A. Pipe
  - 1. Ductile iron:
    - a. Pressure Class as shown on Contract Drawings:
      - 1) Class 350.
    - b. AWWA C151/A21.51

2. Cement mortar lining: AWWA C104/A21.4
- B. Fittings:
1. Ductile iron: AWWA C110/A21.10:
    - a. Mechanical joint fittings: 350 psi rating
    - b. Flanged fittings:
      - 1) Rated to 350-psi per AWWA with use of special gaskets (U.S. Pipe Ring Flange-Tyte, American Toruseal or equal).
  2. Comply with requirements for restrained fittings as indicated on Contract Drawings
  3. Cement mortar lining: AWWA C104/A21.4
    - a. ISO 8179-1 external zinc-based coating
    - b. Active inner layer of 200 g/m<sup>2</sup> of pure metallic zinc under asphalt topcoat
- C. Pipe Joints:
1. Mechanical joints AWWA C111/A21.11:
    - a. Restraint Glands: Fusion bonded coated ductile iron body, domestic sourced either Romac RomaGrip (Romabond), Ebba MegaLug 1100, or equal. Working pressure rating must exceed field test pressure.
    - b. Hardware: Xylan 1424 top coat (Tripac 2000, Romac R-Blue, or equal) bolts, t-bolts and nuts. Furnish Type 304 stainless steel hardware where Xylan coated hardware is not available.
    - c. Gaskets: AWWA C111/A21.11
  2. Flanged joints:
    - a. Flanges:
      - 1) General use: AWWA C115/A21.15 and ASME B16.1, 125 pounds
    - b. Nuts and Bolts:
      - 1) AWWA C111 Flanged heavy hex nuts and bolts of low-carbon steel ASTM A307/Grade B, 60,000 psi tensile strength; t-bolts and nuts of high strength, low alloy corrosion resistant steel (ASTM A242/A242M) with 45,000-psi yield strength. All bolts, nuts & washers zinc plated with Xylan 1424 top coat (Tripac 2000, Romac R-Blue or equal). Furnish Type 304 stainless steel hardware where Xylan coated hardware is not available.
      - 2) Manufacturer's:
        - (a) Tripac 2000
        - (b) Romac R-Blue
        - (c) Tyler Union Flurokote #1
        - (d) Or Equal
    - c. Gaskets: ASTM D1330, Grade 1, red rubber, full face type
      - 1) Provide 350-psi rated gaskets (U.S. Pipe Full Face Flange-Tyte or American Toruseal).
    - d. Screw-on type
  3. Push-on joints: AWWA C111/A21.11:
    - a. Lubricant: Heavy vegetable soap solution suitable for potable water use
    - b. Conforms to Tyton Joint standard for pipe and fittings
    - c. Compatible with U.S. Pipe Field Lock 350 push-on restraint gaskets
  4. Mechanical couplings: Dresser "Style 38," Rockwell "411," or equal
  5. Grooved couplings:
    - a. Standard groove/rigid groove
    - b. 24 inches and smaller:
      - 1) Pipe ends: Grooved with "radius groove"
      - 2) Couplings: Victaulic "Style 31," Tyler," or equal
    - c. Gaskets: Compatible with pipe material
  6. Tapping Sleeves: Romac "FTS 420", Romac "STS 420", Romac SSTIII Ford, or equal

- D. Corrosion Control:
  - 1. Shop coating and lining per AWWA C104/A21.4:
    - a. Cement lining: ANSI A21.4
    - b. Exterior bituminous coating: Manufacturer's standard.
- E. Polyethylene encasement: AWWA C105/A21.5; seamless tube, black, ASTM D1248, Type I, Class C, Grade E-1, 8 mils thick:
  - a. Joint tape: Self-sticking, PVC or polyethylene, 10 mils thick; Chase "Chasekote 750," Kendall "Polyken 900," 3M "Scotchrap 50," or equal
  - b. Strapping: Nonmetallic, water resistant, FS PPP-S-760, Type II
- F. See Piping Schedules in Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.

### **2.03 MANUFACTURED UNITS**

- A. Couplings:
  - 1. Flanged adapters:
    - a. Unit consisting of steel or carbon steel body sleeve, flange, followers, Grade 30 rubber gaskets.
    - b. Provide units equal to those specified in Section 2.01.
    - c. Supply flanges meeting standards of adjoining flanges.
    - d. Rate entire assembly for test pressure specified on piping schedule for each respective application.
  - 2. Compression sleeve coupling:
    - a. Unit consisting of steel sleeve, followers, Grade 30 rubber gaskets.
    - b. Provide units equal to those specified in Section 2.01.
    - c. Supply flanges meeting standards of adjoining flanges.
    - d. Entire assembly to be rated for test pressure specified on piping schedule for each respective application.
    - e. Provide field coating for buried couplings per AWWA C203.

### **2.04 FABRICATION**

- A. Furnish and install without outside coatings of bituminous material any exposed pipe scheduled to be painted.
- B. Furnish cast parts with lacquer finish compatible with finish coat.

### **2.05 SOURCE QUALITY CONTROL**

- A. Factory Test:
  - 1. Subject pipe to hydrostatic test of not less than 500 psi with the pipe under the full test pressure for at least 10 seconds.

## **PART 3 - EXECUTION**

### **3.01 HANDLING AND TRANSPORTATION**

- A. Handling and transportation of pipe shall be in accordance with the pipe manufacturer's published instructions.
- B. Heavy canvas or nylon slings of suitable strength shall be used for lifting and supporting materials. Chains or cables shall not be used.
- C. Pipe and fittings shall not be stored on rocks or gravel or other hard material that might damage the pipe.

### **3.02 RUBBER GASKET STORAGE**

- A. All rubber gaskets shall be stored in a cool, well-ventilated place and not exposed to the direct rays of the sun. Gaskets shall not be allowed in contact with oils, fuels, petroleum, or solvents.

### **3.03 PIPE LAYING**

- A. Pipe shall be laid in accordance with the pipe manufacturer's published instructions, District Standards Drawings, ANSI/AWWA C600, and AWWA C651-14, as complimented and modified herein.

### **3.04 CLEANLINESS**

- A. The interior of pipes shall be clean of foreign materials before sections of pipe are installed and shall be protected to prevent entry of foreign materials after installation.
- B. Open ends of installed pipe shall be sealed with watertight plugs or other approved means at times when pipe installation is not in progress. Ground water shall not be allowed to enter the pipe.

### **3.05 INSPECTION BEFORE INSTALLATION**

- A. All pipe and fittings shall be carefully examined for cracks and other defects while suspended and before installation. Spigot ends shall be examined with particular care as this area is the most vulnerable to damage from handling. Defective pipe or fittings shall be laid aside for inspection by the District, which will accept proposed corrective repairs or rejection.

### **3.06 LOWERING OF PIPE MATERIAL INTO TRENCH**

- A. Proper implements, tools, and equipment, satisfactory to the District, shall be provided and used by the Contractor for the safe and convenient performance of the work. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench piece by piece in such a manner as to prevent damage to the water main materials and protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench.
- B. If damage occurs to any pipe, fittings, valves, hydrants, or water main accessories in handling, the damage shall be immediately brought to the District's attention.

### **3.07 LAYING OF PIPE**

- A. Pipe shall be laid in trenches to the line and grade indicated on the Contract Drawings. Generally, the pipe is laid with the bell end facing the direction of pipe laying, except on steep grades.
- B. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe-laying crew cannot install the pipe into the trench without getting earth into it, the District's Inspector may require a heavy, tightly woven canvas bag of suitable size, or plastic caps, be placed over each end of the pipe prior to installation and left there until the connection is made to the adjacent pipe. During laying operations, no debris, tools, clothing, or other material shall be placed in the pipe.
- C. As each length of pipe is placed in the trench, the spigot end shall be centered in the bell or coupling, and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material tamped under it, except at the bells or couplings. Precautions shall be taken to prevent dirt from entering the joint space.
- D. Joints shall be assembled in accordance with the manufacturer's instructions. Each joint shall be checked with a feeler gauge to assure proper seating of the gasket.

### **3.08 CUTTING OF PIPE**

- A. Pipe that has been marked For Field Cut shall be used. If the pipe is not marked for field
- B. The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe to leave a smooth end at right angles.

### **3.09 ALLOWABLE DEFLECTION**

- A. The maximum allowable angular deflection at the joints shall be 75% of manufacturer's recommendation for push-on and mechanical joints unless otherwise allowed by the District.



### 3.10 INSTALLATION

- A. Joining Method - Push-On Mechanical (Gland-Type) Joints:
  - 1. Install in accordance with AWWA C111/A21.11.
  - 2. Assemble mechanical joints carefully according to manufacturer's recommendations. Deflection not to exceed 75% of manufacturer's allowed deflection.
  - 3. If effective sealing is not obtained, disassemble, thoroughly clean, and reassemble the joint.
  - 4. Do not overstress bolts.
  - 5. Where piping utilizes mechanical joints with tie rods, align joint holes to permit installation of harness bolts.
  
- B. Joining Method - Push-On Joints:
  - 1. Install in accordance with AWWA C151/A21.51.
  - 2. Assemble push-on joints in accordance with manufacturer's directions. Deflection not to exceed 75 percent of manufacturer's allowed deflection 4 degrees for 6"-12" pipe .
  - 3. Bevel and lubricate spigot end of pipe to facilitate assembly without damage to gasket. Use lubricant that is non-toxic, does not support the growth of bacteria, has no deteriorating effects on the gasket material, and imparts no taste or odor to water in pipe.
  - 4. Assure the gasket groove is thoroughly clean.
  - 5. For cold weather installation, warm gasket prior to placement in bell.
  - 6. Taper of bevel shall be approximately 30 degrees with centerline of pipe and approximately 1/4 IN back.
  
- C. Joining Method - Flanged Joints:
  - 1. Install in accordance with AWWA C115/A21.15.
  - 2. Extend pipe completely through screwed-on flanged and machine flange face and pipe in single operation.
  - 3. Make flange faces flat and perpendicular to pipe centerline.
  - 4. When bolting flange joints, exercise extreme care to ensure that there is no restraint on opposite end of pipe or fitting which would prevent uniform gasket compression or would cause unnecessary stress, bending or torsional strains to be applied to cast flanges or flanged fittings.
  - 5. Allow one flange free movement in any direction while bolts are being tightened.
  - 6. Do not assemble adjoining flexible joints until flanged joints in piping system have been tightened.
  - 7. Gradually tighten flange bolts uniformly to permit even gasket compression.
  
- D. Joining Method - Mechanical Coupling Joint:
  - 1. Arrange piping so that pipe ends are in full contact.
  - 2. Groove and shoulder ends of piping in accordance with manufacturer's recommendations.
  - 3. Provide coupling and grooving technique assuring a connection which passes pressure testing requirements.
  
- E. Flange Adapters 12 IN and Less:
  - 1. Locate and drill holes for anchor studs after pipe is in place and bolted tight.
  - 2. Drill holes not more than 1/8 IN larger than diameter of stud projection.
  
- F. Support exposed pipe in accordance with Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.
  
- G. Install buried piping in accordance with Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.
  
- H. Install restrained joint systems where specified in Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements under specific piping system.

### **3.11 ANCHORAGE FOR FITTINGS**

- A. All fittings, unless specified in the Contract Drawings, shall be provided with a thrust block constructed against undisturbed soil.

### **3.12 THRUST BLOCKS**

- A. Thrust blocks shall be constructed of Class B concrete. Care shall be taken not to obstruct the outlets of tees or crosses, which are intended for future connections. A waterproof paper or plastic bond-breaker shall be placed between plugs and caps and the concrete thrust block to facilitate their removal in the future. Thrust blocks shall be poured against undisturbed earth and shall have at least the minimum dimensions shown in the Contract Drawings.

### **3.13 POLYETHYLENE ENCASEMENT**

- A. All buried pipe and fittings shall be wrapped in polyethylene encasement to prevent contact between the pipe and the surrounding backfill and bedding materials but is not intended to be a completely airtight or watertight enclosure. Installation of polyethylene encasement shall be in accordance with the ANSI/AWWA C-105, Method A.
- B. All lumps of clay, mud, cinders, etc. on the pipe surface shall be removed prior to installation of the polyethylene encasement. During installation, care shall be exercised to prevent soil or embedment material from becoming trapped between the pipe and the polyethylene.
- C. For installations below the water table, both ends of the polyethylene tube shall be sealed as thoroughly as possible with adhesive tape at the joint overlap.

### **3.14 FIELD QUALITY CONTROL**

- A. Test piping systems in accordance with Section 33 01 10.58 - Disinfection of Water Utility Piping Systems and Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements

**END OF SECTION 33 01 22**

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**SECTION 33 14 19  
VALVES AND HYDRANTS**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Work Included:
  - 1. Valves indicated on Contract Drawings, specified, or required for proper operation of equipment or systems.
  - 2. Provide ALL valves as shown on Contract Drawings.

**1.02 QUALITY CONTROL**

- A. Shop Testing:
  - 1. Test valves in accordance with the applicable standards referenced in Part 2.

**1.03 SUBMITTALS**

- A. Catalog Data: Submit manufacturer's literature and illustrations sufficient to verify compliance with the Specifications.
- B. Shop Drawings:
  - 1. Dimensions.
    - a. Construction details.
    - b. Materials.
    - c. Assembled weight.
- C. Installation Instructions: Complete manufacturer's installation instructions.
- D. Maintenance Data:
  - 1. Maintenance instructions.
  - 2. Parts lists.
- E. Proof of design test reports for butterfly valves.
  - 1. Submit as outlined in AWWA C504, Section 5.2.4.
  - 2. AWWA certification of proposed tester.

**1.04 PRODUCT DELIVERY**

- A. Prepare Valves and Accessories for Shipment According to AWWA C500, Section 31:
  - 1. Seal valve ends to prevent entry of foreign matter into valve body.
  - 2. Box, crate, completely enclose, and protect valves and accessories from accumulations of foreign matter.

**1.05 WARRANTY**

- A. Supplier warrants equipment (and its component parts) against defects in materials and workmanship under normal use for a minimum of two years after the date of the District's final acceptance and start of beneficial use of the equipment in accordance with the Contract Specifications.

**PART 2 - PRODUCTS**

**2.01 GENERAL**

- A. Construction:
  - 1. Actual valve length within  $\pm 1/16$  inch of specified or theoretical length.
  - 2. Ends, except as otherwise specified:
    - a. 2-1/2 inches and smaller: Threaded or soldered ends.
    - b. 3 inches and larger:
      - 1) Buried: Flanged, AWWA C111/A21.11, or Mechanical Joint..
      - 2) Others: Flanges, ANSI, 125 pounds, or Mechanical Joint.
- B. Shop Painting:

1. Shop paint all ferrous metal surfaces of valves and accessories, both interior and exterior, for corrosion protection.
  2. Manufacturer's standard paint will be acceptable if it is functionally equivalent to the specified paint and compatible with the specified field painting.
  3. Materials:
    - a. Asphalt varnish: TT-U-51.
    - b. Coal tar: Koppers "Bitumastic Super Tank Solution," Tnemec, or equal.
    - c. Epoxy: Tnemec "Hi-Build Epoxoline," Carboline, or equal.
    - d. Rust-inhibitive primer: Tnemec "77 Chem-Prime," Carboline, or equal.
    - e. Rust-preventive compound: Houghton "Rust Veto 344," "Rust-Oleum R-9," or equal.
  4. Surfaces to be painted:
    - a. Unfinished surfaces:
      - 1) Interior: Epoxy.
      - 2) Exterior to be buried, submerged, or located in manholes: Asphalt varnish or coal tar.
      - 3) Other exterior: Rust-inhibitive primer.
    - b. Polished or machined surfaces: Rust-preventive compound.
    - c. Operators and accessories: Rust-inhibitive primer.
- C. Actuators:
1. Provide manual actuators for all valves not specified to be power actuated or designed for automatic operation:
    - a. General use: Handwheel, 8 inch diameter minimum.
    - b. Buried valve, valves operated through floor boxes, and as indicated on Contract Drawings: 2 inch Wrench nuts.
      - 1) AWWA C504, AWWA C508, or C517.
      - 2) Provide two operating keys.
  2. Rotation:
    - a. Counterclockwise (to the left) to open.
    - b. The word "OPEN" and an arrow indicating direction to open cast on each valve body or operator.
  3. Extension stems:
    - a. Provide where indicated on Contract Drawings, specified, or required for proper operation, and for buried valves with operating nuts more than 4 feet below grade.
    - b. Nonrising stems:
      - 1) Solid steel shafting with OD not less than OD of valve stem or galvanized steel pipe with ID not less than OD of valve stem.
      - 2) Connected to valve by a flexible socket coupling.
    - c. Stem guides:
      - 1) Cast iron, bronze bushed, adjustable in two directions.
      - 2) If extension stem length exceeds 10 feet, design top guide to carry the stem weight and provide a collar on the stem to bear against the thrust guide.
      - 3) Maximum spacing:
        - (a) Nonrising stems: 100 times stem OD.
        - (b) 10 feet maximum.
    - d. Buried valves:
      - 1) Stem to extend within 6 inches of grade.
      - 2) Provide spaces to center stem in valve box.
      - 3) Provide wrench nut.
  4. Valve boxes:
    - a. Provide for all buried valves.

- b. ADS extension sleeve with Christy G5 boxes, Brooks, or equal and cast iron traffic covers.
  - c. Extension sleeve depth as required for valve.
  - d. Extension sleeve minimum diameter: 8 inches.
  - e. Box, cover, and base coated by dipping in asphalt varnish.
  - f. An appropriate word designating the valve service cast on the cover.
  - g. Provide locking grade rings as necessary for proper installation.
  - h. Install with concrete collar and thrust block as illustrated on Drawing details.
5. Valve Lockout Device:
- a. Provide Aqua Lockout-Tagout device for valves per valve ID, per Contract Documents.

## **2.02 BUTTERFLY VALVES**

- A. See Section 33 14 19.03 - Butterfly Valves.

## **2.03 GATE VALVES: 3 TO 12 IN DIAMETER**

- A. Resilient Wedge Gate Valve:
  - 1. Comply with AWWA C515 .
  - 2. Ductile iron, NRS, open left, NSF 61-G and NSF 372 compliant, 2-inch square operating nut (unless otherwise noted)
  - 3. Fusion epoxy coated and lined
  - 4. Body shall be constructed of ductile iron ASTM A536 with wall thickness per Table 3 of AWWA C515
    - a. Marked "D.I." or "Ductile Iron" cast on body.
    - b. The body shall have a smooth, oversized waterway
    - c. Prior to assembly, all internal and external ferrous surfaces of body and bonnet shall receive electro-statically applied fusion-bonded epoxy coating complying with AWWA C550.
    - d. All exterior valve body bolting shall be 304 stainless steel with hexagonal heads and dimensions per ANSI B18.2.21.
    - e. All body gaskets shall be pressure energized O-ring style design.
  - 5. Wedge to be ductile iron ASTM A537 with proective Acetal polymer wedge guife covers.
  - 6. Stem forged or cast managanese brones (ASTM B138 C67600 or ASTM B763 C86700), sealed by three O-rings, and thrust washers located above and below the thrust collar to reduce operating torque.
  - 7. Operators for sizes 2" through 12", provide 2" AWWA sequare nut constructed of ductile iron fitted to a square tapered stem.
  - 8. Design Requirements:
    - a. 350 psi working pressure.
- B. Acceptable Manufacturers:
  - 1. Mueller A-2361
  - 2. American Darling 2500 and 3500
  - 3. Kennedy Valve KS-FW, KS-RW
  - 4. Or equal.

## **2.04 AIR AND VACUUM RELIEF VALVES**

- A. General:
  - 1. Provide as indicated on Contract Drawings.
  - 2. Water working pressure: 200 psi.
  - 3. Provide a shutoff valve: Ball valve, globe valve, eccentric action cock, or a Nibo "U-Valve," Dyna-Quip "Combo Valve," or equal.
  - 4. 1-inch and 2-inch inlet, pump applications, vacuum break, AWWA C512 and NSF 61 and NSF 372 compliant, underground, fusion epoxy lined and coated

- B. Materials:
  - 1. Body: Ductile Iron.
  - 2. Cover: Ductile Iron.
  - 3. Seat: Buna N.
  - 4. Float Lever: Bronze.
  - 5. Float: Stainless Steel.
  - 6. Hardware: Stainless Steel.
- C. Design Requirements:
  - 1. Single body.
  - 2. Air and vacuum valve with externally mounted air release valve.
  - 3. Inlet size as indicated on Contract Drawings.
- D. Acceptable Manufacturers:
  - 1. APCO Series S-143C, S-145C
  - 2. Cla-Val 36, 39
  - 3. ValMatic 201C.2, 202C.2
  - 4. Or equal.

## **PART 3 - EXECUTION**

### **3.01 INSPECTION**

- A. Fire Hydrants:
  - 1. Thoroughly inspect.
  - 2. Thoroughly clean interior.
  - 3. Open and close hydrant as many times as required to ensure parts are in proper working order, valves are seating properly, and drain valve is operating freely.
  - 4. Check the packing gland to determine if packing is in-place and gland nut is properly tightened.

