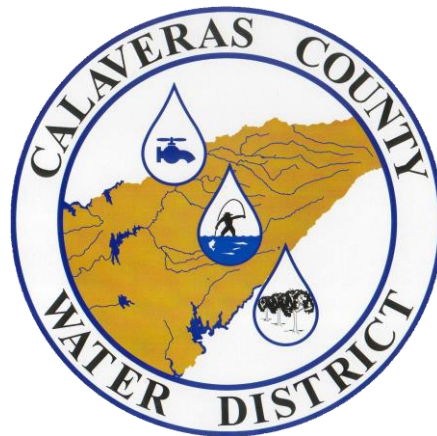


COPPER COVE PHASE 1 AND 2 TANKS PROJECT

CIP NO. 11083C

PROJECT MANUAL
VOLUME 1

ISSUED FOR BID
JUNE 2023



Proposal will be received at the office of:

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

no later than

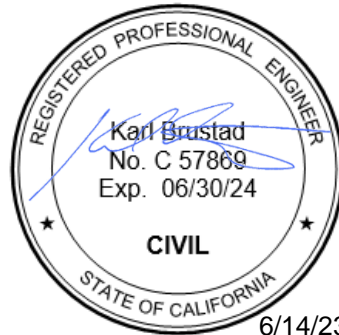
2:00 p.m. local time July 27, 2023

COPPER COVE PHASE 1 AND 2 TANKS PROJECT

CIP NO. 11083C

PROJECT MANUAL
VOLUME 1

ISSUED FOR BID
JUNE 2023



6/14/23

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**SECTION 00 01 00
ADVERTISEMENT FOR BIDS**

CALAVERAS COUNTY WATER DISTRICT

COPPER COVE PHASE 1 AND 2 TANKS PROJECT

Separate sealed Bids for the construction of the Copper Cove Phase 1 and 2 Tanks Project will be received at the office of the Calaveras County Water District at 120 Toma Court, San Andreas, California 95249 **until 2:00 PM local time on July 27, 2023**, at which time Bids will be publicly opened and read aloud. The Engineer's estimate of project construction cost is \$8.2 million.

The Project is located at the Calaveras County Water District's Copper Cove Water Treatment Plant (WTP) at Kiva Place, Copperopolis, California 95228 and the Copper Cove B Tanks Site at Signal Hill, Copperopolis, California 95228 located in the community of Copperopolis. The Project consists of the following work:

1. Demolition of existing redwood tank.
2. Construction of new welded steel storage tanks at the Water Treatment Plant (WTP) and B Tank Site.
3. Rehabilitation of the existing WTP clearwell and Steel B Tank.
4. Associated site piping, both above ground and below ground, and appurtenances for interconnection.
5. Pavement, site grading, and installation of concrete tank foundation.
6. Installation of chain link fence and chain link double swing gate.
7. Miscellaneous electrical improvements and cathodic protection for tanks.
8. Coordination with District for demolition, relocation, and interconnections to existing facilities in such a manner as to minimize impacts to Copper Cove Water Treatment Plant's ability to provide water to its customers.

A **non-mandatory** pre-bid meeting and job walk will be held on **June 29, 2023 starting at 10:00 AM** at the entrance of Copper Cove WTP located at Kiva Place, Copperopolis, California 95228. Inspection of the site prior to bid is strongly encouraged.

Questions and bid associated requests shall be made per schedule below:

1. Seven (7) days Prior to the Bid Date for questions and clarification.
2. Ten (10) days prior to the Bid Date for a "Or Equal" materials or equipment requests.
3. Fifteen (15) days prior to the Bid Date for a "Substitution" materials or equipment requests.

The District must be in receipt of Bidder's questions or requests within the deadline. The District will not respond after the deadlines specified unless deadline is changed by addendum.

The Contract Documents may be examined at the following locations:

Calaveras County Water District 120 Toma Court San Andreas, CA 95249 (209) 754-3181	Sacramento Regional Builders Exchange 5370 Elvas Ave Sacramento, CA 95819 (916) 442-8991
Builders Exchange of Stockton 4561 Quail Dr b2 Stockton, CA 95207 (209) 478-1000	El Dorado Builders Exchange 10656 Industrial Ave, Ste. 160 Roseville, CA 95678 (530) 672-2955
Valley Builders Exchange 1118 Kansas Avenue Modesto, CA 95351 (209) 522-9031	Placer County Builders Exchange 10656 Industrial Ave, Suite 160 Roseville, CA 95678 (916) 771-7229

Copies of the Contract Documents will be available by **June 15, 2023** and may be obtained electronically at no cost. Requests 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: Kate Jesus, Engineering Coordinator

KateJ@ccwd.org

Contractors 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. Bidders will be required to submit proof of registration for themselves and all listed subcontractors prior to award of the contract.

Applicable prevailing wage decisions shall be paid in accordance with the Davis-Bacon Act (40 U.S.C. 276-a-7) as supplemented by the Department of Labor Regulations (29 CFR Part 5).

Date of Initial Advertisement: **June 15, 2023.**

CALAVERAS COUNTY WATER DISTRICT

Charles Palmer

END OF SECTION

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**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 stated in the Advertisement for Bids may be obtained from the Issuing Office.
- 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 The Bidder is required to have a valid, active Class A, General Engineering Contractor License issued by the California, Contractors State License Board, www.cslb.ca.gov. Subcontractors, if any, shall hold a valid, active license issued by the California Contractors State License Board covering the subcontractor's scope of work.

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

- 4.01 Subsurface and Physical Conditions
- A. The project geotechnical study "GEOTECHNICAL ENGINEERING STUDY CALAVERAS COUNTY WATER DISTRICT COPPER COVE WATER SYSTEM IMPROVEMENT PROJECT, COPPEROPOLIS, CALAVERAS COUNTY, CALIFORNIA" dated December 1, 2022 and provided for reference in Appendix A of these Specifications.
- 4.02 Underground Facilities (Not Used)
- 4.03 Hazardous Environmental Condition (Not Used)
- 4.04 (Not Used)
- 4.05 (Not Used)
- 4.06 Additional Owner Provided Information (Not Used)
- 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. 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;
 - D. 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;
 - E. 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;
 - F. 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;
 - G. 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
 - H. 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 meeting and job walk will be held on June 29, 2023 starting at 10:00 AM at the entrance of Copper Cove WTP located at Kiva Place, Copperopolis, California 95228. From that point, prospective bidders will be escorted through the water treatment facility and to the B Tank site. Bidders are required to inspect the site of work prior to submitting a bid.

ARTICLE 6 - SITE AND OTHER AREAS

- 6.01 The Project sites are 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 issued by a surety meeting the requirements of Paragraphs 6.01 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 61 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 7.04 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 7.04 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 All proposed subcontractors shall be listed as required by Public Contract Code Section 4104 et. seq.

- 12.02 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in SC 7.06.A. Please see suggested changes to SC 7.06.
- 12.03 Electrical system suppliers must meet the requirements outlined in Technical Specifications Section 26 05 00-1.05.

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. The bid total will be used to determine whose bid is the lowest price, as provided in Section 19.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

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 Article 13 of the General Conditions.

ARTICLE 15 - SUBMITTAL OF BID

- 15.01 The Bid Form is to be completed and submitted with all the attachments outlined in Article 7 of the Bid Form.
- 15.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Advertisement 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 5100 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 who's 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 6 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.

21.02 (Not Used)

21.03 (Not Used)

ARTICLE 22 - SALES AND USE TAXES

- 22.01 Contractor shall pay all sales, use and other taxes as specified in Paragraph 7.09 of the General Conditions.