### **3.02 STORAGE**

- A. Valves shall be delivered and stored in the field with the port openings covered with plastic, cardboard, or wood. These covers shall remain in place until the valve is ready to be installed. Valves shall not be stored in contact with bare ground. Valves shall not be stacked on top of one another.

### **3.03 INSTALLATION**

- A. General:
  - 1. Install valves and accessories in accordance with manufacturer's recommendations.
  - 2. Provide a union or flanged connection within 2 feet of each threaded end valve, unless the valve can otherwise be easily removed from piping.
  - 3. Set valve and valve boxes plumb.
  - 4. Install valve box directly over valve it serves with top of box flush with finish grade. Provide concrete ring per valve box detail in Contract Drawings.
  - 5. Fill around box with earth and thoroughly tamp on all sides.
- B. Air-Release and Vacuum-Relief Valves:
  - 1. Pipe exhaust to a suitable disposal point.
  - 2. Where exhausted to a trapped floor drain, terminate exhaust line 36 inches above grade.

### **3.04 ADJUSTMENTS**

- A. Check and adjust valves and accessories for smooth operation in accordance with manufacturer's instructions.

### **3.05 POLYETHYLENE ENCASEMENT**

- A. Valves and all bolted connections shall be encased with polyethylene plastic film wrap.

### **3.06 MANUFACTURER'S FIELD SERVICE**

- A. Provide Manufacturer's Field Services for Valves Scheduled Below:
  - 1. One visit required:
    - a. Verify equipment installed properly and ready for operation.
    - b. Schedule:
      - 1) All valves 12 inch and larger.

**END OF SECTION 33 14 19**



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**SECTION 33 14 20  
ALTITUDE VALVES**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Scope:
  - 1. Provide altitude valve to control flow into tank where indicated on Drawings.
  - 2. Purpose: Combination altitude and electronic actuated pressure reducing valve with manually selected hydraulic pressure reducing bypass.
  - 3. Accessories:
    - a. Pressure Gage
    - b. Pressure Transmitter
    - c. Valve Position Indicator
    - d. Flow Meter
    - e. Check Valve with Isolation Valve
    - f. CV Flow Control (Closing)
    - g. Y-Strainer

**1.02 QUALITY ASSURANCE**

- A. Reference Standards:
  - 1. American Society for Testing and Materials (ASTM):
    - a. A536, Specifications for Ductile Iron Castings.

**1.03 ACCEPTABLE MANUFACTURERS**

- A. CLA-VAL Co.

**1.04 SUBMITTALS**

- A. See Section 01 33 00.
- B. Catalog Data: Submit manufacturer's literature, illustrations and data, sufficient to verify compliance with the Specifications.
- C. Shop Drawings:
  - 1. Dimensions.
  - 2. Construction details.
  - 3. Materials of construction.
  - 4. Assembled dimensions and weight.
  - 5. Catalog cuts.
  - 6. Special linings.
- D. Installation Instructions: Complete set of manufacturer's installation instructions.
- E. Operations and Maintenance Data:
  - 1. Maintenance instructions.
  - 2. Parts lists.
  - 3. See Section 01 78 23.

**1.05 WARRANTY**

- A. Supplier warrants equipment (and its component parts) against defects in materials and workmanship under normal use for a minimum of three (3) years after the date of Agency's
  - 1. final acceptance and start of beneficial use of this equipment in accordance with the Contract Specifications.

**PART 2 - PRODUCTS**

**2.01 B-TANK ALTITUDE VALVE**

- A. General 6" Altitude Valve B-Tank Location:

1. Model: 210-03
  2. Pattern: Globe
- B. Design requirements:
1. Maximum Design Flow: 1,800-gpm
- C. Materials:
1. Body & Cover: Ductile Iron, Conform to ASTM A536
  2. Trim:
    - a. Stainless Steel
  3. Disc Guide: Stainless Steel
  4. Cover Bearing: Stainless Steel
  5. Seat: Stainless Steel
  6. Stem, Nut, Spring: Stainless Steel
  7. Disc: Buna-N Rubber
  8. Diaphragm: Nylon Reinforced Buna-N Rubber
  9. Internal Trim Parts: Stainless Steel; Bronze; Brass
  10. Length (Flange to Flange): 21.00"
  11. Pressure Rating: Class 300 lb. (400psi Max.)
  12. Any other wetter metallic parts: Stainless Steel; Bronze; Brass
  13. Lining and Coating: Fusion bonded Epoxy Coating (Interior and Exterior); ANSI/NSF 61 Approved; AWWA coating specifications C116-03.

## 2.02 C-TANK ALTITUDE VALVE

- A. General 10" Altitude Valve B-Tank Location:
1. Model: 210-03
  2. Pattern: Globe
- B. Design requirements:
1. Maximum Design Flow: 4,900-gpm
- C. Materials:
1. Body & Cover: Ductile Iron, Conform to ASTM A536
  2. Trim:
    - a. Stainless Steel
    - b. KO Anti-Cavitation
  3. Disc Guide: Stainless Steel
  4. Cover Bearing: Stainless Steel
  5. Seat: Stainless Steel
  6. Stem, Nut, Spring: Stainless Steel
  7. Disc: Buna-N Rubber
  8. Diaphragm: Nylon Reinforced Buna-N Rubber
  9. Internal Trim Parts: Stainless Steel; Bronze; Brass
  10. Length (Flange to Flange): 31.12"
  11. Pressure Rating: Class 300 lb. (400psi Max.)
  12. Any other wetter metallic parts: Stainless Steel; Bronze; Brass
  13. Lining and Coating: Fusion bonded Epoxy Coating (Interior and Exterior); ANSI/NSF 61 Approved; AWWA coating specifications C116-03.
  14. Sensing Line: Copper

## 2.03 REFERENCE STANDARDS

- A. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984, with Editorial Revision (2019).
- B. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service; 2019.

- C. Modbus - The Modbus Organization Communications Protocol.; Latest Update.
- D. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.

## **2.04 ACCESSORIES**

- A. Pressure Gage
  - 1. Model X141
  - 2. Size: 2-1/2"
  - 3. Equipped with Isolation valve for maintenance
- B. Flow Meter (for 6" Valve Only)
  - 1. Model X144 e-FlowMeter
- C. Check Valve with Isolation Valve
  - 1. Installed in the pilot supply line
  - 2. Isolates pilot control system
  - 3. Allows operator to manually override the automatic functions of the valve and perform field testing of the main valve.
- D. CV Flow Control (Closing)
  - 1. Controls valve closing speed
  - 2. Adjustable restriction device that acts as a needle valve when flow is in the direction of the stem, port fully opens when flow is in the reverse direction to allow unrestricted flow
  - 3. Corrosion Resistance
  - 4. Requires no lubrication
- E. X43 "Y" Strainer
  - 1. Installed in the pilot supply line
  - 2. Protects the pilot system from foreign particles

## **PART 3 - EXECUTION**

### **3.01 PRODUCT DELIVERY**

- A. Prepare Valves in Accordance with AWWA C500, Section 31.
- B. Control valves specified herein shall be factory assembled. Any control valve appurtenances, accessories, parts and assemblies that are shipped unassembled shall be packaged and tagged in a manner that will protect the equipment from damage and facilitate the final assembly in the field. Seal valve ends to positively prevent entrance of foreign matter into valve body.
- C. Care shall be taken in loading, transporting and unloading to protect control valves, appurtenances, or coatings from damage. Equipment shall not be dropped. All control valves and appurtenances shall be examined before installation and no piece shall be installed which is found to be defective. Any damage(s) shall be repaired.
- D. Prior to shipping, the control valves and all associated accessories shall be acceptably packaged and covered to prevent entry of foreign material.
- E. All packaged control valves shall be shipped, remain covered and stored on site until they are installed and put into use.

### **3.02 INSTALLATION**

- A. Install valves and accessories in accordance with the manufacturer's recommendation.

### **3.03 ADJUSTMENTS**

- A. Check and Adjust Valves and Accessories for Smooth Operation in Accordance with Manufacturer's Instructions.
  - 1. System valves open upstream and downstream.
  - 2. Air removed from the main valve cover and pilot system at all high points.

3. Periodic cleaning of Y-strainer is recommended.
4. Reservoir sensing line properly connected.
5. Isolation valve with cocks open.
6. Isolation valve at electric pressure reducing control open during normal operation.
7. Isolation valve at hydraulic pressure reducing control closed during normal operation.

**SECTION 40 05 65  
PUMP CONTROL VALVES**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Scope:
  - 1. Accessories:
    - a. X46A Flow Clean Strainer
    - b. CK2 Isolation Valve
    - c. X43 "Y" Strainer

**1.02 QUALITY ASSURANCE**

- A. Reference Standards:
  - 1. American Society for Testing and Materials (ASTM):
    - a. A536, Specifications for Ductile Iron Castings.

**1.03 ACCEPTABLE MANUFACTURERS**

- A. CLA-VAL Co.

**1.04 SUBMITTALS**

- A. See Section 01 33 00.
- B. Catalog Data: Submit manufacturer's literature, illustrations and data, sufficient to verify compliance with the Specifications.
- C. Shop Drawings:
  - 1. Dimensions.
  - 2. Construction details.
  - 3. Materials of construction.
  - 4. Assembled dimensions and weight.
  - 5. Catalog cuts.
  - 6. Special linings.
- D. Installation Instructions: Complete set of manufacturer's installation instructions.
- E. Operations and Maintenance Data:
  - 1. Maintenance instructions.
  - 2. Parts lists.
  - 3. See Section 01 78 23.

**1.05 WARRANTY**

- A. Supplier warrants equipment (and its component parts) against defects in materials and workmanship under normal use for a minimum of three (3) years after the date of Agency's
  - 1. final acceptance and start of beneficial use of this equipment in accordance with the Contract Specifications.

**PART 2 - PRODUCTS**

**2.01 MAIN VALVE**

- 1. Model: 60-11
- 2. Pattern: Globe
- B. Design requirements:
- C. Materials:
  - 1. Body & Cover: Ductile Iron, Conform to ASTM A536
  - 2. Trim:
    - a. Stainless Steel

3. Disc Guide: Stainless Steel
4. Cover Bearing: Stainless Steel
5. Seat: Stainless Steel
6. Stem, Nut, Spring: Stainless Steel
7. Disc: Buna-N Rubber
8. Diaphragm: Nylon Reinforced Buna-N Rubber
9. Internal Trim Parts: Stainless Steel; Bronze; Brass
10. Pressure Rating: Class 300 lb. (400psi Max.)
11. Any other wetter metallic parts: Stainless Steel; Bronze
12. Lining and Coating: Fusion bonded Epoxy Coating (Interior and Exterior); ANSI/NSF 61 Approved; AWWA coating specifications C116-03.

## **2.02 REFERENCE STANDARDS**

- A. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984, with Editorial Revision (2019).
- B. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service; 2019.
- C. Modbus - The Modbus Organization Communications Protocol.; Latest Update.
- D. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.

## **PART 3 - EXECUTION**

### **3.01 PRODUCT DELIVERY**

- A. Prepare Valves in Accordance with AWWA C500, Section 31.
- B. Control valves specified herein shall be factory assembled. Any control valve appurtenances, accessories, parts and assemblies that are shipped unassembled shall be packaged and tagged in a manner that will protect the equipment from damage and facilitate the final assembly in the field. Seal valve ends to positively prevent entrance of foreign matter into valve body.
- C. Care shall be taken in loading, transporting and unloading to protect control valves, appurtenances, or coatings from damage. Equipment shall not be dropped. All control valves and appurtenances shall be examined before installation and no piece shall be installed which is found to be defective. Any damage(s) shall be repaired.
- D. Prior to shipping, the control valves and all associated accessories shall be acceptably packaged and covered to prevent entry of foreign material.
- E. All packaged control valves shall be shipped, remain covered and stored on site until they are installed and put into use.

### **3.02 INSTALLATION**

- A. Install valves and accessories in accordance with the manufacturer's recommendation.

### **3.03 ADJUSTMENTS**

- A. Check and Adjust Valves and Accessories for Smooth Operation in Accordance with Manufacturer's Instructions.
  1. System valves open upstream and downstream.
  2. Air removed from the main valve cover and pilot system at all high points.
  3. Periodic cleaning of Y-strainer is recommended.
  4. Reservoir sensing line properly connected.
  5. Isolation valve with cocks open.
  6. Isolation valve at electric pressure reducing control open during normal operation.
  7. Isolation valve at hydraulic pressure reducing control closed during normal operation.

**APPENDIX A:  
GEOTECHNICAL ENGINEERING STUDY  
(CLEARWELL TANK SITE)**



**GEOTECHNICAL ENGINEERING STUDY  
CALAVERAS COUNTY WATER DISTRICT  
COPPER COVE WATER SYSTEM IMPROVEMENTS PROJECT  
COPPEROPOLIS, CALAVERAS COUNTY, CALIFORNIA**

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**April 15, 2023**  
**Condor Project No. 8809**

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## **APPENDICES**

### **APPENDIX A – FIGURES**

Figure 1 – Vicinity Map

Figure 2A – Site Map with Test Pit Locations, Clearwell Site

Figure 2B – Site Map with Test Pit Locations, Signal Hill Site

Figure 2 – Geologic Map

Figure 3 – Regional Fault Map

Figure 5 – Ultramafic Rock Map

### **APPENDIX B**

Test Pit Logs

### **APPENDIX C**

Laboratory Test Results

### **APPENDIX D**

U.S. Seismic Design Maps



**GEOTECHNICAL ENGINEERING STUDY  
CALAVERAS COUNTY WATER DISTRICT  
COPPER COVE WATER SYSTEM IMPROVEMENTS PROJECT  
COPPEROPOLIS, CALAVERAS COUNTY, CALIFORNIA**

## **1.0 INTRODUCTION**

### **1.1 GENERAL**

This report presents the results of our Geotechnical Engineering Study (GES) for the proposed Clearwell tank at the Calaveras County Water District (CCWD) wastewater treatment facility on Little John Road and the proposed water storage tank on Signal Hill Road. Condor Earth (Condor) performed this study at the request of Karl Brustad, Peterson Brustad Inc. (PBI). This GES is intended to meet the requirements of American Water Works Association (AWWA) D103-09 and the 2022 California Building Code (CBC).

### **1.2 PROJECT DESCRIPTION**

Plan drawings were not available at the time of this report. However, we understand that the project consists of constructing a new approximately 60-foot diameter steel Clearwell tank on undisturbed native ground immediately north of the existing Clearwell tank. This location is shown in Figure 1, Vicinity Map, and is designated as Kiva Drive. The site is also shown in Figure 2A, Site Map with Test Pit Locations, which includes the approximate location of the proposed tank. The invert elevation of the new tank will be similar to the existing tank and therefore warrants excavation of the existing ground at the new tank location to depths of approximately 7 to 14 feet below existing grade.

The project also includes replacement of an existing redwood water storage tank on Signal Hill Road. The new tank at Signal Hill will be 65 feet in diameter and 21 feet tall. The tank will be replaced with a new steel tank supported on concrete slabs-on-grade with a ringwall foundation. The Signal Hill site is shown on Figure 1, Vicinity Map, and Figure 2B, Site Map with Test Pit Locations.

## **2.0 PURPOSE AND SCOPE**

This GES was performed to 1) explore and evaluate the subsurface soil and rock conditions at the sites; 2) identify geotechnical or geologic conditions that might impact design or construction of the sites; 3) provide geotechnical recommendations to mitigate geologic and geotechnical constraints to the sites; and 4) provide grading recommendations, foundation design parameters, and geotechnical criteria for design of the proposed improvements. Condor completed the following work for this GES:

1. Reviewed available maps and documents relevant to the site geology, seismic setting, and geotechnical conditions.
2. Performed field exploration excavating test pits at each location.
3. Analyzed the findings from the field exploration and developed geotechnical recommendations for:
  - General earthwork, including site stripping, subgrade preparation, temporary excavations, permanent slopes, trench backfill, import fill, compaction criteria, and site surface drainage;
  - Foundation design and construction, including foundation type, allowable bearing capacities, lateral resistance, settlement, and foundation depth;
  - 2022 CBC seismic design criteria;
  - Potential seismic hazards and recommendations for mitigation;
  - Concrete slabs and exterior flatwork;



4. Prepared this written report summarizing our findings, conclusions and geotechnical recommendations.

### **3.0 SITE DESCRIPTIONS**

The projects occur near the base of the Sierra Nevada Mountains in the Sierra Nevada Geologic Province at elevations ranging from 800 to 1,000 feet above mean sea level. Oak-woodland vegetation of native grasses and live oak trees cover rolling hills with natural slopes at the Clearwell site ranging up to 12 percent (7 degrees). The Signal Hill site is in a residential area and the existing tank pad is relatively flat. A steel tank, redwood tank and two wo-framed out buildings are on the site.

### **4.0 GEOLOGIC HAZARDS AND SEISMIC SETTING**

#### **4.1 REGIONAL GEOLOGY**

The project site lies within the Sierra Nevada Geomorphic Province of California. The basement rock in much of Calaveras County consists of steeply dipping metamorphic rock of Paleozoic and Mesozoic age that has been intruded by the Mesozoic granitic plutons of the Sierra Nevada Batholith. Locally, the basement rock is nonconformably overlain by the eroded remnants of younger Tertiary age continental volcanic and sedimentary rock. Tectonic uplift and westward tilting of the Sierra Nevada range began during the late Cenozoic in response to a change in regional plate-boundary motions. Much of the Tertiary rock overlying the basement rock was eroded as uplift of the range progressed. The Sierra Nevada range was further eroded during the last two million years by several episodes of glaciation that exposed the basement rock throughout the higher elevations and generated extensive sedimentary deposits in the Great Central Valley to the west. The geologic processes of tectonic uplift and erosion continue to act on the Sierra Nevada Mountains.

#### **4.2 SITE GEOLOGY**

The regional geologic map, San Francisco-San Jose Quadrangle, California, (Wagner, et. al., 1991) indicates that the site is underlain by Jurassic age Salt Springs Slate and Merced Falls Slate characterized by slate, metagraywacke and conglomerate. Our investigation encountered phyllite rock throughout the planned alignment. Phyllite is a low-grade metasedimentary rock similar to slate that has experienced a greater degree of metamorphism. The geologic mapping in the vicinity of the site is shown on Figure 3 – Geologic Map, Appendix A.

#### **4.3 FAULTING AND REGIONAL SEISMICITY**

The site is not located in a Fault-Rupture Hazard Zone as established by the Alquist-Priolo Earthquake Fault Zoning Act (Hart, 1994), therefore, ground rupture from faulting is not considered a significant hazard. Nevertheless, the site is near several moderately active faults within the Foothills fault system capable of generating strong earthquakes as shown on Figure 4 - Regional Fault Map, Appendix A.

#### **4.4 NATURALLY OCCURRING ASBESTOS**

Ultramafic rocks are mapped in the vicinity of the project site as shown on Figure 5 - Ultramafic Rock Map, Appendix A, and the site is in an area of known ultramafic rock that may contain naturally occurring asbestos. However, no ultramafic rocks were observed in outcrops or test pits at either tank site, and Condor concludes that the risk of hazards from naturally occurring asbestos for the project is very low. No additional evaluation or mitigation for naturally occurring asbestos is recommended.



## **5.0 SUBSURFACE CONDITIONS**

### **5.1 TEST PIT EXPLORATION**

On September 23, 2022, Condor explored subsurface conditions at the Clearwell site (Figure 2A) by means of two (2) test pits (TP-1 and TP-2) and at the Signal Hill site (Figure 2B) by means of three (3) test pits (TP-1, TP-2, and TP-3). The test pits were excavated by DRM Construction using a Bobcat E63 mini track excavator with a 2-foot bucket and locations were selected based on locations of existing underground utilities at each site and discussions with CCWD and PBI. Prior to the exploration, both sites were mapped for utilities by a licensed utility locator. The results indicated significant underground utilities east of the Signal Hill existing tank that would require relocating prior to construction of the new tank.

In addition to mapping the underground utilities at the Signal Hill site, CCWD performed vacuum truck services at planned test pit locations. Condor selected test pit locations based on the anticipated locations of planned improvements, the findings from the utility mapping, and vacuum truck work. Excavation depth at the Clearwell site was 6.5 feet in both test pits. At the Signal Hill site, depths ranged from 2 to 4 feet.

The subsurface materials were classified according to the ASTM-International D 2488, Unified Soil Classification System, and applicable rock classification system. The contacts shown on the test pit logs are approximated based on field observations and measurements. The actual boundaries between different materials may be gradual and soil conditions may vary between the test pit locations. Representative samples were tested for sieve analysis and plasticity index at the Signal Hill site. The test pits were backfilled with excavated material and loosely compacted with the excavation equipment, and the ground surface graded to near original conditions. The test pit logs are provided in Appendix B. Laboratory test reports are provided in Appendix C.