ARTICLE 23 – AGENCY REQUIREMENTS

- 23.01 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.
- 23.02 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 or 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.

END OF SECTION

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**SECTION 00 04 10
BID FORM**

CALAVERAS COUNTY WATER DISTRICT

COPPER COVE PHASE 1 AND 2 TANKS PROJECT

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ARTICLE 1- BID RECIPIENT

- 1.01 This Bid is submitted to: Calaveras County Water District at the main office at 120 Toma Court, San Andreas, California 95249, no later than **2:00 PM local time on July 27, 2023.**
- 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- BIDDERS 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 60 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 drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site.
- 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 11.04.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 13.02 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 15.06 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 Contract documents include project drawings, project specifications, and bid documents, which are incorporated by reference. The following documents are attached to and made a condition of this Bid (Section 00 04 10):

(ATTACH EACH DOCUMENT BELOW TO THE BID)

- A. Non-Collusion Affidavit (Section 00 04 20);
- B. Required Bid security in the form of a Bid Bond or Certified Check (Section 00 04 30);
- C. List of Subcontractors (Section 00 04 70); and
- D. List of References (Section 00 04 80).

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 00 02 00), General Conditions (Section 00 07 00), and Supplementary Conditions (Section 00 08 00).

ARTICLE 9 - BID SUBMITTAL

9.01 This Bid is submitted by:

Bidder’s Business address: _____

Phone: _____ Facsimile: _____

Submitted on _____, 2023.

State Contractor License No. _____

Employer’s Tax ID No. _____

DIR Registration No. _____

If Bidder is:

An Individual

Name: _____

By: _____

(Individual's signature)

Doing business as: _____

A Partnership

Partnership Name: _____

_____ (SEAL)

By: _____

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

Name: _____

A Corporation

Corporation Name: _____

_____ (SEAL)

State of Incorporation: _____

Type *(General Business, Professional, Service, Limited Liability)*: _____

By: _____

(Signature – attach evidence of authority to sign)

Name: _____

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: _____

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

CALAVERAS COUNTY WATER DISTRICT

COPPER COVE PHASE 1 AND 2 TANKS PROJECT

BID ITEM	DESCRIPTION	UNIT	EST QTY.	UNIT PRICE	BID AMOUNT
1	<u>MOBILIZATION/ DEMOBILIZATION</u>	LS	1	\$	\$
2	<u>IMPLEMENTATION OF WATER POLLUTION CONTROL PLAN</u>	LS	1	\$	\$
3	<u>WORKER PROTECTION AND SAFETY/SHORING</u>	LS	1	\$	\$
4	<u>EXISTING REDWOOD B TANK DEMOLITION</u>	LS	1	\$	\$
5	<u>CLEARWELL TANK SITE DEMOLITION</u>	LS	1	\$	\$
6	<u>B TANK SITE DEMOLITION</u>	LS	1	\$	\$
7	<u>TREE REMOVAL</u>	EA	26	\$	\$
8	<u>CLEARWELL SITE PAVING</u>	SF	6,350	\$	\$
9	<u>B TANK SITE ACCESS DRIVEWAY</u>	SF	2,380	\$	\$
10	<u>CLEARWELL SITE CHAIN LINK FENCE</u>	LF	340	\$	\$
11	<u>B TANK SITE CHAIN LINK FENCE AND GATE</u>	LF	40	\$	\$

12	<u>CLEARWELL SITE – 24” TREATED WATER BELOW GRADE (DIP) PIPING AND APPURTENANCES</u>	LS	1	\$	\$
13	<u>CLEARWELL SITE – STORM DRAIN (PVC) PIPING AND APPURTENANCES</u>	LS	1	\$	\$
14	<u>B TANK SITE – 10” TW BELOW GRADE (DIP) PIPING AND APPURTENANCES</u>	LS	1	\$	\$
15	<u>B TANK SITE – 12” TW BELOW GRADE (DIP) PIPING AND APPURTENANCES</u>	LS	1	\$	\$
16	<u>B TANK SITE – 16” OVERFLOW (PVC) PIPING AND APPURTENANCES</u>	LS	1	\$	\$
17	<u>B TANK SITE – 6” DRAIN (PVC) PIPING AND APPURTENANCES</u>	LS	1	\$	\$
18	<u>NEW CLEARWELL – INLET/OUTLET PIPING AND APPURTENANCES</u>	LS	1	\$	\$
19	<u>EXISTING CLEARWELL REHAB – INLET PIPING AND APPURTENANCES</u>	LS	1	\$	\$

20	<u>NEW B TANK – INLET/OUTLET PIPING AND APPURTENANCES</u>	LS	1	\$	\$
21	<u>EXISTING STEEL B TANK REHAB – INLET PIPING MODIFICATIONS AND APPURTENANCES</u>	LS	1	\$	\$
22	<u>NEW CLEARWELL – OVERFLOW PIPING AND APPURTENANCES</u>	LS	1	\$	\$
23	<u>NEW B TANK – OVERFLOW PIPING AND APPURTENANCES</u>	LS	1	\$	\$
24	<u>EXISTING CLEARWELL REHAB – OVERFLOW PIPING MODIFICATIONS AND APPURTENANCES</u>	LS	1	\$	\$
25	<u>EXISTING STEEL B TANK REHAB – OVERFLOW PIPING MODIFICATIONS AND APPURTENANCES</u>	LS	1	\$	\$
26	<u>EFFLUENT BOOSTER PUMP STATION – TRANSMISSION MAIN (DIP) PIPING AND APPURTENANCES</u>	LS	1	\$	\$
27	<u>CLEARWELL TANK SITE – GRADING</u>	LS	1	\$	\$

28	<u>CLEARWELL TANK SITE – HAULING OF EXCAVATED MATERIAL</u>	LS	1	\$	\$
29	<u>NEW CLEARWELL SUBGRADE AND FOUNDATION</u>	LS	1	\$	\$
30	<u>NEW B TANK SUBGRADE AND FOUNDATION</u>	LS	1	\$	\$
31	<u>NEW CLEARWELL TANK AND APPURTENANCES</u>	LS	1	\$	\$
32	<u>EXISTING CLEARWELL REHAB AND APPURTENANCES</u>	LS	1	\$	\$
33	<u>NEW B TANK AND APPURTENANCES</u>	LS	1	\$	\$
34	<u>EXISTING STEEL B TANK REHAB AND APPURTENANCES</u>	LS	1	\$	\$
35	<u>CATHODIC PROTECTION FOR EACH TANK</u>	EA	4	\$	\$

36	<u>FORCED AIR VETILATION FOR EACH TANK</u>	EA	4	\$	\$
37	<u>ELECTRICAL MODIFICATIONS</u>	LS	1	\$	\$
38	<u>ROCK EXCAVATION</u>	100	CY	\$	\$
39	<u>REMAINING WORK: All remaining Work identified in the Contract Documents NOT INCLUDED in Bid Items 1-38.</u>	LS	1	-	\$
\$ _____					
TOTAL BID AMOUNT ITEMS 1 THROUGH 39 (NUMERICAL)					
TOTAL BID AMOUNT ALL ITEMS (WRITTEN)					

END OF SECTION

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**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)

_____ *(SEAL)*

(Notary Public)

END OF SECTION

**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:

OWNER

Name and Address: CALAVERAS COUNTY WATER DISTRICT
120 Toma Ct., San Andreas, CA 95249

BID

Bid Due Date:

Project Name: Copper Cove Phase 1 and 2 Tanks Project

BOND

Bond Number:

Bond 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 *(Name and Corporate Seal)*

SURETY *(Name and Corporate Seal)*

(Attach Power of Attorney)

By: _____
Signature

By: _____
Signature

<hr/> <i>Print Name</i> <hr/>	<hr/> <i>Print Name</i> <hr/>
<hr/> <i>Title</i> <hr/>	<hr/> <i>Title</i> <hr/>
Attest: <hr/>	Attest: <hr/>
<hr/> <i>Signature</i> <hr/>	<hr/> <i>Signature</i> <hr/>
<hr/> <i>Title</i> <hr/>	<hr/> <i>Title</i> <hr/>
<i>Note: Above addresses are to be used for giving any required notice. Provide execution by any additional parties, such as joint venturers, if necessary.</i>	

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.

END OF SECTION

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**SECTION 00 04 70
LIST OF SUBCONTRACTORS**

BIDDER: _____

Work to be Performed	Percent of Total Contract Price	Subcontractor's Name and Location of Place of Business, Contractor's License Number, and DIR Registration Number

(ADD ADDITIONAL SHEETS IF NECESSARY)

END OF SECTION

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**SECTION 00 04 80
LIST OF REFERENCES**

BIDDER: _____

Project References: Provide project references for at least three similar to this Project within the last five (5) years.

Project Name	Amount, \$	Contact Person	Phone Number
1.			
2.			
3.			
4.			
5.			

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**SECTION 00 05 00
AGREEMENT BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT**

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 specified or indicated in the Contract Documents. The Work is generally described as follows:
- A. Demolition of existing redwood tank.
 - B. Construction of new welded steel storage tanks at the Water Treatment Plant (WTP) and B Tank Site.
 - C. Rehabilitation of the existing WTP clearwell and Steel B Tank.
 - D. Associated site piping, both above ground and below ground, and appurtenances for interconnection.
 - E. Pavement, site grading, and installation of concrete tank foundation.
 - F. Installation of chain link fence and chain link double swing gate.
 - G. Miscellaneous electrical improvements and cathodic protection for tanks.
 - H. Coordination with District for demolition, relocation, and interconnections to existing facilities in such a manner as to minimize impacts to Copper Cove Water Treatment Plant's ability to provide water to its customers.

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 PHASE 1 AND 2 TANKS PROJECT

ARTICLE 3 – ENGINEER

- 3.01 The Project has been designed by Peterson Brustad Inc., 80 Blue Ravine Road, Suite 280, Folsom CA 95630.
- 3.02 The Owner has retained/designated Peterson Brustad Inc. (as "Engineer") to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 Time 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. The Phase 1 improvements as defined in Section 01 10 00 – Summary, Section 1.12.A.1, shall be substantially complete within 365 calendar days. The Work will be substantially completed within **700 calendar days** after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within **730 calendar days** after the date when the Contract Times commence to run.
- B. The Phase 2 improvements as defined in Section 01 10 00 – Summary, Section 1.12.A.2, shall be substantially complete within 365 calendar days. The Work will be substantially completed within **700 calendar days** after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within **730 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 **\$3,500** 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 for Phase 1 and the total contract 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 **\$2,000** 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.
 4. Exceeding maximum shutdown time: Contractor Shall pay owner \$500 for each hour past the maximum shutdown time.

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 contact 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 contact amount adjusted accordingly.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided 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 15th or 30th 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.
 - 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:
 - 1. This Agreement (00 05 00).

2. Certificate of Owner's Attorney (00 05 00).
 3. Performance Bond (00 06 10).
 4. Payment Bond (00 06 15).
 5. Other bonds:
 - a. Bid Bond (00 04 30)
 6. General Conditions (00 07 00).
 7. Supplementary Conditions (00 08 00).
 8. Specifications and Drawings as listed in the table of contents of the Project Manual.
 9. Addenda (numbers ___ to ___, inclusive).
 10. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid (pages ___ to ___, inclusive).
 11. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in 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 anything 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. This Agreement, all subcontracts and other subawards related to performance of work under this agreement are subject to Federal Provisions as referenced in 44 CFR, Part 13, Subpart C, Sections 13.36 (i) (1) through (13). Furthermore, not less than the applicable prevailing wage decisions shall be paid in accordance with the Davis-Bacon Act (40 U.S.C. 276-a-7) as supplemented by the Department of Labor Regulations (29 CFR Part 5).

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:
Calaveras County Water District	
By: Michael J. Minkler	By:
_____	_____
<i>Signature</i>	<i>Signature</i>
Title: General Manager	Title:
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"><i>(Attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)</i></div> <div style="width: 45%;"><i>(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)</i></div> </div>	
Attest:	Attest:
_____	_____
<i>Signature</i>	<i>Signature</i>
Title:	Title:
Address for giving notices:	Address for giving notices:
Post Office Box 846 120 Toma Court San Andreas, CA 95249	 License No.:

END OF SECTION

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**SECTION 00 05 50
NOTICE TO PROCEED**

Date: _____

Project: Copper Cove Phase 1 and 2 Tanks Project

Owner: Calaveras County Water District Owner's Contract No. xxxxx

Contract:

Contractor:

Contractor:

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 number of days to achieve Substantial Completion is **700 calendar days** and the total number of contract days to achieve readiness for final payment is **730 calendar days**.

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.

CALAVERAS COUNTY WATER DISTRICT

Given by: _____

Title: _____

Date: _____

END OF SECTION

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**SECTION 00 06 10
PERFORMANCE BOND**

CONTRACTOR *(name and address)*:

SURETY *(name and address)*:

OWNER:

CALAVERAS COUNTY WATER DISTRICT
120 Toma Court
San Andreas, California 95249

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description: Phase 1 and 2 Tanks Project

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

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)

(Surety's Name and Corporate Seal)

By: _____

By: _____

(Signature)

(Signature) (attach power of attorney)

(Print Name)

(Print Name)

(Title)

(Title)

Attest: _____

Attest: _____

(Signature)

(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. Not used.

Calaveras County Water District
Copper Cove
Phase 1 and 2 Tanks Project

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. Not used.

END OF SECTION

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**SECTION 00 06 15
PAYMENT BOND**

CONTRACTOR *(name and address)*:

SURETY *(name and address)*:

OWNER:

CALAVERAS COUNTY WATER DISTRICT
120 Toma Court
San Andreas, California 95249

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description: Copper Cove Phase 1 and 2 Tanks Project

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

(Contractor's Name and Corporate 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. Not used.

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.

Calaveras County Water District
Copper Cove
Phase 1 and 2 Tanks Project

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. Not used.

END OF SECTION

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

Owner:	CALAVERAS COUNTY WATER DISTRICT	Contractor:	
Owner's Contract No.:	xxxxx	Contractor's Project No.:	
Project:	Copper Cove Phase 1 and 2 Tanks Project	Contract Name:	

This [preliminary] [final] Certificate of Substantial Completion applies to:	
<input type="checkbox"/> All Work	<input type="checkbox"/> The following specified portions of the Work:
<hr style="width: 30%; margin-left: 0;"/> 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:	<input type="checkbox"/> None
	<input type="checkbox"/> As follows:
Amendments to Contractor's responsibilities:	<input type="checkbox"/> None
	<input type="checkbox"/> As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

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.

RECOMMENDED	RECEIVED	RECEIVED
By: _____	By: Owner, Michael J. Minkler	By: _____
(Authorized Signature)	(Authorized Signature)	(Authorized Signature)
Title: _____	Title: General Manager	Title: _____
Date: _____	Date: _____	Date: _____

END OF SECTION

**SECTION 00 07 00
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 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 three printed copies of the Contract Documents (including one fully executed counterpart of the Agreement) plus one electronic copy Contract Documents in 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 15 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 sixtieth (60) 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 thirty (30) days after the Effective Date of the Contract.