### **5.2 EARTH MATERIALS**

The subsurface investigation revealed native bedrock at less than ½ foot below existing grade at each site. Excavation refusal at the Clearwell site was encountered at 6.5 feet using the Bobcat E63. Our local experience near Little John Road and Flint Trail indicates test pit excavations up to 15 feet deep are feasible in similar geologic conditions using a Doosan DX255LC excavator with 4-foot-wide bucket and 3-foot-long ripper attached to the bucket. Based on conversations with CCWD, the new Clearwell tank site will need excavation to an elevation similar to the existing tank, which we estimated at 7 to 17 feet below existing grade.

At the Signal Hill site, previous grading for the existing structures removed all residual soil at the location of our test pits and covered the surface with a veneer of fill ranging from sandy clay to fine to coarse gravel to a depth of up to ½ foot in test pit TP-2.

The bedrock at both sites is phyllite that exhibits a blocky structure with well-developed planar fractures generally about 0.5 to 2 inches apart that are tight to moderately open and oriented northwest and dipping near vertical. The rock is very weak to weak with low to moderate hardness and weathering ranges from slightly to severe. In general, the rock at the Clearwell site is less weathered than that at the Signal Hill site.

### **5.3 LOCAL GROUNDWATER CONDITIONS**

At the time of our field investigation, groundwater was not encountered. Moisture did increase at and immediately below the soil/bedrock contact; however, the increased moisture is likely from lower impermeable bedrock causing vadose water to ‘perch’ at and immediately below the soil/ bedrock contact. Perched water in the subsurface may be encountered after periods of precipitation.



Shallow groundwater seepage was encountered at the Signal Hill site in Test Pit TP-2 and is visible in the photo in the test pit log. While it is believed that the seepage is a result of leakage from the existing redwood tank, the source is not definitively known and could be other historic water lines that are leaking. The contractor should anticipate the potential for encountering water in excavations and localized dewatering for earthwork.

## 6.0 SEISMIC CONSIDERATIONS

### 6.1 GROUND SHAKING

Based on review of geologic maps of the area, and our interpretation of relatively thin soil veneer over native bedrock, we recommend classifying the sites as CBC Site Class C for very dense soil and soft rock. The results for the general seismic analysis are summarized below and provided in Appendix D. We recommend the following values for structural design according to the 2022 CBC. These values are based on  $S_s=0.39$ ;  $S_1=0.195$ ;  $F_a = 1.3$ ; and  $F_v = 1.5$ .

#### Site Modified Spectral Acceleration Values

$S_{MS}$  0.507

$S_{MI}$  0.293

#### Design Spectral Acceleration

$S_{DS}$  0.338

$S_{D1}$  0.195

### 6.2 LIQUEFACTION POTENTIAL

No potentially liquefiable deposits were identified, and groundwater is not anticipated within 50 feet of the ground surface; therefore, the risk from liquefaction is considered non-existent.

## 7.0 CONCLUSIONS AND RECOMMENDATIONS

### 7.1 GENERAL

Based on our findings, it is our professional opinion that the project should be suitable from a geotechnical standpoint for construction of the proposed water tanks provided the recommendations contained herein are incorporated into the project design.

Because of the highly weathered condition of the bedrock at the Signal Hill site and the potential for historic piping and foundations associated with the existing redwood tank, we recommend overexcavation of the existing ground to at least 4 feet below the elevation of the ring wall foundation and 4 feet below the interior of the tank. The excavation should extend below the entire tank bottom and a minimum horizontal distance of 5 feet beyond the ringwall foundation. The location of the adjacent existing tank should be reviewed prior to excavation and excavations should not extend to within 20 feet of the existing foundation without approval of CCWD and the Geotechnical Engineer. The subgrade should be observed by the Geotechnical Engineer to verify competent ground is exposed. The excavation may be raised to subgrade elevation using imported Class 2 Aggregate Base. We also anticipate that groundwater seepage may be encountered as discussed in Section 5.3. The contractor should anticipate the potential for encountering water in excavations and localized dewatering for earthwork.

Because of the proposed depth of cut required to achieve subgrade elevation at the Clearwell site, we do not anticipate over-excavation of the proposed tank pad subgrade and footing excavations from a





geotechnical standpoint. The Geotechnical Engineer should approve the exposed subgrade to verify anticipated ground conditions. Additional excavation and backfilling with Class 2 Aggregate Base may be desirable to provide a smooth working surface.

Specific conclusions and recommendations addressing these geotechnical considerations, as well as general recommendations regarding the geotechnical aspects of design and construction, are presented in the following sections.

## **7.2 GRADING AND EARTHWORK RECOMMENDATIONS**

Grading and site work should be performed in accordance with the 2022 CBC, Chapter 33 (Safeguards During Construction Construction), Appendix J (Grading), and Chapter 18 (Soils and Foundations), and with the recommendations of the Geotechnical Engineer-of-Record during construction. Where the recommendations of this report and the cited sections of the CBC are in conflict, the owner should request clarification from the Geotechnical Engineer-of-Record. The recommendations in this report should not be waived without the consent of the Geotechnical Engineer-of-Record for the project. Recommendations for additional work and construction monitoring are contained in later sections of this report.

### **7.2.1 Clearing and Grubbing**

Areas proposed to receive tank and other improvements should commence with the removal of any existing improvements and root systems, if present. All roots greater than ½-inch in diameter shall be removed by either mechanical means or by hand during grading. Any organic-laden material, free from debris, may be stockpiled for later use in non-structural areas where approved by the owner, but such material should not be used for engineered fill.

It is also possible that other buried objects such as foundations and utility lines, etc., may exist, especially in areas of existing improvements at the Signal Hill site. These items should be removed and disposed of offsite where encountered within the construction limits. Underground pipes should be removed within the limits of construction and backfilled with sand-cement slurry with a minimum compressive strength of 100 psi or equivalent approved material where the excavation to remove the underground pipes is deeper than the overexcavation requirements of the foundations. Excavations beyond 10 feet of the tank foundation may be backfilled with engineered fill. Excavations receiving engineered fill should be cleaned of loose or disturbed material and dish-shaped with sides slope 3H:1V or flatter, to permit access of compaction equipment.

### **7.2.2 Overexcavation**

We recommend that all areas required to support the planned tanks at the Signal Hill site should be overexcavated to remove unsuitable soil and highly weathered bedrock and replaced with Class 2 Aggregate Base in accordance with Section 7.1. The depth and extent of required overexcavations should be approved in the field by the Geotechnical Engineer. Additional overexcavation may be required depending on conditions observed in the field during construction.

### **7.2.3 Subgrade Preparation**

Subgrade preparation may be waived for the tank construction where overexcavation requirements described in 7.1 are achieved and the Geotechnical Engineer has approved the subgrade prior to placement of Class 2 Aggregate Base. In all other areas with supporting structures, the exposed subgrade should be scarified to a depth of 8 inches, uniformly moisture conditioned, and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density. Native subgrade soils should





be uniformly moisture conditioned to between 2 and 4 percentage points above the optimum moisture content. Field density tests should be taken to verify compaction of the prepared subgrade in these areas.

**7.2.4 Engineered Fill Materials**

Engineered fill used for the project should be either 1) select import engineered fill, or 2) general on-site soils with less than 3 percent organic content to achieve subgrade elevation for ancillary project components. Fill depth should not exceed 3 feet without review of the planned structure or improvements. The on-site soils and bedrock may be used for engineered fill when processed to the gradation requirements shown in the below table. Select import engineered fill should be inorganic, have an R-value of at least 30, a liquid limit less than 30, and a plastic index less than 7. In addition, select import engineered fill should meet the following particle-size gradation:

Sieve Opening	Percent Passing, by Dry Weight
4-inch square	100
3/4-inch square	70 minimum
U.S. No. 4	60 minimum
U.S. No. 200	50 maximum

Select import engineered fill material that does not meet the above criteria should be tested under the direction of the Geotechnical Engineer-of-Record to determine if it has engineering properties equivalent to, or better than, the existing site materials. Samples of any proposed imported fill material should be submitted to the Laboratory of Record for testing and approved by the Geotechnical Engineer-of-Record prior to being brought to the site.

General on-site engineered fill should be inorganic, contain no rocks greater than 4-inches in least dimension, and be free of deleterious materials. Soils containing more than 3 percent by weight of organic material should be considered organic. Engineered fill generated from excavation of the site weathered bedrock may require processing to meet the gradation requirements.

Due to the presence of shallow bedrock and anticipated deep cuts at the Clearwell site, it is likely that engineered fill derived from the cut areas will require processing to meet the gradation requirements of engineered fill.

**7.2.5 Engineered Fill Placement**

Engineered fill should be placed in a series of horizontal layers not exceeding 8 inches in loose thickness, uniformly moisture-conditioned, and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density. Fill soils composed of sands, silty sands, and non-plastic silts should be uniformly moisture conditioned to between 1 and 3 percentage points above the optimum moisture content. Fill soils consisting of clayey soils should be uniformly conditioned to between 2 to 4 percentage points above optimum moisture content. Additional fill lifts should not be placed if the previous lift did not meet the required relative compaction or if soil conditions are not stable. Processing, mixing and/or blending may be required to uniformly moisture-condition soils used for engineered fill. Engineered fill generated from the Clearwell and Signal Hill Trail sites may require special processing to generate sufficient fines to infill all voids of larger particle size that typically is generated in this material.



Class 2 Aggregate Base is required for all engineered fill below the tank ringwall foundations and within the ringwall except where specified on the plans. Aggregate base should be compacted to a minimum of 95% relative compaction in accordance with ASTM D1557.

### **7.2.6 Excavations**

Onsite materials can be easy to difficult to excavate with conventional excavation equipment. Additional discussion of the anticipated bedrock condition and excavation difficulty is provided in Section 5.2. We anticipate that temporary excavations less than 5 feet deep may be cut as steep as 1½H:1V (horizontal to vertical). Deeper cuts should be considered on a case-by-case basis. All open cuts should be in compliance with applicable Occupational Safety Health Administration (OSHA) regulations (California Construction Safety Orders, Title 8) and should be monitored for evidence of incipient instability.

### **7.2.7 Permanent Cut Slopes and Engineered Fill Slopes**

Based on our current understanding of the project grading, permanent slopes consisting of engineered fill will be minor and limited to 1 to 5 feet for roadway construction. Permanent slopes should be inclined to 2H:1V or flatter (horizontal to vertical)

Permanent cut slopes to be graded at the Clearwell site may be sloped at 2H:1V or flatter (horizontal to vertical). Drainage improvements should be provided at the top of the cut slope to prevent surface water from eroding the exposed slope.

## **7.3 UNDERGROUND UTILITY TRENCHES**

Unless concrete bedding is required around utilities, pipe bedding should consist of sand with a sand equivalent of at least 30 or the pipe manufacturer's requirements, whichever is more restrictive. The pipe bedding should extend from 6 inches below the invert of the pipe to 1 foot above the pipe crown of the pipe. The pipe bedding material should be compacted to a minimum of 90 percent relative compaction or the manufacturer's recommendations if more stringent.

Trench backfill above the pipe bedding zone should be placed in the same manner as required in Section 8.2.5, Engineered Fill Placement. On-site engineered fill soils and "non-organic" native soils may be used as backfill in trenches above the pipe bedding. Utility trench backfill should be placed in layers not exceeding a loose lift thickness of 8 inches, uniformly moisture conditioned, and compacted to a minimum of 90 percent relative compaction.

Compaction criteria for trench backfill above the bedding zone may be decreased to 85 percent relative compaction in landscape areas at least 10 feet beyond structural improvements, except in areas overlain by pavements, sidewalks, or other hardscapes. In areas overlain by pavements, sidewalks, or other hardscapes, we recommend that the trench backfill be compacted to a minimum of 90 percent relative compaction.

## **7.4 SURFACE DRAINAGE CONTROL**

Surface drainage should be planned to prevent ponding and to enable water to drain away from foundations, slabs and edges of pavements toward suitable collection or discharge facilities. A positive surface drainage of at least 5 percent should be provided within 10 feet of all foundations. Elsewhere, positive surface drainage of at least 2 percent is recommended to allow for rapid removal of surface water. A detailed drainage plan is outside the scope of this report but should be included in the preparation of the grading plans for the project.



## **8.0 FOUNDATION RECOMMENDATIONS**

### **8.1 GENERAL FOUNDATION RECOMMENDATIONS**

Foundation improvements should be designed and constructed in accordance with the 2022 CBC, Title 24, Chapter 17 (Structural Tests and Special Inspections), Chapter 18 (Soil and Foundations), and all other sections applicable to the proposed structural improvements.

### **8.2 FOOTINGS**

Footings for all structures should be embedded at least 18 inches below the lowest adjacent grade when founded in ground prepared in accordance with Sections 7.1 and 7.2. Condor defines lowest adjacent grade as the tank bottom, the bottom of an adjacent pavement, or exterior soil subgrades, whichever results in a deeper footing. Footing thickness and widths should meet the minimum requirements in the 2022 CBC and AWWA Standard D100-05.

Footings bearing on compacted engineered fill consisting of Class 2 Aggregate Base or weathered bedrock should be designed using a maximum net allowable bearing capacity of 3,000 pounds per square foot (psf) for dead plus normal duration live loads. This allowable bearing capacity may be increased by one-third for total load conditions, including wind and seismic. This allowable value includes a factor of safety of 2.0 for the Signal Hill site, and 2.5 for the Clearwell site.

Base friction resistance may be calculated using an ultimate friction coefficient of 0.30 for concrete on engineered fill or native ground. For the steel tank bottom, a friction coefficient of 0.25 should be used. Passive resistance may be calculated using an allowable equivalent fluid unit weight of 350 pounds per cubic foot (pcf). The recommended passive resistance is reduced by a factor of about 1.5 from the ultimate value to reduce deflections to tolerable amounts. The recommended passive pressure and friction coefficients may be combined, without reduction, for calculating total lateral resistance. The passive resistance contributed within 1 foot of the ground surface should be neglected unless these soils are protected and confined by a slab-on-grade or pavement.

The perimeter footing should be reinforced to resist hoop stresses within the wall. Hoop stresses may be calculated by assuming outward lateral pressure acting on the foundation equal to 0.45 times the vertical pressure imposed on the subgrade within the ring-wall. Lateral soil pressures acting on buried vaults that may be constructed adjacent to the tank should likewise be calculated using a lateral soil pressure equal to 0.45 times the vertical pressure acting on the adjacent subgrade.

Foundation concrete should be poured neat against footing excavations that are tight and free of loose materials.

Tank bottoms are typically domed upward from the perimeter to the center to allow differential settlement to occur without overstressing the tank bottom in tension. The settlement is anticipated to be greater at the center than at the perimeter. The imposed loads under full hydrostatic pressure may result in some settlement of the underlying engineered fill. Settlement of the ringwall foundation is estimated to be 1-inch and 3/4-inch for total and differential settlement, respectively. The settlement of the center of the tank relative to the ringwall foundation is estimated to be less than 1-inch. The majority of the total settlement is expected to occur during construction and initial filling of the tank.



## **9.0 SLABS-ON-GRADE**

### **9.1 SUBGRADE SUPPORT FOR SLABS-ON-GRADE**

Concrete slabs should be supported on ground prepared in accordance with Section 7.1, including minimum overexcavation depths discussed in the section.

### **9.2 GUIDELINES FOR CONCRETE SLABS-ON-GRADE**

We understand that concrete slabs for buildings may not be included for the proposed project. As such, a portion of the following sections may not be applicable.

Condor does not consider itself an expert on the control of slab cracking or prevention of vapor transmission through concrete slabs. The following recommendations are provided based on current practice in the industry. The designer of record should provide final details on plans based on their past experience, coupled with our recommendations.

Where dampness of floor slabs is to be minimized, the slabs should be constructed on a minimum 4-inch thick layer of capillary break material covered with a high quality vapor retarder. The capillary break material should be free-draining, clean gravel or rock such as No. 4 by ¾-inch pea gravel or permeable aggregate complying with Caltrans Standard Specifications, Section 68, Class 1, Type B.

The vapor retarder should have a minimum thickness of 15 mils, a permeance as tested before and after mandatory conditioning (ASTM E 1745, Section 7.1.2 – 7.1.5) of less than 0.01 perms [grains/(ft<sup>2</sup> · hr · inHg)], and comply with the ASTM E 1745 Class A requirements. Vapor retarders having these properties are commonly referred to as “vapor barriers”. The designer of the slab-on-grade of record may omit the blotter at their discretion when a concrete with a water-cement ratio of 0.45 or less is specified. The vapor retarder should be constructed in accordance with ASTM E 1643 using material which meets ASTM E 1745.

Slabs should be cast using concrete with a maximum slump of 4 inches or less. Excessive water content is the major cause of concrete cracking. To reduce concrete shrinkage, a water reducing agent or plasticizer may be utilized in the concrete to increase slump while maintaining an appropriate water/cement ratio. Hot reinforcing steel should be cooled prior to concrete placement to help prevent concrete shrinkage at the bar location. Where there is potential for moisture accumulation under the slab, special consideration should be given to allow gravity drainage of any water that could migrate into the subgrade of the slab or rock cushion. The final design floor slab thickness and reinforcement should be provided by the project Structural Engineer.

Exterior concrete slabs (i.e., sidewalks, concrete aprons, etc.) should be constructed over a minimum of 4 inches of compacted aggregate base on subgrade prepared as discussed in Section 7.2. All exterior slabs should be reinforced or jointed and scored to limit cracking from shrinkage.

## **10.0 CORROSION POTENTIAL**

Chemical tests were performed on one discrete sample of the near-surface soils at each tank site. Test results are summarized in the following table:



	<b>Tank Site</b>	
	<b>Signal Hill</b>	<b>Clearwell</b>
<b>Redox (mV)</b>	370	340
<b>pH</b>	6.02	6.08
<b>Resistivity (ohm/cm)</b>	7,500	11,000
<b>Chloride (mg/kg)</b>	None detected	None detected
<b>Sulfate (mg/kg)</b>	32	None detected

Resistivity tests performed on the same discrete soil samples indicated that the soils range from mildly corrosive to moderately corrosive to buried metal. A commonly accepted correlation between soil resistivity and corrosivity towards ferrous metals is provided in the following table developed by the National Association of Corrosion Engineers (NACE):

<b>Soil Resistivity</b>	<b>Corrosivity</b>
Less than 500 ohm-cm	Very corrosive
500 to 1,000 ohm-cm	Corrosive
1,000 to 2,000 ohm-cm	Moderately corrosive
2,000 to 10,000 ohm-cm	Mildly corrosive
Over 10,000 ohm-cm	Progressively less corrosive

Appendix C contains the results of the corrosivity tests performed, as well as a brief evaluation letter by our laboratory subcontractor. The brief evaluation provides general recommendations regarding protecting buried metals. If warranted, a corrosion expert should be consulted to develop specific recommendations.

## 11.0 ADDITIONAL SERVICES

The geotechnical recommendations and design criteria given in this report are sensitive to the location, design details, and any special requirements of the new construction. Condor should review the geotechnical elements of project grading, foundation plans and specifications prior to construction bidding to check that the intent of our recommendations has been incorporated into these project documents. If Condor does not review the geotechnical elements of the plans and specifications, the reviewing Geotechnical Engineer should thoroughly review this report and concur with its conclusions and recommendations or provide alternative recommendations.

Because surface conditions may vary across the sites, geotechnical recommendations used as a basis for construction contracting are sensitive to the possible need for adjustment in the field. The adjustments are dependent upon conditions revealed during construction that could previously only be assumed based upon site exploration. Since the intent of the recommendations given in this report are best understood by a Condor representative, we recommend that field observations and testing during earthwork and construction be performed by Condor. If Condor does not provide the field observations and testing, the Geotechnical Engineer-of-Record should thoroughly review this report and concur with its conclusions and recommendations or provide alternative recommendations.

The Geotechnical Engineer or qualified representative should be on-site to observe and advise during site preparation, grading and earthwork, and construction of foundations and slabs-on-grade. These observations should be supplemented with periodic density and compaction testing of subgrade and





engineered fills to evaluate conformance with the recommendations contained in this report. It is important that foundation excavations be checked after cleaning and immediately prior to concrete placement to verify their suitability.

## 12.0 LIMITATIONS

The conclusions and recommendations presented in this report are intended for planning, design, and construction of the proposed tank sites as described in this report. These conclusions and recommendations may be invalid if:

- The report is used for other sites or project components;
- The encountered soil or groundwater conditions are different than those anticipated in this report;
- The recommendations contained in this report are not followed; or
- Any other change is implemented that materially alters the project.

This report was prepared in accordance with the generally accepted standards of environmental and geotechnical engineering practice existing in California at the time it was written. No other warranty, express or implied, is made. It is the owner's responsibility to see that all parties to the project, including the designer, contractors, subcontractors, etc., are made aware of this report in its entirety.

The analyses and recommendations submitted herein are based upon the data obtained from subsurface exploration and materials testing. Subsurface exploration of any site is necessarily confined to selected locations and conditions may, and often do, vary between and around these locations. Should varied conditions come to light during construction on the project, additional exploration, testing, or analysis may be required. Any person concerned with this project who observes conditions or features of the sites or their surrounding areas that are different from those described in this report, should report them immediately to Condor for evaluation.