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 considered 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.

END OF SECTION

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**SECTION 08 00 00
SUPPLEMENTARY CONDITIONS**

These Supplementary Conditions amend or supplement the General Conditions. 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 located in Section 00 08 40. Owner 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.

49. *Submittals* - Shop drawings, samples, technical data, schedules, plans, or other Contract related items furnished to the Owner for information, acknowledgement, evaluation, comment, rejection, or approval.

50. *Holidays* – The following twelve holidays are celebrated by the Owner and Owner employees.

- a. New Year's Day
- b. Martin Luther King Day
- c. Presidents Day
- d. Memorial Day
- e. Juneteenth
- f. Independence Day
- g. Labor Day
- h. Veterans' Day
- i. Thanksgiving
- j. Day After Thanksgiving
- k. Christmas Eve
- l. Christmas Day

SC-1.02.C.2 After the last sentence of Paragraph 1.02.C.1, add the following sentence:

Holidays “days” are not numerically counted in the Contract Document schedule, or milestones.

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 Adobe Systems® Portable Document Format (PDF).

SC-3.01 Delete Paragraph 3.01C in its entirety.

SC-5.07 Add the following after endo of Paragraph 5.06.K:

5.07 *Site Conditions, Access and Utilities*

- A. *Sanitary Facilities* - The Contractor is required to furnish and maintain temporary sanitary facilities (portable toilets) for his employees and subcontractors, at the construction site, for the duration of the project the Contractor is onsite.
- B. *Utilities* - Power, telephone or other utilities is not available at construction site. Contractor shall provide temporary utilities as needed for construction and his own use. All temporary electrical work by the Contractor shall be adequately grounded, safe for use and installed by a licensed electrician in conformance with the 2016 California Electrical Code.
- C. *Vehicle Parking* - The Contractor shall park vehicles only in areas designated by the Owner. The Owner may change designated parking areas at any time if parking of vehicles is found to interfere with on-going operations.
- D. *Security* - The Contractor shall secure the construction site when not present to eliminate site hazards and maintain public safety.
- E. *Elevation* – The construction is located at elevations as follows:
Water Treatment Plant - approximately 780 feet above mean sea level
B Tank Site – approximately 985 feet above mean sea level

SC-6.01 Add to Paragraph 6.01.A.

- A. Contractor shall furnish a 2-year warranty bond (from the date of substantial completion) in the amount of fifteen percent of the total contract price to be issues by the same surety issuing the performance bond.

SC-6.03.K 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 \$1,000,000
- 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 and Property Damage \$2,000,000
 - e. Excess or Umbrella Liability
 - 1) General Aggregate \$2,000,000
 - 2) Each Occurrence \$2,000,000
- 2. Automobile Liability under paragraph 6.03.D of the General Conditions:
 - a. Combined Single Limit \$2,000,000
- 3. Property Damage liability insurance will provide Explosion, Collapse and Underground (X,C,U) coverages where applicable.
- 4. 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.
- 5. 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. Peterson Brustad Inc.

SC-6.06 Delete Paragraph 6.06B. and Paragraph 6.06C. in entirety.

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.

Amend the last sentence of Paragraph a.3 by striking out "and:" and adding a period at the end of Paragraph a.3. 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:

Calaveras County Water District
Copper Cove
Phase 1 and 2 Tanks Project

The Contractor shall not award work valued at more than seventy-five percent of the Contract Price to Subcontractor(s), without prior written approval of the Owner. Prime contractor must perform at least twenty-five percent of contract work (minus material cost) using own forces.

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-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-12.02 Add the following immediately after Article 12.01 Claims:

SC-12.02 Resolution of claims in connection with public works projects (Public Contract Code §9204)

- (a) The Legislature finds and declares that it is in the best interests of the state and its citizens to ensure that all construction business performed on a public works project in the state that is complete and not in dispute is paid in full and in a timely manner.
- (b) Notwithstanding any other law, including, but not limited to, Article 7.1 (commencing with Section 10240) of Chapter 1 of Part 2, Chapter 10 (commencing with Section 19100) of Part 2, and Article 1.5 (commencing with Section 20104) of Chapter 1 of Part 3, this section shall apply to any claim by a contractor in connection with a public works project.
- (c) For purposes of this section:
 - (1) "Claim" means a separate demand by a contractor sent by registered mail or certified mail with return receipt requested, for one or more of the following:
 - (A) A time extension, including, without limitation, for relief from damages or penalties for delay assessed by a public entity under a contract for a public works project.
 - (B) Payment by the public entity of money or damages arising from work done by, or on behalf of, the contractor pursuant to the contract for a public works project and payment for which is not otherwise expressly provided or to which the claimant is not otherwise entitled.
 - (C) Payment of an amount that is disputed by the public entity.
 - (2) "Contractor" means any type of contractor within the meaning of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code who has entered into a direct contract with a public entity for a public works project.
 - (3)
 - (A) "Public entity" means, without limitation, except as provided in subparagraph (B), a state agency, department, office, division, bureau, board, or commission, the California State University, the University of California, a city, including charter city, county, including a charter county, city and county, including a charter city and county, district, special district, public authority, political subdivision, public corporation, or nonprofit transit corporation wholly owned by a public agency and formed to carry out the purposes of the public agency.
 - (B) "Public entity" shall not include the following:
 - (i) Department of Water Resources, (ii) Department of Transportation, (iii) Department of Parks and Recreations, (iv) Department of Corrections and Rehabilitation, (v) Military Department, (vi) Department of General Services, or (vii) High-Speed Rail Authority.
 - (4) "Public works project" means the erection, construction, alteration, repair, or improvement of any public structure, building, road, or other public improvement of any kind.
 - (5) "Subcontractor" means any type of contractor within the meaning of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code who either is in direct contract with a contractor or is a lower tier subcontractor.
- (d)
 - (1)

- (A) Upon receipt of a claim pursuant to this section, the public entity to which the claim applies shall conduct a reasonable review of the claim and, within a period not to exceed 45 day, shall provide the claimant a written statement identifying what portion of the claim is disputed and what portion is undisputed. Upon receipt of a claim, a public entity and a contractor may, by mutual agreement, extend the time period provided in this subdivision.
 - (B) The claimant shall furnish reasonable documentation to support the claim.
 - (C) If the public entity needs approval from its governing body to provide the claimant a written statement identifying the disputed portion and the undisputed portion of the claim, and the governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a claim sent by registering mail or certified mail, return receipt requested, the public entity shall have up to three days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension, expires to provide the claimant a written statement identifying the disputed portion and the undisputed portion.
 - (D) Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the public entity issue its written statement. If the public entity fails to issue a written statement, paragraph (3) shall apply.
- (2)
- (A) If the claimant disputes the public entity's written response, or if the public entity fails to respond to a claim issued pursuant to this section within the time prescribed, the claimant may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the public entity shall schedule a meet and confer conference within 30 days for settlement of the dispute.
 - (B) Within 10 business days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, the public entity shall provide the claimant a written statement identifying the portion of the claim that remains the dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the public entity issues its written statement. Any disputed portion of the claim, as identified by the contractor in writing, shall be submitted to nonbinding mediation, with the public entity and the claimant sharing the associated costs equally. The public entity and claimant shall mutually agree to a mediator within 10 business days after the disputed portion of the claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject to applicable procedures outside this section.

- (C) For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assist the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to timeframes in this section.
 - (D) Unless otherwise agreed to by the public entity and the contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Section 20104.4 to mediate after litigation has been commenced.
 - (E) This section does not preclude a public entity from requiring arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program, if mediation under this section does not resolve the parties' dispute.
- (3) Failure by the public entity to respond to a claim from a contractor within the time periods described in this subdivision or to otherwise meet the time requirements of this section shall result in the claim being deemed rejected in its entirety. A claim that is denied by reason of the public entity's failure to have responded to a claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding with regard to the merits of the claim or the responsibility or qualifications of the claimant.
 - (4) Amounts not paid in a timely manner as required by this section shall bear interest at 7 percent per annum.
 - (5) If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against a public entity because privity of contract does not exist, the contractor may present to the public entity a claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on their own behalf or on behalf of a lower tier subcontractor, that the contractor present a claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the claim be presented to the public entity shall furnish reasonable documentation to support the claim. Within 45 days of receipt of this written request, the contractor shall notify the subcontractor in writing as to whether the contractor presented the claim to the public entity and, if the original contractor did not present the claim, provide the subcontractor with a statement of the reasons for not having done so.
- (e) The text of this section or a summary of it shall be set forth in the plans or specifications for any public works project that may give rise to a claim under this section.
 - (f) A waiver if the rights granted by this section is void and contrary to public policy, provided, however, that:
 - (1) Upon receipt of a claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to commencement of a civil action or binding arbitration, as applicable; and
 - (2) A public entity may prescribe reasonable change order, claim, and dispute resolution procedures and requirements in addition to the provision of this section, so long as the contractual provisions do not conflict with or otherwise impair the timeframes and procedures set forth in this section.
 - (g) This section applies to contracts entered into on or after January 1, 2027.

- (h) Nothing in this section shall impose liability upon a public entity that makes loans or grants available through a competitive application process, for the failure of an awardee to meet its contractual obligations.
- (i) This section shall remain in effect only until January 1, 2027, and as of that date is repealed, unless a later enacted statute is enacted before January 1, 2027, deletes or extends that date.

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 retainage of five percent (5%); 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 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 for consideration. If the Owner 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 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-15.06.D Delete paragraph 15.06.D and replace as follows:

D. Final Payment Becomes Due: Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Thirty-five days after filing of a Notice of Completion (conforming with Cal. Civil Code 8414), with the County recorder and after presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is owed.

SC-15.08 Change correction period from one (1) to two (2) years in Paragraph 15.08.A.

SC-19

At the end of ARTICLE 18 – MISCELLANEOUS, add the following:

ARTICLE 19 - CALIFORNIA STATE REQUIREMENTS

- 19.01 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.
- 19.02 In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or Subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties.
- 19.03 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.

END OF SECTION

Contractor's Application for Payment No.

To (Owner):	Calaveras County Water District	From (Contractor):		Application Date:	
Project:	Cooper Cove Phase 1 and 2 Tanks Project	Contract:		Application Period:	
Owner's Contract No.:	xxxxx	Contractor's Project No.:			

Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

- 1. ORIGINAL CONTRACT PRICE \$ _____
- 2. Net change by Change Orders \$ _____
- 3. Current Contract Price (Line 1 ± 2) \$ _____
- 4. TOTAL COMPLETED AND STORED TO DATE
(Column F total on Progress Estimates)..... \$ _____
- 5. RETAINAGE:
 - a. X _____ Work Completed.... \$ _____
 - b. X _____ Stored Material..... \$ _____
 - c. Total Retainage (Line 5.a + Line 5.b) \$ _____
- 6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5.c) \$ _____
- 7. LESS PREVIOUS PAYMENTS
(Line 6 from prior Application) \$ _____
- 8. AMOUNT DUE THIS APPLICATION..... \$ _____
- 9. BALANCE TO FINISH, PLUS RETAINAGE
(Column G total on Progress Estimates + Line 5.c above)..... \$ _____

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:

(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;

(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all Liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such Liens, security interest, or encumbrances); and

(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

By: _____ Date: _____

Contractor Signature

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is recommended by: Charles Palmer, P.E. District Engineer
_____ (Signature) _____ (Date)

is approved by: Michael J. Minkler, General Manager
_____ (Signature) _____ (Date)

Progress Estimate - Lump Sum Work

Contractor's Application

For (Contract):					Application Number:			
Application Period:					Application Date:			
A		B	C	D	E	F	Percentage (F/B)	G
Specification Section No.	Description	Scheduled Values, (\$)	From Previous Application (C+D)	This Period	Materials Presently Stored (not in C or D)	Total Completed and Stored to Date (C + D + E)		Balance to Finish (B - F)
Totals								

Stored Material Summary							Contractor's Application				
For (Contract):							Application Number:				
Application Period:							Application Date:				
A		B	C		D		E	Subtotal Amount Completed and Stored to Date ($D + E$)	F		G
Bid Item No.	Supplier Invoice No.	Submittal No. (with Specification Section No.)	Storage Location	Description of Materials or Equipment Stored	Date Placed into Storage (Month/Year)	Amount, (\$)	Amount Stored this Month, (\$)		Incorporated in Work		Materials Remaining in Storage (\$) ($D + E - F$)
									Date (Month/ Year)	Amount (\$)	
Totals											

END OF SECTION 00 08 20

SECTION 00 08 20
PAYMENT REQUEST FORM (CONT.)

Progress Estimate - Unit Price Work							Contractor's Application				
For (Contract):							Application Number:				
Application Period:							Application Date:				
A					B	C	D	E	F		
Item			Contract Information		Total Value of Item, (\$)	Estimated Quantity Installed	Value of Work Installed to Date	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	Percentage (F / B)	Balance to Finish (B - F)
Bid Item No.	Description	Item Quantity	Units	Unit Price							
Totals											

SECTION 00 08 20
PAYMENT REQUEST FORM (CONT.)

**SECTION 00 08 30
WORK CHANGE DIRECTIVE**

WORK CHANGE DIRECTIVE NO.	
Date of Issuance:	Effective Date:
Owner: Calaveras County Water District	Contractor:
Owner's Contract No. xxxxx	Contractor's Project No.:
Project: Copper Cove Phase 1 and 2 Tanks Project	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: <i>[check one or both of the following]</i>	
<input type="checkbox"/> Non-agreement on pricing of proposed change.	
<input type="checkbox"/> 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:	
<input type="checkbox"/> Lump Sum	<input type="checkbox"/> Unit Price
<input type="checkbox"/> Cost of the Work	<input type="checkbox"/> Other

RECOMMENDED	RECEIVED	RECEIVED
By:	By: OWNER	By: CONTRACTOR
Name:	Name: Michael J. Minkler	Name: _____
_____	_____	_____
<i>(Authorized Signature)</i>	<i>(Authorized</i>	<i>Signature)</i>
Title:	Title: General Manager	Title: _____
Date: _____	Date: _____	Date: _____

END OF SECTION

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**SECTION 00 08 40
CHANGE ORDER FORM**

CHANGE ORDER NO.	
Date of Issuance:	Effective Date:
Owner: Calaveras County Water District	Contractor:
Owner's Contract No. xxxxx	Contractor's Project No.:
Project: Copper Cove Phase 1 and 2 Tanks Project	Contract Name:

The Contract is modified as follows upon execution of this Change Order: *[Include description]*

Attachments: *[List documents supporting change]*

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIMES <i>[note changes in Milestones if applicable]</i>
Original Contract Price: \$	Original Contract Times: Substantial Completion: Ready for Final Payment: <div style="text-align: right; border-top: 1px solid black; width: 100px; margin-left: auto;"><i>days or dates</i></div>
[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: <div style="text-align: right; border-top: 1px solid black; width: 100px; margin-left: auto;"><i>days</i></div>