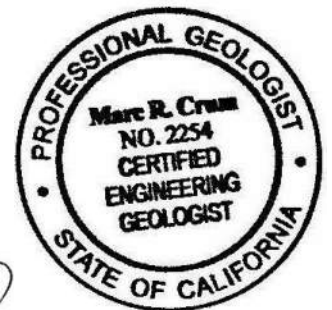
It should be noted that changes in the standards of practice in the field of environmental and geotechnical engineering, changes in site conditions, new agency regulations, or modifications to the proposed project are grounds for this report to be professionally reviewed. In light of this, there is a practical limit to the usefulness of this report without critical professional review. It is suggested that two years be considered a reasonable time for the usefulness of this report.


We trust this report provides the information required at this time. Please call with any questions.

Respectfully submitted,  
CONDOR EARTH



  
Ronald L. Skaggs  
Geotechnical Engineer (CA #2295)



  
Marc R. Crum  
Certified Engineering Geologist (CA #2254)



### **13.0 REFERENCES**

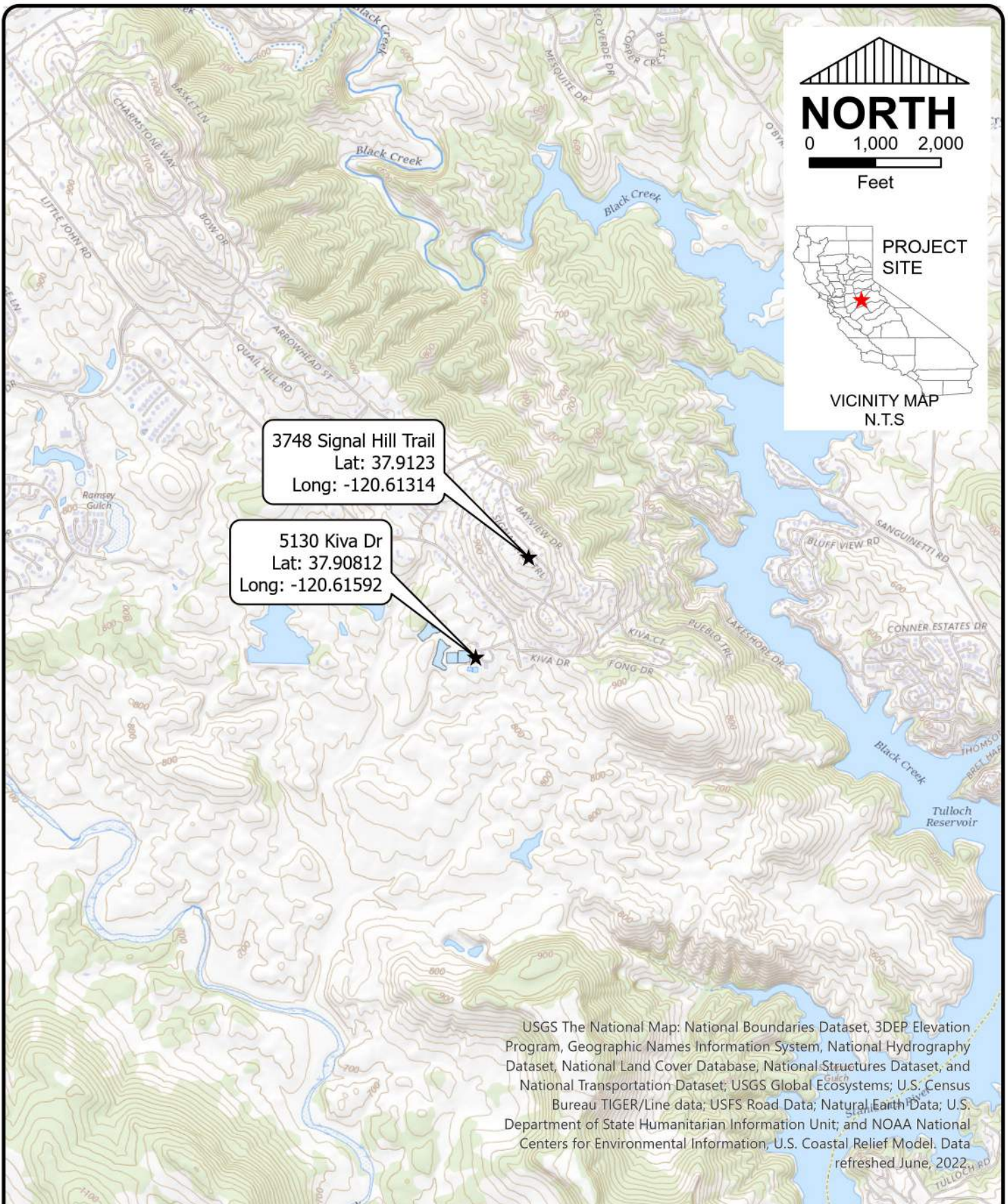
California Building Code, 2022, California Building Standards Commission, and International Conference of Building Officials, 2012.




**APPENDIX A**  
**Figures**

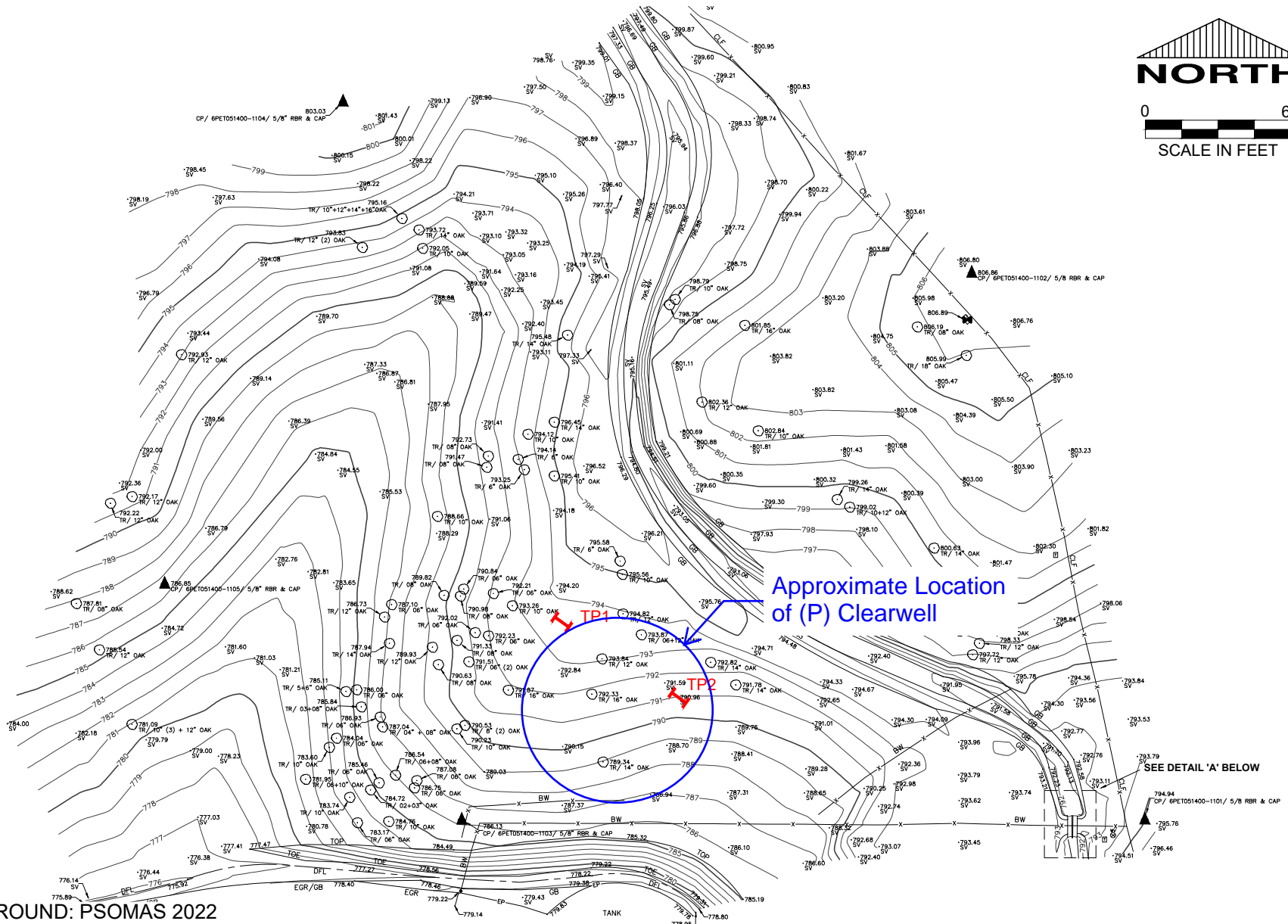
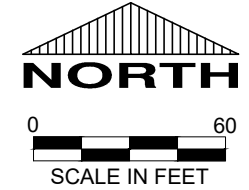






 <p><b>CONDOR EARTH</b>          21663 Brian Lane          P.O. Box 3905          Sonora, CA 95370          (209) 532-0361          fax (209) 532-0773          www.condorearth.com</p>	Job No. 8809	<b>VICINITY MAP</b> <b>CALAVERAS COUNTY WATER DISTRICT</b> <b>COPPER COVE WATER SYSTEM IMPROVEMENTS</b> <b>COPPEROPOLIS, CALIFORNIA</b>	<b>FIGURE</b> <b>1</b>
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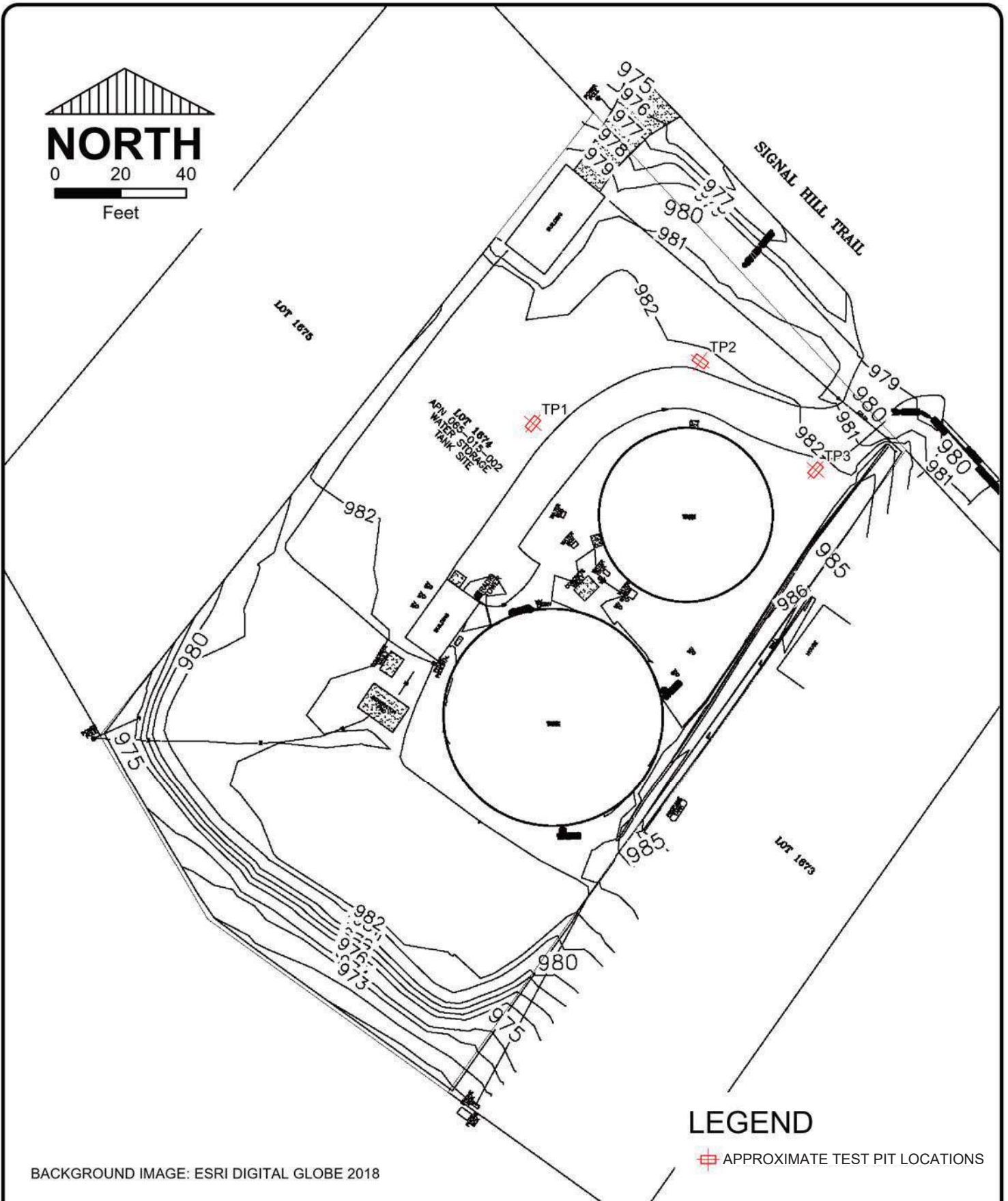
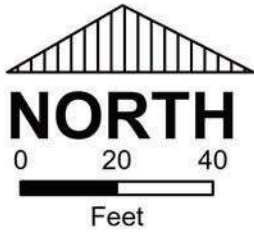




BACKGROUND: PSOMAS 2022

DISCLAIMER: THIS PLAN REPRESENTS FEATURES FOR ILLUSTRATION PURPOSES ONLY. IT IS NOT A LEGAL SURVEY OR CONSTRUCTION DOCUMENT AND IS NOT INTENDED FOR USE IN DETERMINING BOUNDARIES OR DIMENSIONS. ANY USE OF THIS PLAN FOR PURPOSES OTHER THAN FOR APPROXIMATE LOCATION OF FEATURES IS DONE SO AT THE USER'S RISK AND WITHOUT THE CONSENT OF CONDOR EARTH.

F2A_8809  <b>FIGURE 2A</b>	 <b>CONDOR</b>	<b>CONDOR EARTH</b> 21663 Brian Lane P.O. Box 3905 Sonora, CA 95370 (209) 532-0361 fax(209) 532-0773 www.condorearth.com	Job No. <b>8809</b> Date <b>8 Nov 2022</b> Scale <b>AS SHOWN</b> Drawn <b>JW</b>	Chk'd <b>LA</b>	<b>SITE MAP WITH TEST PIT LOCATIONS</b> <b>CALAVERAS COUNTY WATER DISTRICT</b> <b>COPPER COVE WATER SYSTEM IMPROVEMENTS</b> <b>COPPEROPOLIS, CALIFORNIA</b>	



BACKGROUND IMAGE: ESRI DIGITAL GLOBE 2018

### LEGEND

 APPROXIMATE TEST PIT LOCATIONS



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Date  
08 Nov 2022

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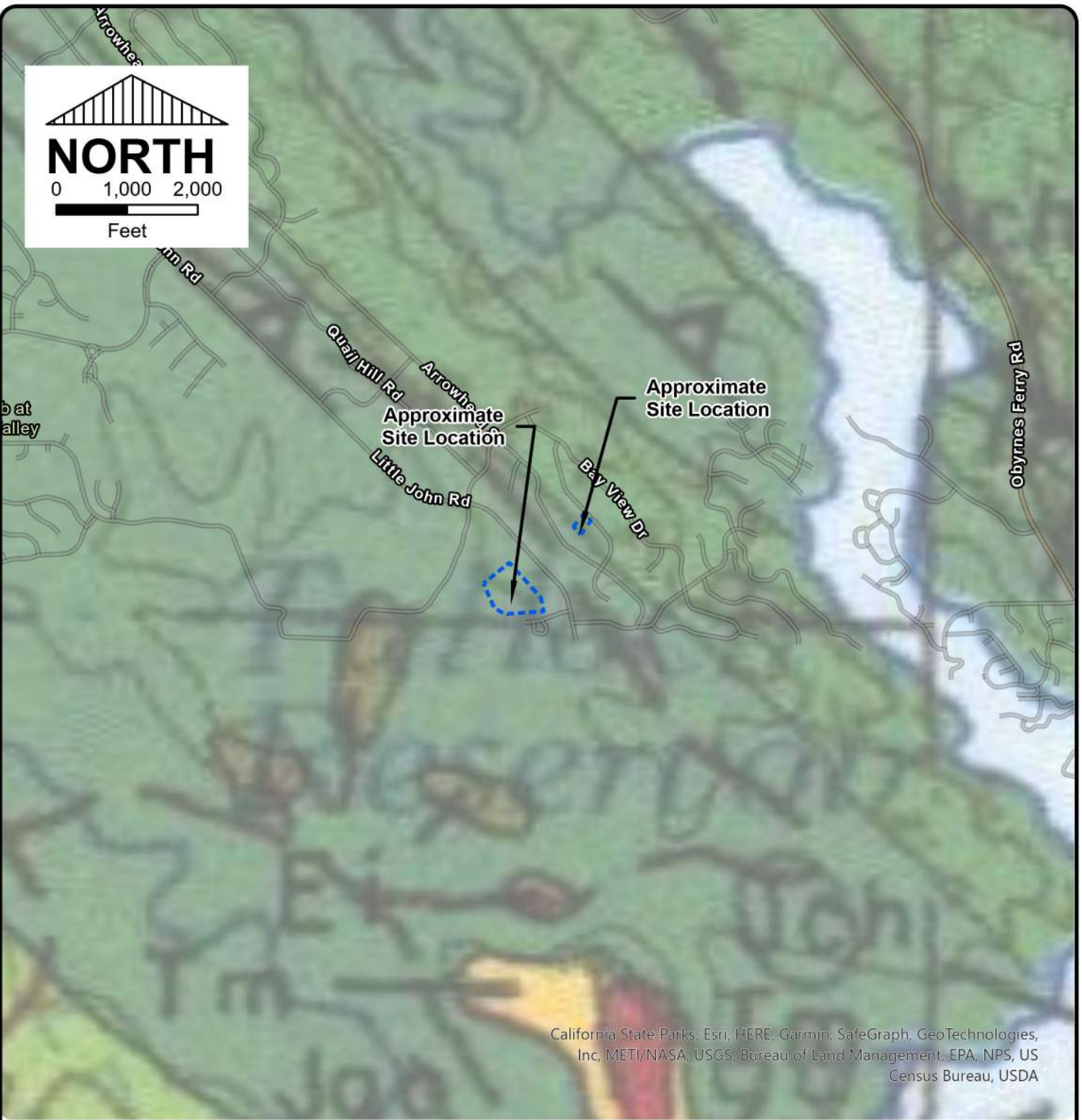
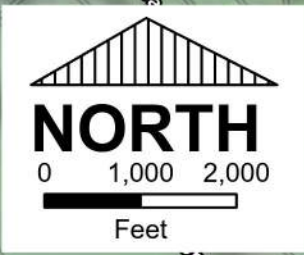
Chk'd  
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SITE MAP WITH TEST PIT LOCATIONS  
CALAVERAS COUNTY WATER DISTRICT  
COPPER COVE WATER SYSTEM IMPROVEMENTS  
COPPEROPOLIS, CALIFORNIA