(continued on next page)

Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial Completion: Ready for Final Payment: _____ <i>days or dates</i>
[Increase] [Decrease] of this Change Order: \$ _____	[Increase] [Decrease] of this Change Order: Substantial Completion: Ready for Final Payment: _____ <i>days or dates</i>
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial Completion: Ready for Final Payment: _____ <i>days or dates</i>

RECOMMENDED		ACCEPTED	ACCEPTED
By: _____	By: OWNER	By: CONTRACTOR	
Name: _____	Name: Michael J. Minkler	Name: _____	
_____	_____	_____	
<i>(Authorized Signature)</i>	<i>(Authorized</i>	<i>(Authorized Signature)</i>	
Title: _____	Title: General Manager	Title: _____	
Date: _____	Date: _____	Date: _____	

END OF SECTION

**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 "Copper Cove Phase 1 and 2 Tanks Project" 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 demolition, construction, rehabilitation, and interconnection of water storage tanks. Major components of work include: demolition of existing redwood tank, construction of new welded steel storage tanks at the Water Treatment Plant (WTP) and B Tank Site, rehabilitation of the existing WTP clearwell and Steel B Tank, associated site piping, both above ground and below ground, appurtenances for interconnection, pavement, site grading, installation of concrete tank foundation, installation of chain link fence and chain link double-swing gate, miscellaneous electrical improvement, and cathodic protection for tanks.
- B. Work includes coordinating with District for demolition, relocation, and interconnections to existing facilities in such a manner as to minimize impacts to Copper Cove Water Treatment Plant's ability to provide water to its customers.

1.03 PROJECT LOCATION

- A. The Project is located at the Calaveras County Water District's Copper Cove Water Treatment Plant, Kiva Place, Copperopolis, California 95228 and at the Copper Cove B Tank Site, Signal Hill, Copperopolis, California, 95228.

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, construction of new facilities, and modifications of existing facilities as outlined in Bid Items 1 through 38 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 Storm Water Pollution Prevention Plan (SWPPP). The Engineer to provide a Water Pollution Control Program (WPCP) to Contractor. The WPCP 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. 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 followed:
 - 1. Phase 1
 - a. B Tank Site

- 1) Close valves 5 and 14 to isolate the existing redwood B Tank.
 - 2) Contractor to drain redwood B Tank under direction of District's operations staff. Contractor to dechlorinate water if discharged to environment via ground surface, drainages, or by other methods.
 - 3) Demolish the existing redwood B Tank and appurtenances.
 - 4) Prepare subgrade for new B Tank foundation and construct foundation with a minimum 28-day compressive strength of 7,000 pounds per square inch.
 - 5) Construct new 360,000-gallon welded steel storage tank; construction of new B Tank shall include appurtenances and above ground piping.
 - 6) Construct underground 12-inch inlet piping and existing 10-inch piping modifications to the existing steel B Tank and the new B Tank.
 - (a) Perform pressure testing, disinfection, sampling and verification of bacteriological test results.
 - (b) Shut down existing 18-inch inlet pipe to complete tie-in 1 of underground piping per Contract Drawings.
 - (c) Connect all above ground 12-inch treated water to new B Tank.
 - 7) Clean interior of new B Tank.
 - 8) Open valve 14 and fill new B Tank, disinfect and place in service. Prior to placing the tank in service, authorization from Division of Drinking Water must be obtained pending passing results from sampling and laboratory testing.
 - 9) Place new B Tank into service and disconnect existing B Tank by completing tie-in 2 to existing 18-inch inlet per Contract Drawings and opening Valves 2 and 5. Valves 19 and 20 to be permanently abandoned.
- b. Clearwell Site
- 1) Prepare subgrade for new Clearwell foundation and construct foundation with a minimum 28-day compressive strength of 7,000 pounds per square inch.
 - 2) Construct new 346,000-gallon welded steel storage tank Clearwell.
 - 3) Construct all below ground site piping and terminate short of tanks and tie-in locations.
 - (a) Perform pressure testing, disinfection, sampling and verification of bacteriological test results.
 - (b) Connect inlet and outlet piping to new Clearwell.
 - (c) Shut down 24-inch outlet TW/BWS pipe to complete tie-in of new outlet TW/BWS piping per Contract Documents.
 - 4) Clean interior of new Clearwell.
 - 5) Fill new Clearwell and disinfect. Prior to placing the tank in service, authorization from Division of Drinking Water must be obtained pending passing results from sampling and laboratory testing.
 - 6) Shut-down 24-inch inlet and complete tie-in.
 - 7) Place new Clearwell into service by opening Valves 1 and 6.
 - 8) Complete site paving.
2. Phase 2
- a. B Tank Site
- 1) Close valves 7, 11, and 15 to isolate existing steel B Tank.
 - 2) Contractor to drain existing steel B Tank under direction of District's operations staff. Contractor to dechlorinate water if discharged to environment via ground surface, drainages, or by other methods.
 - 3) Complete Rehabilitation of existing steel B Tank.
 - (a) Reduce the height of the overflow piping from 31.5 feet to 28 feet above grade.
 - (1) Modify overflow piping to add required air gap.
 - (b) Cut the side shell down from 32 feet to a height of 30.5 feet above grade.
 - (c) Modify existing steel B Tank appurtenances.

- (1) Remove the exterior ladder and cage and reducing their height to match the new tank height.
 - (2) Connect new inlet piping.
 - (3) Sample tap off existing steel B Tank shell.
 - (4) Install new stairs.
 - (5) Remove and replace the guard rail and access hatch.
 - (6) Install new cathodic protection.
 - (d) Shop prime and field paint each new component.
 - (e) Install a new center column, rafters, and a roof plate.
 - (f) Install a new forced air ventilation system.
 - (g) Sandblast and recoat the interior and exterior surfaces of existing steel B Tank.
 - (h) Install and configure tank instrumentation.
 - (1) Pressure transmitter or ultrasonic level transmitter for water level monitoring.
 - 4) Clean interior of existing steel B Tank.
 - 5) Fill existing steel B Tank, disinfect, and open valves 1, 7, 11, 15, and 17 to place in service. Prior to placing the tank in service, authorization from Division of Drinking Water must be obtained pending passing results from sampling and laboratory testing.
- b. Clearwell Site
- 1) Close valves 7 and 8 to isolate existing Clearwell and drain tank.
 - 2) Complete rehabilitation of existing Clearwell.
 - (a) Increase the height of the overflow piping from 10 feet to 13.5 feet above grade.
 - (b) Remove the existing roof plate, rafters, and center column.
 - (1) Remove top 1.5 feet from existing Clearwell side shell.
 - (c) Modify existing Clearwell appurtenances.
 - (1) Remove the exterior ladder and cage and increasing their height to match the new Clearwell.
 - (2) Connect new inlet piping to existing Clearwell.
 - (3) Sample tap off tank shell.
 - (4) Install stairs.
 - (5) Remove and replace the guard rail and access hatch.
 - (6) Install a new cathodic protection.
 - (d) Add 5.5-feet to side shell to increase the existing Clearwell height to 16 feet.
 - (e) Shop prime and field paint each new component.
 - (f) Install a new center column, rafter, and roof plate.
 - (g) Install a new forced ventilation system.
 - (h) Sand blast and recoat the interior and exterior surfaces of the existing Clearwell Tank.
 - (i) Install and configure existing Clearwell instrumentation.
 - (1) Pressure transmitter or ultrasonic level transmitter for water level monitoring.
 - 3) Clean interior of existing Clearwell.
 - 4) Fill existing Clearwell, disinfect and open valves 4, 5, 7, and 8 to place in service. Prior to placing the tank in service, authorization from Division of Drinking Water must be obtained pending passing results from sampling and laboratory testing.

B. 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.

- C. The work must be sequenced to allow for continuous access to the water treatment plant facility.

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. Work Sequence and Constraints described hereinafter are critical events in work sequence which are presented to underscore the importance of proper sequencing, scheduling, and coordination so that it is integrated with the required distribution system operation. The work sequence and constraints presented do not describe all items affecting the completion of the Work but are intended to describe important events necessary to minimize disruption of the existing facilities and to ensure compliance with water quality permit requirements.
- C. 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 20 00
PRICE AND PAYMENT PROCEDURES**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Schedule of Values.
- B. Application for Payment.
- C. Change procedures.
- D. Defect assessment.
- E. Unit prices.
- F. Lump Sum Work

1.02 SCHEDULE OF VALUES

- A. Submit electronic file of schedule on Contractor's Standard form.
- B. Submit Schedule of Values within 20 days after date of Notice to Proceed.
- C. Format: Use bid schedule as master template. Contractor shall breakdown activities as necessary to best represent the construction activities required.
- D. Include within each line item, direct proportional amount of Contractor's overhead and profit.
- E. Revise schedule to list approved Change Orders with each Application for Payment.
- F. Request for Payment Applications shall be made in accordance with the approved schedule of values and bid descriptions.

1.03 APPLICATION FOR PAYMENT

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for payment will be processed by the Engineer as provided in the General Conditions.
- B. Content and Format: Use Schedule of Values for listing items in Application for Payment.
- C. Submit updated 3-week look-ahead construction schedule with each Application for Payment.
- D. Payment Period: Monthly.
- E. Submit submittals with transmittal letter as specified in Section 01 33 00 - Submittal Procedures.
- F. Substantiating Data: When Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
 - 1. Current construction photographs specified in Section 01 33 00 - Submittal Procedures.
 - 2. Partial release of liens from major Subcontractors and vendors.
 - 3. Record Documents as specified in Section 01 70 00 - Execution and Closeout Requirements, for review by the District, which will be returned to Contractor.
 - 4. Affidavits attesting to off-Site stored products.

1.04 CHANGE PROCEDURES

- A. Submittals: Submit name of individual who is authorized to receive change documents and is responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. Carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise Engineer of any error, inconsistency, omission, or apparent discrepancy.
- C. Requests for Interpretation (RFI) and Clarifications: Allot time in construction scheduling for liaison with Engineer; establish procedures for handling queries and clarifications.
 - 1. Use Contractor's standard form for requesting interpretations.

2. Engineer may respond with a direct answer on the Request for Interpretation form, Field Order, or Work Changes Proposal Request.
- D. Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions.
 - E. Engineer may issue Proposal Request including a detailed description of proposed change with supplementary or revised Contract Drawings and Specifications, a change in Contract Time for executing the change. Contractor will prepare and submit estimate within 5 working days.
 - F. Contractor may propose changes by submitting a request for change to Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change and the effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on the Work by separate or other Contractors.
 - G. Substitute or "Or-Equal" items are subject to the requirements of Article 7.04 of the General Conditions General Conditions.
 - H. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's price quotation or Contractor's request for Change Order as approved by Engineer.
 - I. Unit Price Change Order: For Contract unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of that which are not predetermined, execute Work under Work Directive Change. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.
 - J. Work Directive Change: Engineer may issue directive, signed by District, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.
 - K. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.
 - L. Maintain detailed records of Work done on Time and Material basis. Provide full information required for evaluation of proposed changes and to substantiate costs for changes in the Work.
 - M. Document each quotation for change in Project Cost or Time with sufficient data to allow evaluation of quotation.
 - N. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.
 - O. Correlation of Contractor Submittals:
 1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
 2. Promptly revise Progress Schedules to reflect change in Contract Time, revise subschedules to adjust times for other items of Work affected by the change, and resubmit.
 3. Promptly enter changes in Record Documents.

1.05 DEFECT ASSESSMENT

- A. At the discretion of the District, Contractor shall replace the Work, or portions of the Work, not conforming to specified requirements at no cost to the District.
- B. If, in the opinion of Engineer, it is not practical to remove and replace the Work, Engineer will direct appropriate remedy or adjust payment.
- C. Defective Work may will be partially repaired according to instructions of Engineer, and unit sum/price may will be reduced at discretion of Engineer.
- D. Individual Specification Sections may modify these options or may identify specific formula or percentage sum/price reduction.

- E. Authority of District to assess defects and identify payment adjustments is final.
- F. Nonpayment for Rejected Products: Payment will not be made for rejected products for any of the following reasons:
 1. Products wasted or disposed of in a manner that is not acceptable.
 2. Products determined as unacceptable before or after placement.
 3. Products not completely unloaded from transporting vehicle.
 4. Products placed beyond lines and levels of the required Work.
 5. Products remaining on hand after completion of the Work.
 6. Loading, hauling, and disposing of rejected products.

1.06 UNIT PRICES

- A. Contractor shall take measurements and compute quantities. Engineer will verify measurements and quantities.
- B. Unit Quantities: Quantities and measurements indicated on Bid Form are for Contract purposes only. Actual quantities provided shall determine payment.
 1. When actual Work requires more or fewer quantities than those quantities indicated, provide required quantities at contracted unit sum/prices.
- C. Payment Includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application, or installation of item of the Work; overhead and profit.
- D. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by Engineer multiplied by unit sum/price for Work incorporated in or made necessary by the Work.
- E. Measurement of Quantities:
 1. Weigh Scales: Inspected, tested, and certified by applicable California weights and measures department within past year.
 2. Platform Scales: Of sufficient size and capacity to accommodate conveying vehicle.
 3. Metering Devices: Inspected, tested, and certified by applicable California department within past year.
 4. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel, or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
 5. Measurement by Volume: Measured by cubic dimension using mean length, width, and height or thickness.
 6. Measurement by Area: Measured by square dimension using mean length and width or radius.
 7. Linear Measurement: Measured by linear dimension, at item centerline or mean chord.
 8. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of the Work.

1.07 LUMP SUM WORK

- A. Payment to the contractor for Work covered under the Bid Schedule Denoted as Lump Sub bid items shall be paid for at the lump sum amount listed in the Bid Schedule. District will accept and process monthly progress payments for Lump Sum bid item work where the Progress payment request is based upon the approved Schedule of Values and the work completed to date is agreed to between the Contractor and District in advance of submitting the request. Where agreement cannot be reached on the quantity of work item completed, the District's estimate of the percentage of work will be used.