FIGURE  
2B

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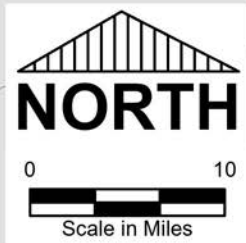
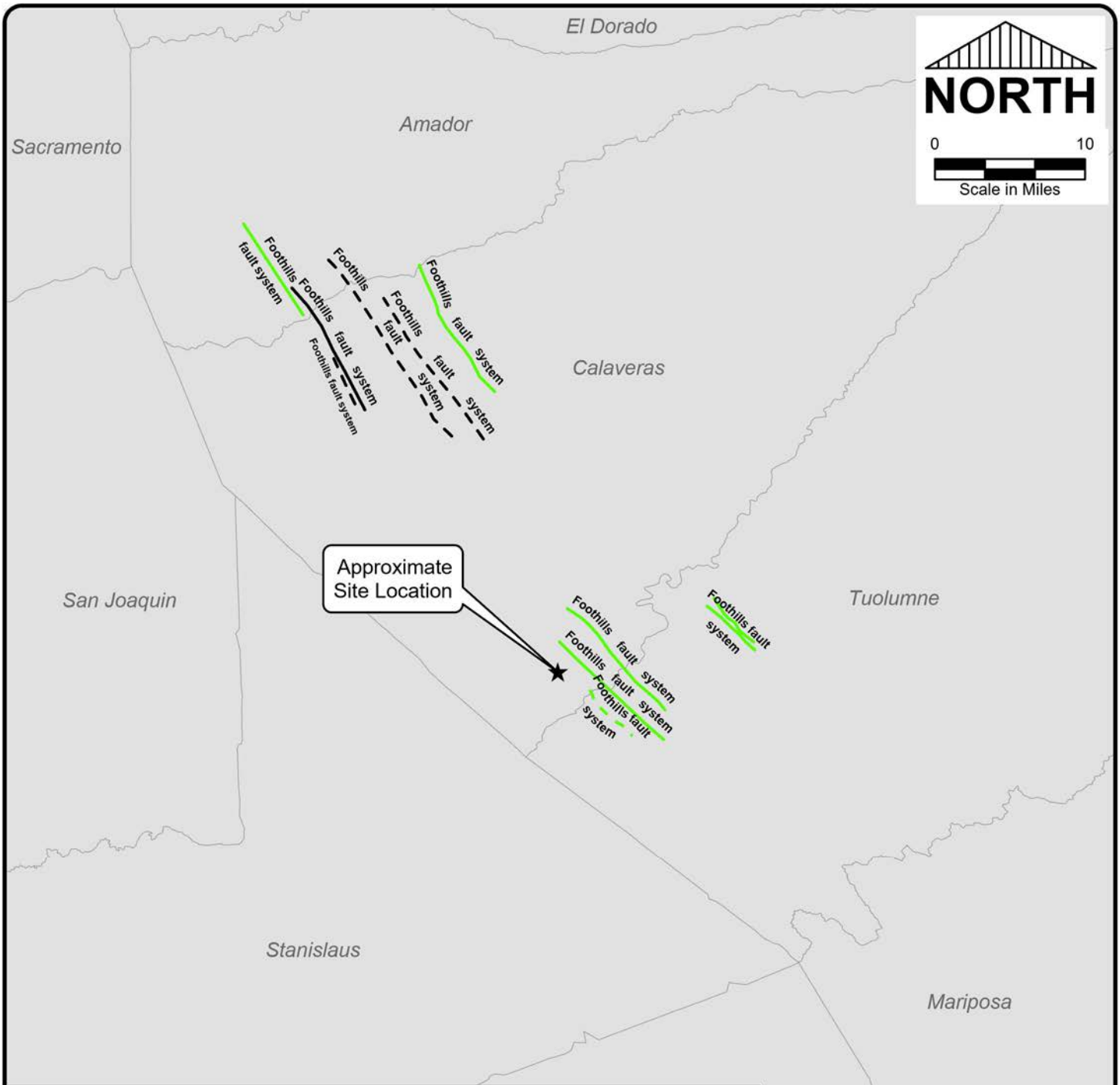
California State Parks, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA

## LEGEND

- APPROXIMATE SITE BOUNDARY
- Copper Hill Volcanics
- Salt Springs and Merced Falls Slates

Source:  
California Geological Survey, C.W. Jennings, Carlos Gutierrez,  
William Bryant, George Saucedo, Chris Wills, 1977

 <b>CONDOR EARTH</b> 21663 Brian Lane P.O. Box 3905 Sonora, CA 95370 (209) 532-0361 fax (209) 532-0773 www.condorearth.com	Job No. 8809	<b>GEOLOGIC MAP</b> <b>CALAVERAS COUNTY WATER DISTRICT</b> <b>COPPER COVE WATER SYSTEM IMPROVEMENTS</b> <b>COPPEROPOLIS, CALIFORNIA</b>	<b>FIGURE</b> <b>3</b>
	Date 08 Nov 2022		
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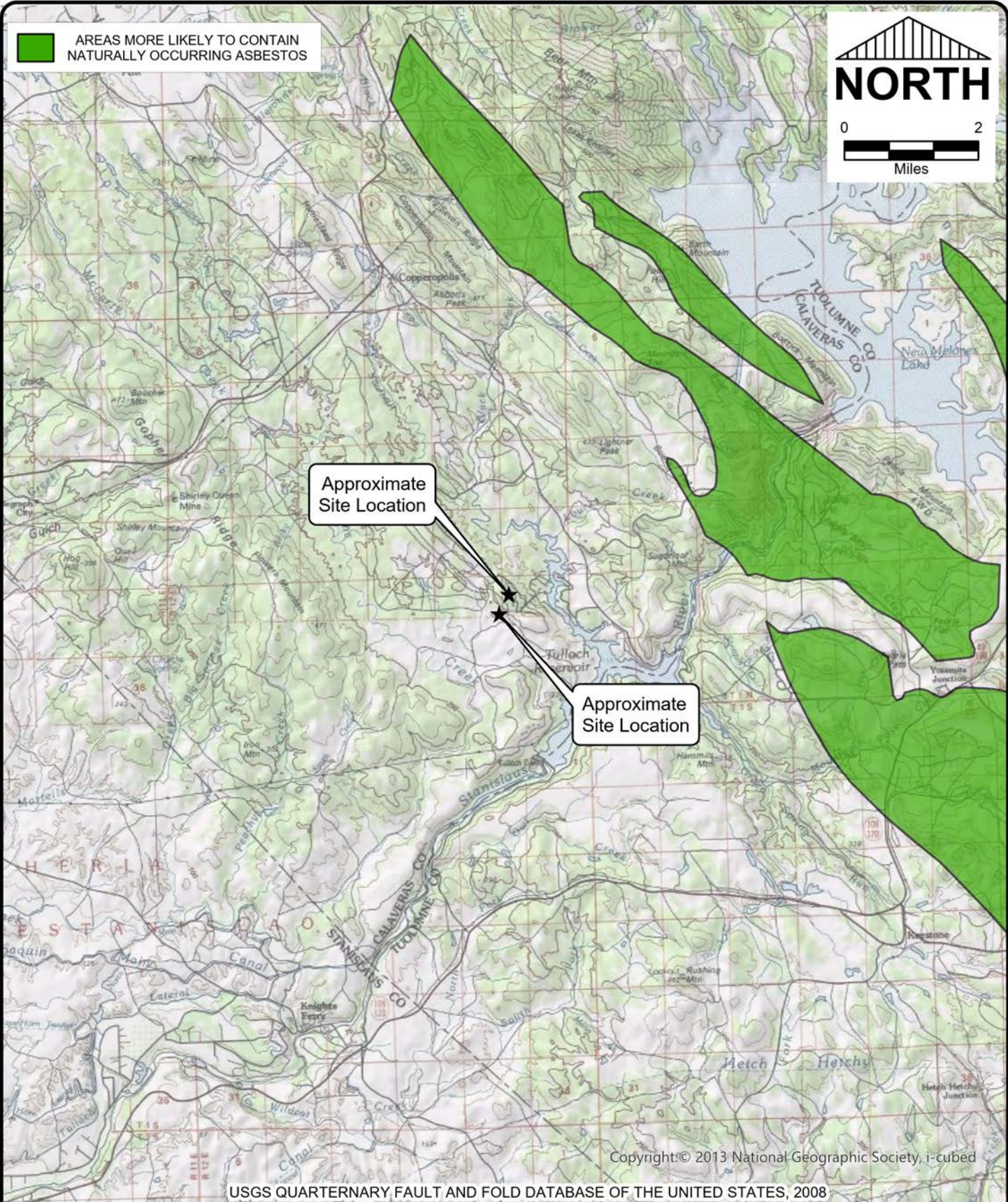
Legend	
<b>Fault Classification</b>	
	"Historical" (evidence of movement over the last 150 years)
	"Latest Quaternary" (evidence of movement over the last 150 to 15,000 years)
	"Late Quaternary" (evidence of movement over the last approximately 15,000 to 130,000 years)
	"Middle and Late Quaternary" (evidence of movement over the last approximately 130,000 to 750,000 years)
	"Undifferentiated Quaternary" (evidence of movement over the last 750,000 to 1.6 million years)
	Unspecified age
	Class B (various age)

US GEOLOGICAL SURVEY  
QUARTEARNARY FAULTS OF CALIFORNIA, 2017

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**AREAS MORE LIKELY TO CONTAIN NATURALLY OCCURRING ASBESTOS**



Approximate Site Location

Approximate Site Location

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USGS QUATERNARY FAULT AND FOLD DATABASE OF THE UNITED STATES, 2008



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Scale	AS SHOWN
Drawn	Chk'd
JW	LA

**ULTRAMAFIC ROCK MAP  
CALAVERAS COUNTY WATER DISTRICT  
COPPER COVE WATER SYSTEM IMPROVEMENTS  
COPPEROPOLIS, CALIFORNIA**

**FIGURE  
5**

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**APPENDIX B**  
**Test Pit Logs**



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- **Engineering**
- **Geotechnical**
- **Environmental**
- **Mapping**
- 

## TEST PIT LOG

**Project No:** 8809 – Copper Cove Water System Improvements

**Client:** Calaveras County Water District

**Project Location:** Copperopolis, California, Little John WWTP

**Test Pit Location:** West Extent of Proposed Clearwell Tank

**Equipment:** Bobcat B-63 Mini Excavator with 2' Bucket and 2' Ripper

**Test Pit No:** TP – 1

**Total Depth:** 6.5 feet

**Date Excavated:** 9/23/22

**Elevation:** 793', Topo

**Logged by:** M. Crum



DEPTH	USCS	DESCRIPTION
0'-0.3'		DUFF: mainly organic material Grades to:
0.3'-6.5'		JURASSIC METASEDIMENTARY ROCKS: phyllite, pale olive (10Y 6/2), slightly weathered, weak, low to moderately hard, planar fractures, very tight to moderately open, northwest (310°/70 dip), spacing 0.5"-2", blocky structure

**Notes:** Ripper required to continue excavation below 4 feet. At 6 feet, six to ten passes required for full penetration. No refusal encountered, no groundwater encountered. Bulk sample from 1-3'. Test pit about 15' long and excavated in an 'L' shape, and backfilled with loosely compacted excavated material.





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- **Mapping**

## TEST PIT LOG

**Project No:** 8809 – Copper Cove Water System Improvements

**Client:** Calaveras County Water District

**Project Location:** Copperopolis, California, Little John WWTP

**Test Pit Location:** Southeast Extent of Proposed Clearwell Tank

**Equipment:** Bobcat B-63 Mini Excavator with 2' Bucket and 2' Ripper

**Test Pit No:** TP – 2

**Total Depth:** 6.5 feet

**Date Excavated:** 9/23/22

**Elevation:** 791', Topo

**Logged by:** M. Crum



DEPTH	USCS	DESCRIPTION
0'-0.3'		DUFF: mainly organic material Grades to:
0.3'-6.5'		JURASSIC METASEDIMENTARY ROCKS: phyllite, pale olive (10Y 6/2), slightly weathered, weak, low to moderately hard, planar fractures, very tight to moderately open, northwest (310°/70 dip), spacing 0.5"-2", blocky structure

**Notes:** Ripper required to continue excavation below 4 feet. At 6 feet, six to ten passes required for full penetration. No refusal encountered, no groundwater encountered. Bulk sample from 1-3'. Test pit about 10' long and backfilled with loosely compacted excavated material.



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 (209) 532-0361 FAX (209) 532-0773  
 (209) 388-9601 FAX (209) 388-1778

- **Engineering**
- **Geotechnical**
- **Environmental**
- **Mapping**

## TEST PIT LOG

**Project No:** 8809 – Copper Cove Water System Improvements

**Client:** Calaveras County Water District

**Project Location:** Copperopolis, California, Signal Hill Tank

**Test Pit Location:** ~30 Feet East of Existing Redwood Tank

**Equipment:** Bobcat B-63 Mini Excavator with 2' Bucket and 2' Ripper

**Test Pit No:** TP – 1

**Total Depth:** 3.0 feet

**Date Excavated:** 9/23/22

**Elevation:** 982', Topo

**Logged by:** M. Crum



DEPTH	USCS	DESCRIPTION
0'-0.2'		ARTIFICIAL FILL: fine to coarse gravel, road base Sharp contact with:
0.2'-3'		JURASSIC METASEDIMENTARY ROCKS: phyllite, pale yellow brown (10YR 6/2), severely weathered, very weak, low hardness, fractures not well preserved oriented east/west (280°/60 dip). Classified as soil: Silty Sand, very dense (4.5TSF)

**Notes:** No refusal encountered, no groundwater encountered. Bulk sample collected from 1-2 feet below grade. Test pit about 6' long and backfilled with loosely compacted excavated material.





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(209) 388-9601 FAX (209) 388-1778

• **Engineering** • **Geotechnical** • **Environmental** • **Mapping** •

## TEST PIT LOG

**Project No:** 8809 – Copper Cove Water System Improvements

**Client:** Calaveras County Water District

**Project Location:** Copperopolis, California, Signal Hill Tank

**Test Pit Location:** ~30 Feet Northwest of Existing Redwood Tank

**Equipment:** Bobcat B-63 Mini Excavator with 2' Bucket and 2' Ripper

**Test Pit No:** TP – 2

**Total Depth:** 4.0 feet

**Date Excavated:** 9/23/22

**Elevation:** 982', Topo

**Logged by:** M. Crum



DEPTH	USCS	DESCRIPTION
0'-0.5'	SC	CLAYEY SAND, moderate brown
0.5'-4'		JURASSIC METASEDIMENTARY ROCKS: phyllite, moderate yellow brown (10YR 5/4), highly weathered, very weak, low hardness, fractures not well preserved, oriented northwest (310°/80 dip), blocky structure

**Notes:** Water from existing redwood tank seeping into test pit at 2 feet below grade. No refusal encountered. Test pit about 6' long and backfilled with loosely compacted excavated material.





# CONDOR EARTH

188 Frank West Circle, Suite I, Stockton, CA 95206  
 21663 Brian Lane, PO Box 3905, Sonora, CA 95370  
 1739 Ashby Road, Suite B, Merced, CA 95347

(209) 234-0518 FAX (209) 234-0538  
 (209) 532-0361 FAX (209) 532-0773  
 (209) 388-9601 FAX (209) 388-1778

- **Engineering**
- **Geotechnical**
- **Environmental**
- **Mapping**

## TEST PIT LOG

**Project No:** 8809 – Copper Cove Water System Improvements

**Client:** Calaveras County Water District

**Project Location:** Copperopolis, California, Signal Hill Tank

**Test Pit Location:** ~25 Feet Northeast of Existing Redwood Tank

**Equipment:** Bobcat B-63 Mini Excavator with 2' Bucket and 2' Ripper

**Test Pit No:** TP – 3

**Total Depth:** 2.0 feet

**Date Excavated:** 9/23/22

**Elevation:** 982', topo

**Logged by:** M. Crum



DEPTH	USCS	DESCRIPTION
0'-0.2'		ARTIFICIAL FILL: fine to coarse gravel, road base Sharp contact with:
0.2'-2'		JURASSIC METASEDIMENTARY ROCKS: phyllite, pale yellow brown (10YR 6/2), moderately weathered, weak, low to moderately hard, planar fractures, very tight to moderately open, northwest (310°/50 dip), spacing 0.5"-2", blocky structure

**Notes:** No refusal encountered, no groundwater encountered. Test pit about 4' long and backfilled with loosely compacted excavated material.











**UNIFIED SOIL CLASSIFICATION SYSTEM**

Division		Group Symbol	Group Name
<b>Coarse-Grained Soils</b> (more than 50 percent retained or the No. 200 sieve)	<b>Gravel</b> (% gravel > % sand)	<b>GW</b>	Well-graded Gravel (with Sand)
		<b>GW-GM</b>	Well-graded Gravel with Silt (and Sand)
		<b>GW-GC</b>	Well-graded Gravel with Clay (and Sand)
		<b>GP</b>	Poorly graded Gravel (with Sand)
		<b>GP-GM</b>	Poorly graded Gravel with Silt (and Sand)
		<b>GP-GC</b>	Poorly graded Gravel with Clay (and Sand)
		<b>GM</b>	Silty Gravel (with Sand)
		<b>GC</b>	Clayey Gravel (with Sand)
	<b>Sand</b> (% sand ≥ % gravel)	<b>SW</b>	Well-graded Sand (with Gravel)
		<b>SW-SM</b>	Well-graded Sand with Silt (and Gravel)
		<b>SW-SC</b>	Well-graded Sand with Clay (and Gravel)
		<b>SP</b>	Poorly graded Sand (with Gravel)
		<b>SP-SM</b>	Poorly graded Sand with Silt (and Gravel)
		<b>SP-SC</b>	Poorly graded Sand with Clay (and Gravel)
		<b>SM</b>	Silty Sand (with Gravel)
<b>Fine-Grained Soils</b> (50 percent or more passing the No. 200 sieve)	<b>Silt or Clay</b> LL < 50	<b>ML</b>	Silt (with Sand or Gravel), Sandy Silt (with Gravel), Gravelly Silt (with Sand)
		<b>CL-ML</b>	Silty Clay (with Sand or Gravel), Sandy Silty Clay (with Gravel), Gravelly Silty Clay (with Sand)
		<b>CL</b>	Lean Clay (with Sand or Gravel), Sandy lean Clay (with Gravel), Gravelly lean Clay (with Sand)
		<b>OL</b>	Organic Clay (with Sand or Gravel), Sandy organic Clay (with Gravel), Gravelly organic Clay (with Sand), organic Silt (with Sand or Gravel), Sandy organic Silt (with Gravel), Gravelly organic Silt (with Sand)
	<b>Silt or Clay</b> LL ≥ 50	<b>MH</b>	Elastic Silt (with Sand or Gravel), Sandy elastic Silt (with Gravel), Gravelly elastic Silt (with Sand)
		<b>CH</b>	Fat Clay (with Sand or Gravel), Sandy fat Clay (with Gravel), Gravelly fat Clay (with Sand)
		<b>OH</b>	Organic Clay (with Sand or Gravel), Sandy organic Clay (with Gravel), Gravelly organic Clay (with Sand), organic Silt (with Sand or Gravel), Sandy organic Silt (with Gravel), Gravelly organic Silt (with Sand)
<b>Highly Organic Soils</b>		<b>PT</b>	Peat and other highly organic soils

**Note:** Percentages are by dry weight. Soil classifications based on some criteria that are not shown. Group Name items in parentheses may or may not apply, depending on percent of sand or gravel.

Coarse Grained Soil Definitions	
Fraction	Particle Dimension or U.S. Standard Sieve Size/No.
Boulders	Above 12"
Cobbles	12" to 3"
Gravel - coarse - fine	3" to 3/4" 3/4" to No. 4
Sand - coarse - medium - fine	No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200

-  Split-barrel, 3-inch O.D., 2.43-inch I.D.
-  Split-barrel, 2.5-inch O.D., 1.93-inch I.D.
-  Standard Penetration Test (SPT), 2.0-inch O.D., 1.375-inch I.D.
-  Shelby Tube
-  Disturbed sample
-  No recovery
-  Groundwater level during drilling
-  Subsequent groundwater level

**Note:** O.D. = outside diameter I.D. = inside diameter



CONDOR EARTH TECHNOLOGIES, INC.

**LOG LEGEND AND  
SOIL CLASSIFICATION**

## **WEATHERING**

**Severely Weathered** – minerals decomposed to soil, but rock fabric and structure are preserved.

**Highly Weathered** – abundant fractures coated with oxides, carbonates, sulphates, mud, etc., thorough discoloration, rock disintegration, mineral decomposition.

**Moderately Weathered** – some fracture coating, moderate or localized discoloration, little to no effect on cementation, slight mineral decomposition.

**Slightly Weathered** – a few stained fractures, slight discoloration, little or no effect on cementation, no mineral decomposition.

**Fresh** – unaffected by weathering agents; no appreciable change with depth.

## **FRACTURE, JOINT, OR SHEAR SPACING**

(Spacing in Inches)

<b>Very little fractured</b>	Greater than 48
<b>Occasionally fractured</b>	12 to 48
<b>Moderately fractured</b>	6 to 12
<b>Closely fractured</b>	1.25 to 6
<b>Intensely fractured</b>	0.5 to 1.25
<b>Crushed</b>	Less than 0.5

## **THICKNESS OF SEDIMENTARY ROCK BEDS**

(Thickness in Inches)

<b>Very thickly bedded</b>	Greater than 72
<b>Thickly bedded</b>	24 to 72
<b>Medium bedded</b>	8 to 24
<b>Thinly bedded</b>	2.5 to 8
<b>Very thinly bedded</b>	0.75 to 2.5
<b>Laminated</b>	0.25 to 0.75
<b>Thinly laminated</b>	Less than 0.25

## **FRACTURE OR LAYER SEPARATION**

(Thickness of Separations in Millimeters)

<b>Very tight</b>	< 0.1 mm
<b>Tight</b>	0.1 – 0.5 mm
<b>Moderately open</b>	0.5 – 2.5 mm
<b>Open</b>	2.5 – 10 mm
<b>Very wide</b>	> 10 mm

## **FRACTURE OR LAYER ROUGHNESS**

**Very Rough** - Non-continuous, Hard joint rock wall

**Slightly Rough** - Hard joint rock wall

**Slightly Rough and Soft** - Soft joint rock wall

**Slickensided** - Open and continuous with gouge

**Soft Gouge** - Open and continuous with soft gouge

## **STRUCTURE**

**Intact/Massive** – intact rock specimens with few widely spaced discontinuities.

**Blocky** – well interlocked, undisturbed rock mass, consisting of cubical blocks formed by three intersecting joint sets.

**Very blocky** – interlocked, partially disturbed, with multi-faceted angular blocks formed by 4 or more joint sets.

**Disturbed/Seamy** – folded with angular blocks, formed by many intersecting joint sets, persistence of bedding planes or schistosity.

**Disintegrated** – poorly interlocked, heavily broken, mix of angular and rounded rock pieces.

**Laminated/Sheared** – lack of blockiness due to close spacing of shear planes.

## **STRENGTH**

**Plastic** or very low strength.

**Friable** – crumbles easily by rubbing with fingers.

**Weak** – an unfractured specimen of such material will crumble under light hammer blows.

**Moderately strong** – specimen will withstand a few heavy hammer blows before breaking.

**Strong** – specimen will withstand a few heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments.

**Very strong** – specimen will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments.

## **HARDNESS**

**Soft** – reserved for plastic material alone.

**Low hardness** – can be gouged deeply or carved easily with a knife blade.

**Moderately hard** – can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and is readily visibly after the powder has been blown away.

**Hard** – can be scratched with difficulty; scratch produced a little powder and is often faintly visible.

**Very hard** – cannot be scratched with knife blade; leaves a metallic streak.

## **GROUND WATER**

**Dry**

**Damp**

**Wet**

**Dripping**

**Flowing**



CONDOR EARTH TECHNOLOGIES, INC.

**ROCK PROPERTIES**

**APPENDIX C**  
**Laboratory Test Results**



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.8	22.2	12.3	19.0	14.9	27.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1-1/2"	100.0		
1"	97.9		
3/4"	96.2		
1/2"	92.8		
3/8"	87.1		
#4	74.0		
#8	63.9		
#16	54.8		
#30	46.4		
#50	39.3		
#100	33.0		
#200	27.8		

**Material Description**

Reddish Light Brown Silty Clayey Sand with Gravel

PL= 22      **Atterberg Limits**      LL= 27      PI= 5

**Coefficients**

D<sub>90</sub>= 10.8834      D<sub>85</sub>= 8.6156      D<sub>60</sub>= 1.7566  
D<sub>50</sub>= 0.8149      D<sub>30</sub>= 0.1023      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= SC-SM      AASHTO= A-2-4(0)

**Remarks**

F.M.=3.05

\* (no specification provided)

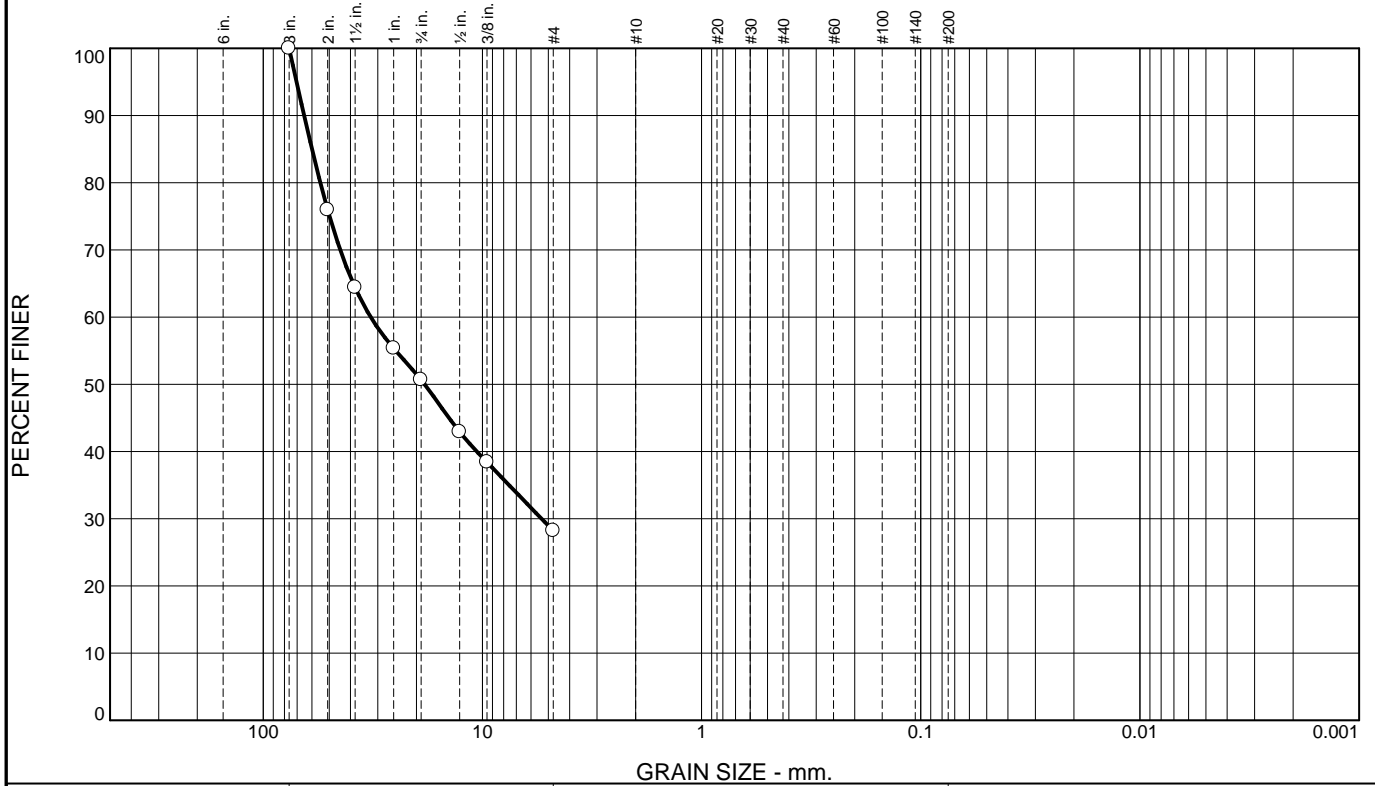
Location: Signal Hill Tank Site, TP-1      Depth: 1'-2'      Date: 11/28/2022  
Sample Number: SA-1 (CT-1, PI-1)

<b>CONDOR</b> <b>EARTH TECHNOLOGIES, INC.</b> <b>Stockton, California</b>	<b>Client:</b> Calaveras County Water District <b>Project:</b> Copper Cove Water System Improvements <b>Project No:</b> 8809
<b>Figure</b>	

Tested By: E. Carrasco      Checked By: R. Skaggs



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	49.3	22.5				28.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3.0"	100.0		
2.0"	75.9		
1.5"	64.4		
1.0"	55.4		
.750	50.7		
.500	42.9		
.375	38.4		
.187	28.2		

**Material Description**

Olive Brown Well Graded Gravel with Silt and Sand

**Atterberg Limits**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Coefficients**

D<sub>90</sub>= 65.0834    D<sub>85</sub>= 59.9309    D<sub>60</sub>= 32.3292  
D<sub>50</sub>= 18.3711    D<sub>30</sub>= 5.3730    D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_    C<sub>u</sub>= \_\_\_\_\_    C<sub>c</sub>= \_\_\_\_\_

**Classification**

USCS= \_\_\_\_\_ AASHTO= \_\_\_\_\_

**Remarks**

Coarse gradation only  
F.M.=2.18

\* (no specification provided)

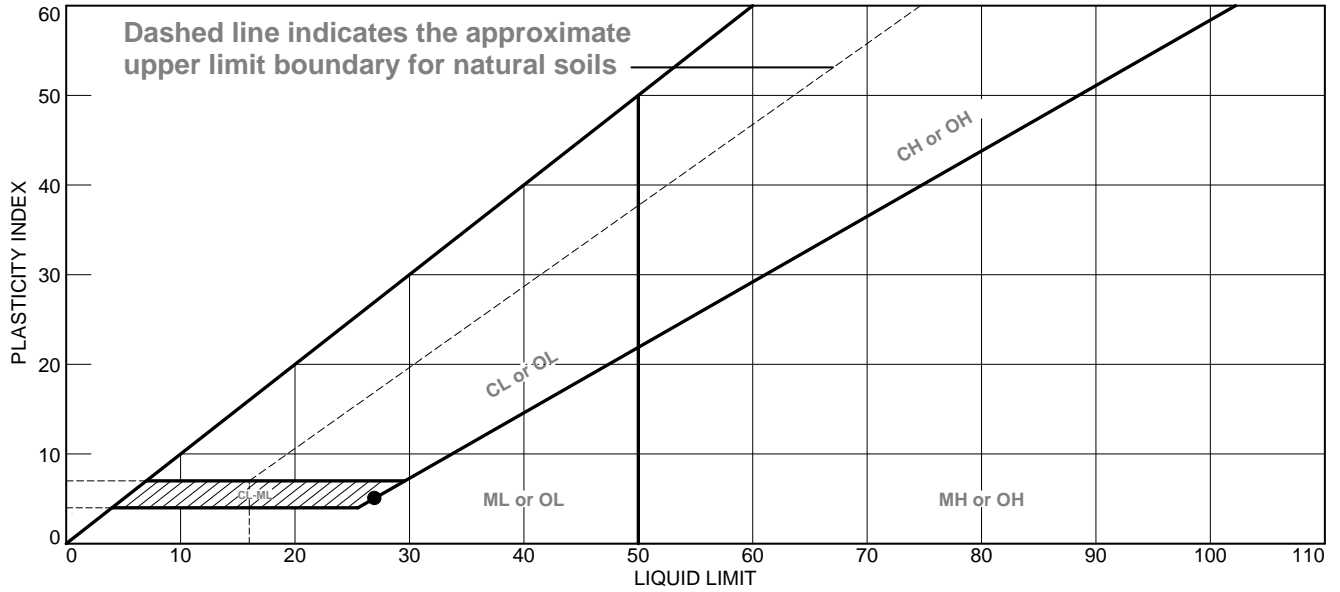
**Location:** Clearwell Tank Site, TP-1  
**Sample Number:** SA-1      **Depth:** 1'-3'

**Date:** 12/1/2022

<b>CONDOR EARTH TECHNOLOGIES, INC. Stockton, California</b>	<b>Client:</b> Calaveras County Water District <b>Project:</b> Copper Cove Water System Improvements <b>Project No:</b> 8809
<b>Figure</b>	

**Tested By:** E. Carrasco      **Checked By:** R. Skaggs

# LIQUID AND PLASTIC LIMITS TEST REPORT



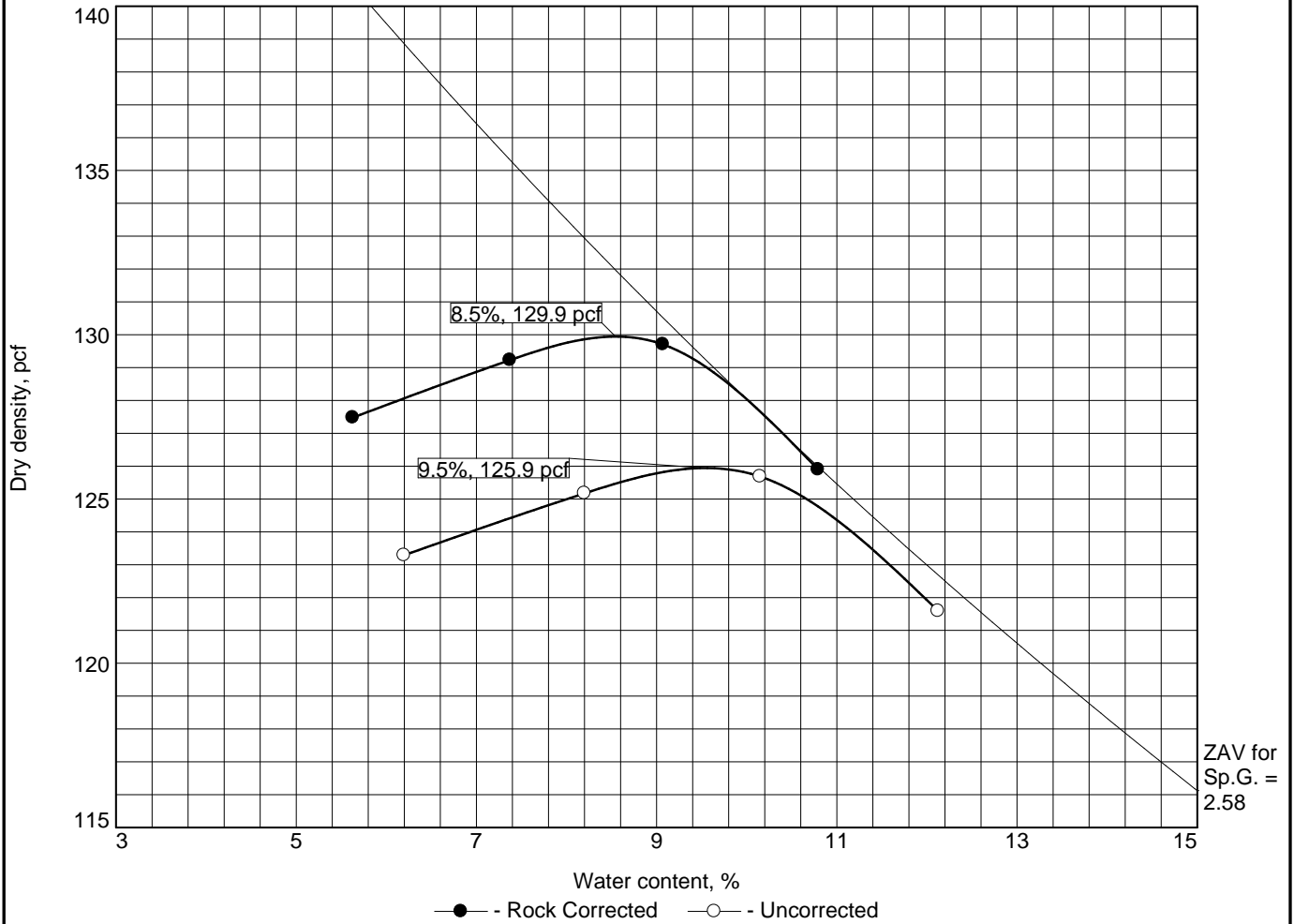
MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● Reddish Light Brown Silty Clayey Sand with Gravel	27	22	5	42.7	27.8	SC-SM

<b>Project No.</b> 8809 <b>Client:</b> Calaveras County Water District <b>Project:</b> Copper Cove Water System Improvements <b>Location:</b> Signal Hill Tank Site, TP-1 <b>Sample Number:</b> PI-1 (CT-1, SA-1) <b>Depth:</b> 1'-2' <b>CONDOR EARTH TECHNOLOGIES INC.</b> <b>Stockton, California</b>	<b>Remarks:</b> ● 11/28/2022
--	---------------------------------

Figure

**Tested By:** E. Carrasco      **Checked By:** R. Skaggs

# COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method B Modified  
 ASTM D4718-15 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
1'-2'	SC-SM	A-2-4(0)	4.1		27	5	12.9	27.8

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 129.9 pcf	125.9 pcf	Reddish Light Brown Silty Clayey Sand with Gravel
Optimum moisture = 8.5 %	9.5 %	

<b>Project No.</b> 8809 <b>Client:</b> Calaveras County Water District <b>Project:</b> Copper Cove Water System Improvements  Location: Signal Hill Tank Site, TP-1 <b>Sample Number:</b> CT-1 (PI-1, SA-1)	<b>Remarks:</b> 11/23/2022
<b>CONDOR EARTH TECHNOLOGIES INC.</b>  Stockton, California	

Figure

**Tested By:** E. Carrasco      **Checked By:** R. Skaggs



28 November, 2022

Job No. 2211021  
Cust. No. 12257

1100 Willow Pass Court, Suite A  
Concord, CA 94520-1006  
925 462 2771 Fax. 925 462 2775  
www.cercoanalytical.com

Ms. Laura Arista  
Condor Earth Technologies, Inc.  
188 Frank West Circle, Suite I  
Stockton, CA 95206

Subject: Project No.: 8809  
Project Name: Copper Cove Water System Improvements  
Corrosivity Analysis – ASTM Test Methods

Dear Ms. Arista:

Pursuant to your request, CERCO Analytical has analyzed the soil sample submitted on November 16, 2022. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurements, Sample 001 is classified as “moderately corrosive” and Sample 002 is classified as “mildly corrosive”. All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentrations were none detected at a detection limit of 15 mg/kg.

The sulfate ion concentration ranged from none detected to 32 mg/kg and are determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations.

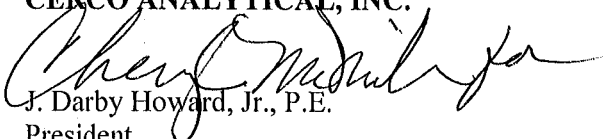
The pH of the soils ranged from 6.02 to 6.08 which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potentials range from 340 to 370-mV which is indicative of potentially “slightly corrosive” soils resulting from anaerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific design recommendations or consultation, please call *JDH Corrosion Consultants, Inc.* at (925) 927-6630.

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,  
CERCO ANALYTICAL, INC.

  
J. Darby Howard, Jr., P.E.  
President


JDH/jdl  
Enclosure

Client: Condor Earth Technologies, Inc.  
 Client's Project No.: 8809  
 Client's Project Name: Copper Cove Water System Improvements  
 Date Sampled: 11-Nov-22  
 Date Received: 16-Nov-22  
 Matrix: Soil  
 Authorization: Signed Chain of Custody

Date of Report: 28-Nov-2022

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2211021-001	TP-1@1-2' Signal Hill Tank	370	6.02	-	7,500	-	N.D.	32
2211021-002	TP-2 Clearwell Plant	340	6.08	-	11,000	-	N.D.	N.D.

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
Date Analyzed:	21-Nov-2022	21-Nov-2022	-	18-Nov-2022	-	21-Nov-2022	21-Nov-2022

  
 Sherri Moore  
 Chemist

\* Results Reported on "As Received" Basis  
 N.D. - None Detected

# Chain of Custody

221107

1100 Willow Pass Court  
Concord, CA 94520-1006  
925 462 2771  
Fax 925 462 2775



Job No.	CU#	Client Project I.D.	Schedule	Date Sampled	Date Due
	12247	8009		11/11/22	<b>RUSH</b>
Full Name			ANALYSIS		
Laura Arista			ASTM		
Company and/or Mailing Address			Redox Potential		
Condor Earth Technologies			pH		
Sample Source			Sulfate		
Copper Cove Water System Improvements			Chloride		
Lab No.			Resistivity-100% Saturated		
Sample I.D.			Brief Evaluation		
Date					
Time					
Matrix					
Contain.					
Size					
Preserv.					
Qty.					

Phone 209 728 x 4237  
Fax  
Cell

Lab No.	Sample I.D.	Date	Time	Matrix	Contain.	Size	Preserv.	Qty.	Redox Potential	pH	Sulfate	Chloride	Resistivity-100% Saturated	Brief Evaluation
1	CCWD-Signal Hill Tank TP-1 & 1'-2'	11/11	9:00a	S	Bag	9x9	None	1	x	x	x	x	x	x
2	CCWD-Clearwell Plant TP-2	11/11	9:00a	S	Bag	9x9	None	1	x	x	x	x	x	x

**RUSH**  
Date Due

MATRIX	DW - Drinking Water	ABBREVIATIONS	HB - Hosebib	SAMPLE RECEIPT	Total No. of Containers	
	GW - Ground Water		PV - Petcock Valve		Rec'd Good Cond/Cold	
	SW - Surface Water		PT - Pressure Tank		Conforms to Record	
	WW - Waste Water		PH - Pump House		Temp. at Lab -°C	
Water	RR - Restroom	PL - Plastic	Sampler			
SL - Sludge	GL - Glass	ST - Sterile				
S - Soil						
Product						

Relinquished By: *[Signature]* Date 11/11/22 Time 9:00am  
 Received By: *[Signature]* Date 11/15/22 Time 1600  
 Relinquished By: \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_  
 Received By: \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_  
 Relinquished By: \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_  
 Received By: \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

Comments:  
THERE IS AN ADDITIONAL CHARGE FOR EXTRUDING SOIL FROM METAL TUBES

Email Address: *larista@condor-earth.com*  
*ecarraslo@condor-earth.com*

**APPENDIX D**  
**U.S. Seismic Design Maps**





# CCWD Clearwell Tank Site

Latitude, Longitude: 37.90895972, -120.61587451



<b>Date</b>	4/14/2023, 10:38:48 AM
<b>Design Code Reference Document</b>	ASCE7-16
<b>Risk Category</b>	II
<b>Site Class</b>	C - Very Dense Soil and Soft Rock

Type	Value	Description
$S_S$	0.39	$MCE_R$ ground motion. (for 0.2 second period)
$S_1$	0.195	$MCE_R$ ground motion. (for 1.0s period)
$S_{MS}$	0.507	Site-modified spectral acceleration value
$S_{M1}$	0.293	Site-modified spectral acceleration value
$S_{DS}$	0.338	Numeric seismic design value at 0.2 second SA
$S_{D1}$	0.195	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	C	Seismic design category
$F_a$	1.3	Site amplification factor at 0.2 second
$F_v$	1.5	Site amplification factor at 1.0 second
PGA	0.165	$MCE_G$ peak ground acceleration
$F_{PGA}$	1.235	Site amplification factor at PGA
$PGA_M$	0.204	Site modified peak ground acceleration
$T_L$	12	Long-period transition period in seconds
$SsRT$	0.39	Probabilistic risk-targeted ground motion. (0.2 second)
$SsUH$	0.404	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
$SsD$	1.5	Factored deterministic acceleration value. (0.2 second)
$S1RT$	0.195	Probabilistic risk-targeted ground motion. (1.0 second)
$S1UH$	0.204	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
$S1D$	0.6	Factored deterministic acceleration value. (1.0 second)
$PGAd$	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
$PGA_{UH}$	0.165	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
$C_{RS}$	0.967	Mapped value of the risk coefficient at short periods



Type	Value	Description
$C_{R1}$	0.959	Mapped value of the risk coefficient at a period of 1 s
$C_V$	0.86	Vertical coefficient

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# CCWD Signal Hill Tank Site

Latitude, Longitude: 37.9127948, -120.6132588



<b>Date</b>	4/14/2023, 10:51:16 AM
<b>Design Code Reference Document</b>	ASCE7-16
<b>Risk Category</b>	II
<b>Site Class</b>	C - Very Dense Soil and Soft Rock

Type	Value	Description
$S_S$	0.389	$MCE_R$ ground motion. (for 0.2 second period)
$S_1$	0.195	$MCE_R$ ground motion. (for 1.0s period)
$S_{MS}$	0.506	Site-modified spectral acceleration value
$S_{M1}$	0.292	Site-modified spectral acceleration value
$S_{DS}$	0.337	Numeric seismic design value at 0.2 second SA
$S_{D1}$	0.195	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	C	Seismic design category
$F_a$	1.3	Site amplification factor at 0.2 second
$F_v$	1.5	Site amplification factor at 1.0 second
PGA	0.164	$MCE_G$ peak ground acceleration
$F_{PGA}$	1.236	Site amplification factor at PGA
$PGA_M$	0.203	Site modified peak ground acceleration
$T_L$	12	Long-period transition period in seconds
$SsRT$	0.389	Probabilistic risk-targeted ground motion. (0.2 second)
$SsUH$	0.402	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
$SsD$	1.5	Factored deterministic acceleration value. (0.2 second)
$S1RT$	0.195	Probabilistic risk-targeted ground motion. (1.0 second)
$S1UH$	0.203	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
$S1D$	0.6	Factored deterministic acceleration value. (1.0 second)
$PGAd$	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
$PGA_{UH}$	0.164	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
$C_{RS}$	0.967	Mapped value of the risk coefficient at short periods

Type	Value	Description
$C_{R1}$	0.959	Mapped value of the risk coefficient at a period of 1 s
$C_V$	0.859	Vertical coefficient

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**APPENDIX B:  
STORMWATER POLLUTION PREVENTION PLAN**

**APPENDIX C:  
CALAVERAS COUNTY WATER DISTRICT APPROVED  
MATERIAL LIST**

**SECTION 6**  
**APPROVED MATERIALS LIST**



**GENERAL**

<b>Item</b>	<b>Description</b>	<b>Manufacturer/Model</b>
Carrier Pipe	PVC or Ductile Iron Pipe with Restrained Joints	See Approved Water / Wastewater Material List
Carrier Pipe Skids	For carrier pipe sizes 12-inch diameter and less; Plastic High-Density Polyethylene, centered and restrained, with all stainless-steel hardware. Provide four (4) spacers per full stick of pipe unless otherwise approved by CCWD.	CALPICO / Model PX-SS CCI Piping Systems, Model CSPCASCAD E CCSPL (Gold)
Casing Pipe	Steel ASTM A283, Grade C, or ASTM A245 commercial grade. Conforming to CalTrans requirements.	
Casing Pipe End Seal	Seamless or Wrap Around with 2 ½-inch wide stainless-steel bands and permanent compression adhesive strips along split seam.	CALPICO, CCI Piping Systems, CASCADE
Concrete	CalTrans Specification Section 90, "Portland Cement Concrete." Maximum water/cement ratio to be 0.55. <i>Class A</i> – Type II Portland Cement (6 sack), 3,500 psi 28-day compressive strength, 2 to 4-inch slump. <i>Class B</i> – Type II Portland Cement (5 sack), 2,000 psi 28-day compressive strength, 2 to 4-inch slump.	
Concrete Bonding Adhesive	Bond fresh concrete to hardened concrete and steel. Use as admixture for grouting base plates.	SIKA / Sikadur 32
Grout	Concrete patching, sealing, filling, and repair for below grade structures.	ThoRoc/SP15 Spray Mortar BASF / SP 15 Spray Mortar
Paddle Marker	CalTrans Type Object Marker Standard Plans A73A and A73B. Flexible and vehicle impacts resistant. Provide colors, custom signage, custom decals and reflective sheeting to suite CCWD requirements. Provide anchor barbs or U-channel anchors.	CARSONITE, CRM (Road Marker), CTFM (Tuff-Flex Marker), SNFB (Sno Pole), CSS (Sign Support Post), CSP (Support Post)
Pipe Penetration Wall Seal	Mechanical modular rubber links to seal pipe to concrete wall openings with 316 stainless steel bolts and nuts. (watertight seal)	Link-Seal Model S-316 CCI Wrap- It Link, Type WL-SS
Reinforcing Steel	ASTM A615, Grade 60 for Class A concrete structures, Grade 40 for Class B concrete structures, unless otherwise specified.	Camblin Steel Service, Inc. or equal
Tracer Wire	#10 AWG solid copper, ASTM B-3, UL listed for direct burial applications, High Molecular Weight PE Insulation 0.045-inch (45 mil) thick, 600-volt.	AGAVE WIRE, PRO-LINE, PRO- TRACE AW Alan Wire KrisTech

Tracer Wire Connectors	Electrically connect tracer wires. Direct buy splice kit for underground applications. Install per manufacturer directions.	3M / DBR/Y-6DRYCONN / KDBR/Y-600
Utility Tape	10-mil minimum PVC tape for above and below ground use.	3M / Scotchrap 50, 51 Christy's Calpico
Warning Tape	6-inch wide 4-mil tape marked as follows: Water – Colored Blue “CAUTION: Water Line Below” Sewer – Colored Green “CAUTION: Sewer Line Below”	PRESCO / BRADY
Wire Welded Fabric	ASTM A185, size and spacing per Plans.	

**WATER**

Item		Description	Manufacturer/Model
Angle Meter Stop		ANSI/AWWA C800, NSF/ANSI 61 compliant, locking wing, no-lead/low-lead brass, w/insert stiffeners, grip joint for CTS PE or Copper Tubing, 300-psig working pressure.	Ford / BA43-xxxW-NL, BFA43-xxxW-NL Mueller / P-24258N, P-24276N
Backflow Prevention Devices			
1. Reduced Pressure Assembly	1. Reduced Pressure (NSF-61, lead free)	1" – 2"	Febco / LF825Y Watts / L F 909 / Zurn 975XL2 / Apollo RPFL 4A
		4"- 10"	Watts / LF909, LF957RPDA / Ames / C400, LFC500 / LFM500 / Zurn 375AST/375ASTDA
2. Double Check Detector Valve Assembly (Commercial Only)	3. Double Check Detector (NSF-61, lead free)	4" – 10"	Watts / LF757DCDAOSY Ames / Colt LFC300OSY / Zurn 350ADA / 350ASTDA
Bolts and Nuts, for fittings, valves, etc.		Conforming to AWWA C111, Flange Connections – ASTM A307, Gr B, with Xylan coating. Mechanical Joints T-Bolts and Nuts – Cor-Ten with Xylan coating	TRIPAC 2000 ROMAC R-BLUE Sigma COR-BLUE Tyler Union / Flurokote #1
Corporation Stop (Ball Corp)		ANSI/AWWA C800, NSF/ANSI 61 compliant, no-lead/brass (MIP thread inlet x Pack Joint outlet for CTS with set screw)	Ford / FB1100 NL4 / Mueller P-25028N
Coupling, Flange Adapter (Operating pressure not to exceed rated pressure)	Unrestrained	AWWA C219, NSF/61 compliant, Ductile Iron, fusion bonded epoxy coated bolts and nuts, 304 stainless steel for water systems and 316 stainless steel for sewer systems.	ROMAC / FCA 501, Macro HP FC, Krausz, Hymax-2
	Restrained	AWWA C219, NSF-61 certified, ductile iron body fusion bonded epoxy coated with stainless steel bolts and nuts.	ROMAC / RFCA/RFCA-PVC-Mueller / Hymax Grip / EBAA / 2100 MegaFlange
Dismantling Joint, Restrained		Double ended flanged adapter, adjustable length, Fusion bonded epoxy, NSF 61 certified, AWWA Class-E (275-psig) flanges, all stainless-steel bolts, nuts and tie-rods.	ROMAC / DJ 400 / DJ 405 / FORD FDJ-ExxY-R-U

Fire Hydrants (Dry-Barrel / 250-psig rated)	AWWA C502, NSF/ANSI 61 Compliant, 5 ¼-inch main valve and two (2) 2 ½-inch hose nozzle, one pump nozzle, 6-inch MJ shoe connection, upper barrel epoxy lined and coated with exterior UV resistant alkyd enamel topcoat, bronze drain, color: per local Fire District.	Mueller / 250, A-423 American Darling / B-84-B-5
Fittings, Brass (Underground Service Line Fittings)	AWWA C800, NSF/ANSI 61 compliant, heavy cast brass, lead free.	Mueller / Ford Meter Box
Fittings, Ductile Iron	ANSI/AWWA C 110, C 111, C 153, C116, NSF/ANSI 61 and 372 compliant, ductile iron, for water systems fusion bonded epoxy coating and lining for use with C900 PVC or zinc coated cement mortar lining for use with ductile iron pipe, for sewer lift stations ceramic novalac epoxy lining (Protecto 401).	US Pipe Tyler Union Sigma Corp Star Pipe Products
Fittings, PVC	Twin Gasketed, High Deflection Coupling (2.5-deg per side, 5-deg per joint)	NAPCO Fluid-Tite
Gate Valves Bronze, Brass	Above Ground ¼ to 2-inch, non-rising, solid disk (lead free required for water systems).	Red-White / 206/206AB-LF, 267/267AB-LF
Meter Idlers	ANSI/AWWA C800, NSF/ANSI 61 compliant, no-lead/low-lead brass.	Ford / Idler-3,-4, -6, -7 Mueller / H-10887
Meter Valve	ANSI/AWWA C800, NSF/ANSI 61 compliant, no-lead/low-lead brass.	Ford / B43-444W-NL, B Mueller / B-24351N, B-24337N
Pipe, Brass and Fittings	Lead free, NSF 61 and 372 compliant, Red Brass Nipples, ASTM B43, Sch 40 and 80, ASME B1.20.1 threads, fittings conforming to ASME B16.15, Class 125 and Class 250.	Matco Norca / Merit Brass
Pipe, Ductile Iron	ANSI/AWWA C 151, C111, C115, C116, C104, NSF/ANSI 61 compliant. Zinc coated and cement mortar lined for water service, and ceramic novalac epoxy lining (Protecto 401) for	American Ductile Iron Pipe McWane Ductile U.S. Pipe

	sewer service. Pressure Class 350 (bell and spigot joints) and Special Thickness Class 53 (flanged).	
Pipe, Restraining mechanisms	Restraining glands with gripping type wedges, integral gasket and locking segments. Ductile iron mechanical joint restraint glands to be furnished polyester coated with fluoropolymer coated nuts and bolts.	EBABA / Megalug / Romac / Grip Ring / US Pipe/ TR Flex, Tyton w/Field Lok / American / Flex-Ring, Fastite Sigma / One-Lok / McWane / TR Flex
Pipe, PVC C900	ANSI/AWWA C900, NSF/ANSI 61 Compliant. (Both restrained and unrestrained joints). PR 235 (DR18) under 150-psi, PR 305 (DR14) 150-psi and above. Color coded to service (water, sewer, and reclaimed water).	NAPCO (C900 & Certa-Lok RJIB) / JM Eagle (Blue Brute & Loc 900) / Diamond Plastics (C900 & Lok-21) / Vinyltech
Pressure Reducing Valves (Globe)	Ductile Iron Body w/Fusion Epoxy Lined and Coated, SS trim and tubing, flange connections. (Class 150 under 200-psi, Class 300 at/above 200-psi)	CLA-VAL / 90G-01BCSYKCX / CLA-VAL / 50A-01KO-BKCX
Pressure Relief Valves	Ductile Iron Body w/Fusion Epoxy Coated Inside, Bronze trim and tubing, flange connections	CLA-VAL / 50A-01 BKCX
Sampling Station	Water quality sampling stations w/ brass pipe bury encased in galvanized pipe and vent tube to prevent freezing.	Kupferle Foundry / Eclipse #88
Service Coupling Compression (no lead)	1 to 2-inch PE CTS tubing	Ford / C44-44-NL, C44-77-NL Mueller / P-15403N

Service Fittings (no lead)		Bronze Adaptors Couplings, Bends and Unions	Ford / L44-44-NL, L44-77-NL Mueller / P-15526N (90-deg bend)
Service Saddles		ANSI/AWWA C800, compliant with NSF/ANSI 61, Double strap, bronze, IP threads.	Romac / 202B (under 200-psi) / Mueller BR2B (ductile iron under 200-psi / Jones / J-996 or Mueller H-13000 (PVC under 200-psi) / Ford 5912 (PVC under 150-psi) / Romac 202NSSU (ductile iron above 200-psi to 350-psi)
Service Tubing		ANSI/AWWA C 901, Flexible Polyethylene tubing, CTS, ASTM D2737/D3350, PE4710, NSF/ANSI 61, 14 and 372 compliant, SDR 9, 250-psi rated.	Centennial Plastics 4710 JM Eagle HDPE Water Service / ADS PolyFlex Potable (CTS PE4710)
Tapping Sleeves		AWWA C223, Fabricated ASTM A36 steel sleeve, epoxy coated or stainless steel, all nuts and bolts stainless steel, test plug, NSF 61 compliant, AWWA C207 Class E Flange, 250-psi working pressure rated .	Romac / FTS 420, STS420, SSTIII Ford / FTSC, FTSS, FTSAS / Power Seal / 3460CS, 3460HP, 3490AS
Utility Boxes	Blow-Off, Air Valves	Steel Cover marked "Water". Size as shown on drawings. Provide vent tubes for all air valves.	Box: Christy B1730, FL36 & B40 Covers & Vent Tubes: Placer Waterworks PW/AE218-M, PW/AE3618-M, PW/AE318
	Valve Box	Concrete w/traffic lid	Christy Concrete Products / G5
	Meter Box and AMR Cover (5/8" – 1" meter)	<b><u>Below Elev. 2,500 feet</u></b>	Christy Concrete Products / N30 with R-Series Composite Lid (non-traffic rated) / OldCastle / Fibrelyte FL30 (incidental wheel loads Tier 8 loading, off pavement)
		<b><u>Above Elev. 2,500 fee</u></b>	Heavy Wall BCF1324 with polymer concrete lid / Oldcastle / Fibrelyte FL30
Meter Box and AMR Cover (1½ " – 2" meter)	<b><u>Below Elev. 2,500 feet</u></b>	Christy Concrete Products / N36 with R-Series Composite Lid (non-traffic rated) / Oldcastle / Fibrelyte FL36 (incidental wheel loads Tier 8 loading, off pavement)	

		<u>Above Elev. 2,500 fee</u>	Carson / Heavy Wall BCF1730 with polymer concrete lid (Tier 8 loading) / Oldcastle / Fibrelyte FL 36 (Tier 8 loading)
Valves	Air / Vacuum	1-inch and 2-inch inlet, pump applications, vacuum break, AWWA C512 and NSF 61 and 372 compliant, underground, fusion epoxy lined and coated AWWA C550, 300-psi rated.	Cla-Val 33A/ ValMatic / 101S, 102S
	Air Release	1-inch and 2-inch inlet, stainless steel lever, place on long ascending pipeline, AWWA C512 and NSF 61 and 372 compliant, underground, fusion epoxy lined and coated AWWA C550, 300-psi rated.	APCO / 200A / ValMatic / CMC 38 / Cla-Val 34
	Combination	1-inch and 2-inch inlet, single body, placed at high points, AWWA C512 and NSF 61 and 372 compliant, underground, fusion epoxy lined and coated AWWA C 550, 300-psi rated.	APCO / S-143C, S-145C / ValMatic / 201C.2, 202C.2 / Cla-Val / 36 & 39
Valves, Ball (1" – 2")		Brass or Bronze, above ground use, threaded joint ends, NSF 61 and 372 compliant.	Red-White / 5044F, 5049AB LF Crane / , LF9202 / NIBCO T-FP600A-LF
Valves, Butterfly (> 12")		AWWA C504 Class 250B, Ductile Iron Body, ss shaft, epoxy coated/lined, ANSI B16.1 125# Flange, NSF 60 and 372 compliant.	Mueller / Lineseal XPII Pratt / HP 250II / Val-Matic / VM-2004
Valves, Gate, Brass/Bronze (1" – 2")		Above ground use, non-rising, solid disk, screwed ends, NSF 61 and 372 compliant.	Red-White / 206AB LF / NIBCO T-113-LF
Valves, Gate, Resilient Wedge (2" – 12")		AWWA C509 or C515, ductile iron, NRS, open left, NSF61 and 372 compliant, 2-inch square operating nut (unless otherwise noted), fusion epoxy coated and lined. By-pass valve required for 16-inch and larger. Type 316 stainless steel stems and hardware for sewer	Mueller / A-2361 American Darling / 2500 & 3500 / Kennedy Valve / KS-FW, KS-RW

	service.	
Valves, Tapping	Tapping valves shall be resilient wedge gate valves. The mating valve flange to the tapping sleeve outlet must have a raised male face, conforming to MSS SP-60, to ensure true alignment of valve and tapping sleeve.	American Darling / Mueller / Kennedy Valve
Vault, Precast Concrete	For pressure reducing stations, control valves, sump pit. Non-traffic Cover: Double leaf aluminum, top mounted, bolt down, torsion rod, spring assisted, hot dip galvanized, non-skid surface, recessed padlock hasp, safety bar, stainless steel hardware. Traffic Cover: Double leaf aluminum, flush mounted, bolt down, H20 traffic rated, torsion rod, spring assisted, recessed padlock hasp, stainless steel hardware,	Christy / Oldcastle / Jensen Precast / Vault Access Solutions (VAS) / BILCO

*Note: All material coming in contact with potable water is to be ANSI/NSF 61 compliance*



**SEWER**

<b>Item</b>	<b>Description</b>	<b>Manufacturer/Model</b>
Air/Vacuum Valve and Air Release (Combination air-valve)	Stainless steel body, polypropylene float, specifically designed for sewage and wastewater, 250-psi rated (optional Nylon body requires CCWD approval).	A.R.I. USA / Model D-025L
Cleanout Box	Concrete traffic valve box with iron lid marked "SEWER"	Christy Concrete Products / G5CBOX
Liner Systems – Existing Concrete manholes/vaults	1. Microsilica enhanced, fiber reinforced wet spray mortar for underground use. 2. PVC t-ribbed sheet lining 3. 100% solids Epoxy system	1. BTF / ThoRoc SP15 Spray mortar 2. Ameron / Arrow-Lock System 3. ConTech / Hdro-pox 251
Liner Systems – New Concrete manholes/vaults	PVC T-ribbed sheet cast into concrete manhole/vault components.	Ameron / T-Lok PVC Liner / Armorlok PVC Linder / Epoxy coating
Manhole Frame and Cover	24-inch diameter cast iron frame and cover, with machined seats, closed pickhole, O-ring gasket, marked "SEWER"	South Bay Foundry/ SBF-1900 D&L Foundry / A-1024-R4
Manhole, Precast Concrete Epoxy coated T-Lok	Manhole barrel section, bases, concentric cones, grade rings designed for minimum H-20 loading, manufacturer to supply integrated rubber watertight pipe connectors and flexible joint gaskets.	Jensen Precast Oldcastle Hanson Pipe & Precast Armorock (polymer concrete)
Mortar Seal	Sealing and filling at pipe openings and joints.	
Pipe Connector – Manholes	ASTM C-923, rubber Flexible type pipe connector for manholes, stainless steel clamps.	NPC/ Kor-N-Seal (cored hold) / A-Lok / G3 (cored hole) / Press-Seal / PSX Direct Drive Nitrile (cored hole) / Press-Seal / WS Water Stop (caste in place) / A-Lok / Water-Stop
Sewer Pipe & Fittings, Gravity (4" – 12")	<u>SDR 26 (PS115), PVC complying with ASTM D1784, ASTM D-3034 and F1336, integral bell joint</u> ASTM D3212, gasket ASTM F477,	JM Eagle / NAPCO / Diamond Plastics / HARCO Fittings / TIGRE

	<u>Color:</u> Green	
Sewer Service & Fittings, Pressure	PVC Pipe ASTM D-1785 sch 40 or 80, Socket type fittings ASTM D-2466	
Sewer Popper	Sewer popper valve at building	Jones Stephens / sewer popper #S62-304

**ATTACHMENT A – COUNTY PUBLIC WORKS UTILITY  
ENCROACHMENT PERMIT**



# COUNTY OF CALAVERAS

## DEPARTMENT OF PUBLIC WORKS

### PRELIMINARY ENCROACHMENT PERMIT

Application Date: 12/12/24      Utility: CCWD      76-UE-24  
Road Name:  
Little John Road and Charmstone Way

**Prior to Permit Issuance** (Items required are marked with "x")

- The submitted plans need the following changes.
  - Provide redline corrections on sheets G01, T01, T05, and T06
  - Provide WDID for the proposed LUP
- Provide traffic control plan that conforms to the current California Manual of Uniform Traffic Control Devices (MUTCD).
- Provide evidence of Caltrans approval of signage for Hwy \_\_\_\_\_.
- Prepare and submit an Engineers Estimate for the cost of work to restore County right of way. \$ \_\_\_\_\_
- Post \$ \_\_\_\_\_ Performance Bond (Based on 138% of Engineers Estimate).
- Post **\$35,000** Inspection Fee Deposit **2100-2308**
- Pay \$500 License Agreement Fee for \_\_\_\_\_ in right of way.
- Provide evidence of \$1 Million Liability Insurance with Calaveras County as Additional Insured for work in right of way.
- Provide Erosion and Sediment Control Plan Worksheet (ESCP)
- Provide haul route(s) /disposal area of excavated materials. The disposal of the 8,900 cubic yards +/- may require a separate permit for the disposal location.
- Provide Permit to Excavate from the Division of Industrial Safety
- Permittee and Contractor sign and date Page 8, Utility Encroachment Permit

\_\_\_\_\_ *Staff initial items when complete, \*NA when not applicable*

Upon issuance of an Encroachment Permit, permission to encroach will be granted to the permittee and their designated contractor to perform the work specified in the application subject to the terms and conditions set forth in the County of Calaveras Department of Public Works General Permit Conditions and Specifications for Trench Cuts and Street Resurfacing, Calaveras County Code of Ordinances, and the **Utility Encroachment General Conditions** as follows:

**Road PCI for pavement restoration:**

**Little John Road PCI = Kiva Place to Moccasin Street = 30**

**Little John Road PCI = Moccasin Street through station 94+50 = 90+**

**Charmstone Way PCI = 40**

## Utility Encroachment General Conditions

**Acceptance of Provisions:** It is expressly understood and agreed by the Permittee<sup>1</sup> that the work performed under this Encroachment Permit constitutes an acceptance of all the applicable provisions of the **County of Calaveras Department of Public Works General Permit Conditions and Specifications for Trench Cuts and Street Resurfacing dated 10/16/2019 (Policy)**.

**Encroachment Permit:** Other than emergency repairs, there shall be no work performed in the public Right-of-Way until a Utility Encroachment Permit (Encroachment Permit or Blanket Permit) is issued. A copy of the Permit, a set of approved plans, and permits required by any other legally constituted authority shall be on site at all times construction is in progress. Encroachment Permits may be revoked at the discretion of the Director of Public Works.

**Permittee Acknowledgment:** By acceptance of this Permit, the Permittee agrees that whenever future construction, reconstruction, or maintenance work upon the road may require removal or relocation, installations or encroachment must be removed from the Right-of-Way in accordance with Municipal Code Section 12.08.320.

**Prior Notice of Work Start:** Permittee shall notify Public Works at 209-754-6401 a minimum of two full working days, excluding weekends and holidays, prior to starting a project and prior to each subsequent phase of construction. Before work is started, the Permittee shall furnish names and telephone numbers of persons on-call if the County requires emergency work at the jobsite. In addition, the Permittee shall notify Dig Alert/USA at 800-227-2600 a minimum of 48 hours (two working days) prior to any excavation. In emergencies, immediately contact the County Public Works Department at 209-754-6402. Where work impacts private driveway, notify resident 7 days in advance of work.

**Standards and Specifications:** All work within the public Right-of-Way shall be performed in accordance with the current applicable County of Calaveras and State of California standards, and Caltrans Standard Specifications.

**Inspection:** All construction performed in relation to an Encroachment Permit shall be inspected by the County prior to and during installation except as otherwise determined by the Director of Public Works.

**Performance Period:** Within two years from the time the County approves and accepts the Permittee's completed work or from the time the County accepts and closes out the encroachment permit, the County and/or Permittee shall inspect the work to ensure the pavement has not failed<sup>2</sup>. If the trench fails within this period, the Permittee will be required to make the necessary repairs as directed by the Director of Public Works.

**Trench Failure and Repair:** If the trench fails after the two-year Performance Period, and the Permittee did not follow the requirements outlined in the Policy, the Permittee will be required to make the necessary repairs as directed by the Director of Public Works. If the Permittee has submitted all compaction testing documentation, and if the failure is attributable to the excavation, repaving the excavation, or resulting from a failure of the utility service, the Permittee shall coordinate the proposed trench repair method and schedule with the Director of Public Works.

**Traffic and Access:** No road shall be closed without authorization from the Director of Public Works. An authorized road closure will allow the detour of *through* traffic only.

**Traffic Control:** Traffic control shall conform to the current California Manual of Uniform Traffic Control Devices (MUTCD).

<sup>1</sup> Permittee shall mean the Utility Encroachment Permit applicant and/or the owner of the facilities, or any and all successors in interest to the facilities, for which the permit was issued under the provisions of this Policy.

<sup>2</sup> Settlement of 3/8 inch or greater with a 6 foot straight edge will be cause for repair in the case of settlement, or replacement in the case of unsatisfactory workmanship. Trench settlement that results in water ponding or other drainage issues may also be considered inadequate despite meeting the aforementioned requirements.

## Utility Encroachment General Conditions

**Working Hours:** Except for emergency repairs, no work shall be performed within County road Right-of-Way on weekends, County holidays, before 7 AM or after 6 PM unless authorized by the Director of Public Works.

**Surplus Materials:** There shall be no equipment or materials stored or stockpiled in road Right-of-Way except as approved by the Director of Public Works.

**Clean up and Dust Control:** Throughout all phases of construction, including suspension of work, the Permittee shall regularly clean and sweep to keep the work site clean and free from rubbish and debris.

**County Facilities:** Prior to construction, the Permittee may be asked to assess the condition of County facilities within project limits. Any damages to County facilities during construction shall immediately be brought to the attention of the County. If the County identifies any deficiencies as a result of Permittee activity, the condition assessment documentation shall provide a record of prior condition. Failure to provide condition assessment data could result in Permittee liability.

**Pavement Removal:** As much as possible, underground work shall be confined to the shoulder area outside of the traveled way. Trenching within the wheel path shall be prohibited unless no other options or alternatives exist. Paving shall be cut for removal and excavated in a manner that does not disturb the adjacent pavement. It is the permittee's responsibility to secure a disposal site and permission to use that site. For off-site disposal greater than 50 cubic yards, a grading permit is required.

**Depth of Installation:** Underground installations of wet utilities shall have a minimum cover below finished grade of 36 inches in accordance with Ordinance 2295 and as indicated by the attached drawings and applicable County standards.

**Separation of Utilities:** Adequate separation shall be maintained between new or replaced underground main lines from existing sewer lines, water lines and drainage culverts. The alignment of new main installations or replacement of existing mains shall be shown in the permit application. Unless specifically authorized by the Director of Public Works:

- The minimum separation for new or replaced main lines running parallel shall be 3 feet from outside of pipe to outside of pipe.
- The minimum separation for new or replaced main line crossings shall be 1 foot clear from outside of pipe to outside of pipe.

County requirements do not supersede State requirements.

**Open Trench:** The maximum length of open trench (excavation or backfill not resurfaced) allowed during construction within the paved surface or shoulder shall be the distance of construction that can be reasonably installed in a single day. Contractor's personnel shall protect the traveling public from any open trenches at all times. Where pavement has been removed, a minimum of 2 inches of temporary paving or sufficient temporary paving to match the grade of the travel way (as applicable) shall be placed before that area is made available to traffic.

**Backfill Material:** Material for backfill, with the exception of pipe bedding, shall be:

- Class II Aggregate Base (AB) for trenches within the roadway and up to 3-feet beyond the edge of pavement, or equal as approved by the Director of Public Works; or
- Native material for trenches outside of roadway and greater than 3-feet beyond the edge of pavement. Select native material shall be free from organic matter, debris, and rock larger than 4 inches, and shall generally conform to the following gradation

## Utility Encroachment General Conditions

Sieve Size	% Passing
4"	100
3"	95-100
#4	50-100
#200	0-50

- Or two-sack slurry or greater.

**Asphalt Concrete (AC):** AC mix formula shall be prepared by an approved certified independent laboratory under the supervision of a certified asphalt technician. Finish coarse shall be 1/2-inch Type A, PG 64- 16 conforming to Caltrans State Standard Specifications, Sections 39 and 92. AC shall not be applied to ground temperatures lower than 50°F/10°C.

**Relative Compaction (RC):** AC shall be placed in layers not to exceed 0.20 feet and compacted to a minimum of 95% RC<sup>3</sup>. Aggregates placed beneath paved surfaces and within 3 feet of the edge of pavement shall be compacted to achieve a minimum 95% RC<sup>4</sup>. Soils placed beyond 3 feet of the edge of pavement shall be compacted to achieve a minimum of 90% RC<sup>4</sup>.

**Compaction Testing Frequency and Location:** Trench backfill testing shall be at random 100-foot maximum intervals. After three (3) successful tests the intervals may be increased by 50 feet increments per successive successful tests up to a maximum interval of 250 feet. One test shall be performed for each 4 feet of depth or fraction thereof starting at the top of the installation. Twenty percent (20%) of laterals and one hundred (100%) of manholes shall be tested independently of the main line. Failure of a compaction test will result in the entire area represented by that test being uniformly reworked and retested at a random location. Additionally, a failed test, at the discretion of the County, may result in more frequent compaction testing to a minimum of 100-foot intervals. The use of two-sack slurry in lieu of compacted materials shall be exempt from compaction testing requirements.

**Test Reports:** Tests shall be certified by a registered California Civil or Geotechnical engineer or testing laboratory in accordance with the State of California test requirements. The test report shall include an accurate description of the test location. **Compaction reports shall be submitted to the County's inspector and approved prior to permanent paving.**

**Trench Pavement Repair:** Trench edges shall be sawcut or cold planed with straight lines to a minimum depth of 2 inches and to a minimum of 1 foot beyond the edge of trench. The repaired section shall be patched with hot-mix asphalt of equal thickness to existing asphalt but not less than 2 inches thick, flush with the existing paving. A tack coat of emulsified asphalt shall be applied to all edges/surface of old pavement prior to placement of new asphalt concrete surface material.

**Overlay Paving or Resurfacing:** When a trench is 300 feet or longer, or when removing six or more separate areas of pavement equal to 15% of the total area of a lane (excluding work done within the paved shoulder) within a continuous 300-foot length of street, pavement restoration shall be required in accordance with Table 1.

<sup>3</sup> 95% RC of Caltrans Test Method CTM-308 or 92% RC of Caltrans Test Method CTM-309 (or equivalent).

<sup>4</sup> RC of ASTM D1557 or Caltrans Test Methods CTM 216 and CTM 231 (or equivalent).



# COUNTY OF CALAVERAS

## DEPARTMENT OF PUBLIC WORKS

**Table 1 – Pavement Restoration Options**

Street Category	Options
<b>A</b>	<p><b>Option 1</b> - Trenching prohibited. Directional boring or jacking may be permitted.</p> <p><b>Option 2</b> - Grind and replace length of trench with 2” overlay over half road width.</p> <p><b>Option 3</b> - 1 ½” overlay over entire road surface for length of trench with shoulder backing as appropriate.</p> <p><b>Option 4 - (Qualified Projects)</b> - CIP Project, eligible for in-lieu cash contribution.</p>
<b>B</b>	<p><b>Option 1</b> - Grind and replace length of trench with 2” overlay over half road width.</p> <p><b>Option 2</b> - Type II or Type III Microsurface across entire road width for length of trench.</p> <p><b>Option 3</b> - Other approved resurfacing method to conform to current road conditions.</p> <p><b>Option 4</b> - Directional boring or jacking may be permitted.</p> <p><b>Option 5 - (Qualified Projects)</b> - CIP Project, eligible for in-lieu cash contribution.</p>
<b>C</b>	<p><b>Option 1</b> - Trench pavement repair (per Section 8.2) and crack seal trench. No additional pavement restoration required.</p>

**STREET CATEGORIES**

- A**-Street newly constructed or repaved within 3 years of trench cut application date or PCI of 80 or greater.
- B**-Street in good or fair condition, not constructed or repaved within 3 years, and PCI of less than 80 or greater than 45.
- C**-Street in poor condition, PCI 45 or less.

**Liability for Damages, Bonding, and Insurance:** The Permittee is responsible for all liability for personal injury or property damage which may arise out of the permitted work, or which may arise out of failure on the Permittee’s part to perform the requirements of this Permit.

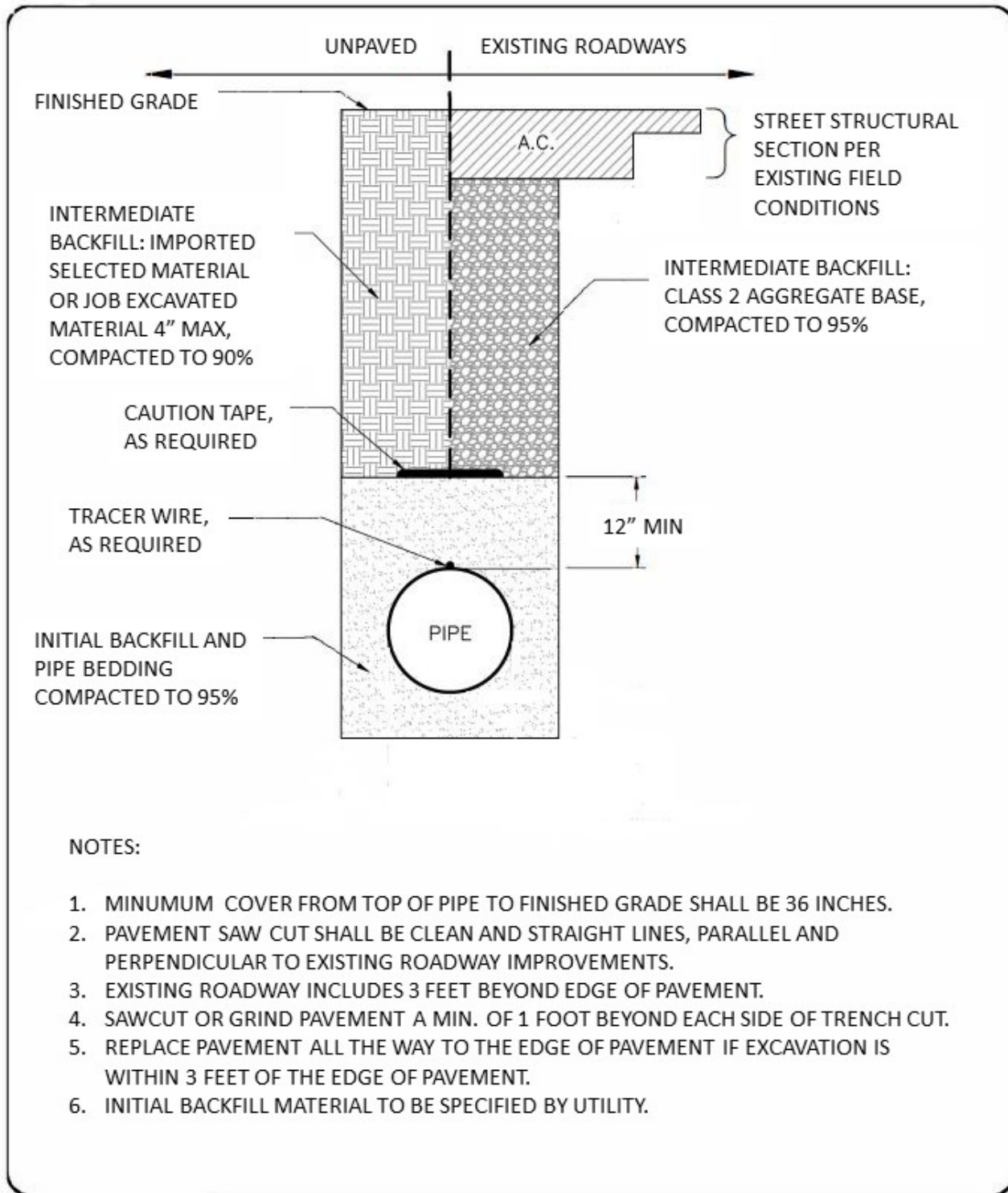
**Exceptions:** Exceptions to the Policy are as follows:

- Emergencies that endanger life or property.
- Interruption of an Essential Utility service.
- Service for buildings where no other reasonable means of providing service exists.
- Boring is not feasible due to technical engineering reasons.

If an exception is granted by the Director of Public Works, trenching and restoration efforts shall continue to be governed by the Policy. All reasonable efforts must be made by the Permittee to restore the road to its original condition.



County of Calaveras  
Standard Trench Specifications

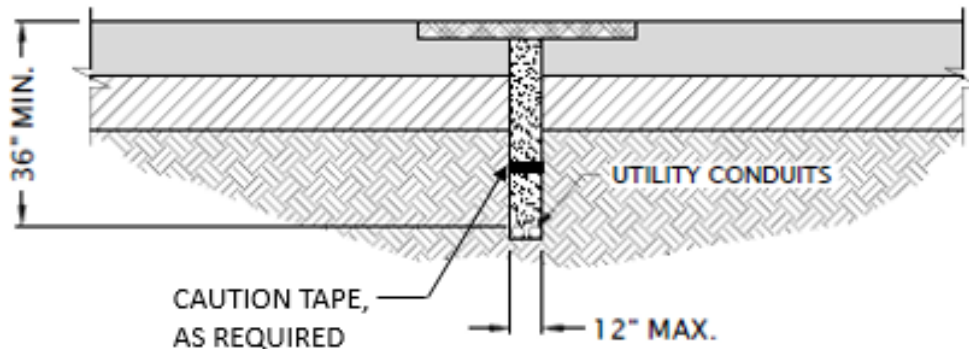


Department of Public Works  
891 Mountain Ranch Road  
San Andreas, CA 95249  
Phone: (209) 754-6401  
Fax: (209) 754-6664

## TRENCH RESTORATION DETAIL

DATE: AUGUST 2019

**HATCH LEGEND:**



**NOTES:**

1. SAWCUT OR GRIND PAVEMENT A MIN. OF 1 FOOT BEYOND EACH SIDE OF TRENCH CUT. REMOVE 2-INCH MINIMUM OF AC PAVEMENT BY COLD PLAINING
2. REPLACE PAVEMENT ALL THE WAY TO THE EDGE OF PAVEMENT IF EXCAVATION IS WITHIN 3 FEET OF THE EDGE OF PAVEMENT.
3. MINIMUM COVER FROM TOP OF PIPE TO FINISHED GRADE SHALL BE 36 INCHES.
4. PLACE AND COMPACT AC PAVEMENT PER THE COUNTY OF CALAVERAS TRENCH CUTS AND STREET RESURFACING POLICY
5. TRENCHES BEYOND 3 FEET OF THE EDGE OF PAVEMENT MAY BE BACKFILLED WITH IMPORTED SELECTED MATERIAL OR JOB EXCAVATED MATERIAL 4" MAX, COMPACTED TO 90%.



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**TRENCH RESTORATION DETAIL –  
NARROW TRENCH**

DATE: SEPTEMBER 2019



# COUNTY OF CALAVERAS

## DEPARTMENT OF PUBLIC WORKS

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### UTILITY ENCROACHMENT PERMIT

The undersigned agrees to perform all work in accordance with the rules and regulations as set forth by Chapter 12.08 of the Calaveras County Code. Section 12.08.120 states, "the applicant shall at all times comply with and shall cause all his agents and employees to comply with such laws, ordinances, regulation, decisions, court and similar authoritative orders; and shall protect and indemnify the County and all of its officers, agents and employees against any claims of liability proximately caused by the violation of any such law, ordinance, regulation or order issued under police power and in accordance with law, whether by himself or by his agents or employees."

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Permittee:

Date:

---

Contractor:

Date:

Permission to encroach in accordance with the Application for Encroachment Permit, the Preliminary Encroachment Permit, and the plans and specifications, is hereby granted.

Issue Date: \_\_\_\_\_ Expiration Date: \_\_\_\_\_

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Permit Issued By:

Date:

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Permit Finalized By:

Date:

As specified in the Utility Encroachment General Conditions, a two-year Maintenance Bond shall be submitted once work is complete as a condition of release of the Performance Bond. The bond shall be 10% of the Performance Bond. For cash in lieu of bonds, 10% of the monies will be held in place of the Maintenance Bond.

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Performance Bond Released By:

Date:

---

Maintenance Bond Received By:

Date:

---

Maintenance Bond Released By:

Date:

**ATTACHMENT B – CONSTRUCTION STORMWATER  
POLLUTION PREVENTION PLAN (SWPPP)**

**(TO BE PROVIDED VIA ADDENDA)**