1.08 DESCRIPTION OF BID ITEMS

- A. Bid Item No. 1 – Mobilization/Demobilization (Lump Sum)
 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.
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.
- B. Bid Item No. 2 – Implementation of Water Pollution Control Plan (Lump Sum)
1. The work under this bid item includes implementation of the water pollution control and protection during all construction activities including mobilization, site development, and demobilization. The total amount shall not exceed one percent (1%) of Total Base Bid Price as provided in the Bid Schedule. The Water Pollution Control Plan can be found in Appendix B.
 2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in Implementation of the Water Pollution Control Plan are being completed.
- C. Bid Item No. 3 – Worker Protection and Safety/Shoring (Lump Sum)
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.
- D. Bid Item No. 4 – Existing Redwood B Tank Demolition (Lump Sum)
1. The work under this bid item shall include the demolition and removal of existing equipment and facilities, including but not limited to, the existing redwood tank, appurtenances, and foundation, as shown on the Contract Drawings and as specified in Section 02 41 00 - Demolition. This bid item shall also include the hauling and disposal of removed materials. Upon tank demolition, Contractor shall stack redwood lumber (exterior wall boards) on site for material salvage by the District.
 2. Work will be paid for on a lump sum basis. Contractor may apply for payment for this Bid Item on a percent complete basis. The lump sum price shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.
- E. Bid Item No. 5 – Clearwell Tank Site Demolition (Lump Sum)

1. The work under this bid item shall include the demolition and removal of existing equipment and facilities, including but not limited to, above and below ground water pipe and appurtenances, asphalt, and fencing as shown on the Contract Drawings and as specified in Section 02 41 00 - Demolition. This bid item shall also include the hauling and disposal of removed materials.
 2. Work will be paid for on a lump sum. Contractor may apply for payment for this Bid Item on a percent complete basis. The lump sum price shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.
- F. Bid Item No. 6 – B Tank Site Demolition (Lump Sum)
1. The work under this bid item shall include the demolition and removal of existing equipment and facilities, including but not limited to, above and below ground water pipe and appurtenances, asphalt, and fencing as shown on the Contract Drawings and as specified in Section 02 41 00 - Demolition. This bid item shall also include the hauling and disposal of removed materials.
 2. This bid item does not include the demolition of the existing redwood B tank.
 3. Work will be paid for on a lump sum. Contractor may apply for payment for this Bid Item on a percent complete basis. The lump sum price shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.
- G. Bid Item No. 7 - Tree Removal (Each)
1. The work under this bid item shall include the removal of existing trees as shown on the Contract Documents and as specified in Section 02 41 00 - Demolition. This bid item shall also include the hauling and disposal of removed items.
 2. Work will be paid for by each tree removed.
- H. Bid Item No. 8 – Clearwell Site Paving (Square Foot)
1. The work under this bid item includes furnishing all required labor, materials, project equipment, tools, construction equipment, safety equipment, transportation and services for the paving of the Clearwell site according to the Contract Drawings and in the Specifications.
 2. Work will be paid for by square foot of paving on the Clearwell site.
- I. Bid Item No. 9 – B Tank Site Access Driveway (Square Foot)
1. The work under this bid item includes furnishing all required labor, materials, project equipment, tools, construction equipment, safety equipment, transportation and services for the paving of the B Tank site access driveway according to the Contract Drawings and in the Specifications.
 2. Work will be paid for by square foot of paving on the B Tank site access driveway.
- J. Bid Item No. 10 – Clearwell Site Chain Link Fence (Linear Foot)
1. The work under this bid item shall include the furnishing and installation of fencing around the site as shown on the Contract Drawings and in the Specifications.
 2. Work will be paid for by linear foot of fencing installed.
- K. Bid Item No. 11 – B Tank Site Chain Link Fence and Gate (Linear Foot)
1. The work under this bid item shall include the furnishing and installation of chain link fence and one double-swing gate as shown on the Contract Drawings and in the Specifications.
 2. Work will be paid for by linear foot of fencing and gate installed.
- L. Bid Item No. 12 – Clearwell Site - 24" Treated Water Below Grade (DIP) Piping and Appurtenances (Lump Sum)
1. The work under this bid item shall include furnishing and installing below grade 24" ductile iron pipe including all valves, taps, joints, fittings, pipe supports, excavation, trenching, backfill and compaction, and the tie-in to the existing system as shown and specified in the Contract Documents. This bid item shall include disinfection, sampling, and hydrostatic testing.
 2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in Clearwell Site - 24" Treated Water Below Grade (DIP) Piping and

Appurtenances are being completed.

- M. Bid Item No. 13 – Clearwell Site - Storm Drain (PVC) Piping and Appurtenances (Lump Sum)
 - 1. The work under this bid item includes the furnishing and installation of all below grade storm drain piping from site facilities to existing storm drain, fittings and other appurtenances, new storm drain manholes, DIs, excavation, trenching, backfill and compaction as shown on the Contract Drawings and in the Specifications.
 - 2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in Clearwell Site - Storm Drain (PVC) Piping and Appurtenances are being completed.
- N. Bid Item No. 14 – B Tank Site - 10" TW Below Grade (DIP) Piping and Appurtenances (Lump Sum)
 - 1. The work under this bid item shall include furnishing and installing below grade 10" ductile iron pipe including all valves, taps, joints, fittings, pipe supports, excavation, trenching, backfill and compaction, and the tie-in to the existing system as shown and specified in the Contract Documents. This bid item shall include disinfection, sampling, and hydrostatic testing.
 - 2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in B Tank Site - 10" TW Below Grade (DIP) Piping and Appurtenances are being completed.
- O. Bid Item No. 15 – B Tank Site - 12" TW Below Grade (DIP) Piping and Appurtenances (Lump Sum)
 - 1. The work under this bid item shall include furnishing and installing below grade 12" ductile iron pipe including all valves, taps, joints, fittings, pipe supports, excavation, trenching, backfill and compaction, and the tie-in to the existing system as shown and specified in the Contract Documents. This bid item shall include disinfection, sampling, and hydrostatic testing.
 - 2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in B Tank Site - 12" TW Below Grade (DIP) Piping and Appurtenances are being completed.
- P. Bid Item No. 16 – B Tank Site - 16" Overflow (PVC) Piping and Appurtenances (Lump Sum)
 - 1. The work under this bid item shall include installation of below-ground 16" PVC overflow pipe including all valves, taps, joints, fittings, pipe supports and the tie-in to the existing system as shown and 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 B Tank Site - 16" Overflow (PVC) Piping and Appurtenances are being completed.
- Q. Bid Item No. 17 – B Tank Site - 6" Drain (PVC) Piping and Appurtenances (Lump Sum)
 - 1. The work under this bid item shall include furnishing and installing 6" PVC drain pipe including all valves, taps, joints, fittings, pipe supports and the tie-in to the existing system as shown and 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 B Tank Site - 6" Drain (PVC) Piping and Appurtenances are being completed.
- R. Bid Item No. 18 – New Clearwell - Inlet/Outlet Piping and Appurtenances (Lump Sum)
 - 1. The work under this bid item includes the furnishing and installing of new above ground inlet/outlet steel piping, valves and expansion joints as shown in Contract Drawings. This bid item shall include disinfection, sampling, and hydrostatic testing.
 - 2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in New Clearwell - Inlet/Outlet Piping and Appurtenances are being completed.
- S. Bid Item No. 19 – Existing Clearwell Rehab - Inlet Piping and Appurtenances (Lump Sum)
 - 1. The work under this bid item includes the furnishing and installing of new above ground inlet steel piping, valves and expansion joint as shown in Contract Drawings. This bid item

- shall include disinfection, sampling, and hydrostatic testing.
2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in Existing Clearwell Rehab - Inlet Piping and Appurtenances are being completed.
- T. Bid Item No. 20 – New B Tank - Inlet/Outlet Piping and Appurtenances (Lump Sum)
1. The work under this bid item includes furnishing and installing new above ground inlet/outlet steel piping, valves, and expansion joints as shown in Contract Drawings.
 2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in New B Tank - Inlet/Outlet Piping and Appurtenances are being completed.
- U. Bid Item No. 21 – Existing Steel B Tank Rehab - Inlet Piping Modifications and Appurtenances (Lump Sum)
1. The work under this bid item includes furnishing and installing new above ground inlet steel piping, valves, and expansion joints as shown in Contract Drawings.
 2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in Existing Steel B Tank Rehab - Inlet Piping Modifications and Appurtenances are being completed.
- V. Bid Item No. 22 – New Clearwell - Overflow Piping and Appurtenances (Lump Sum)
1. The work under this bid item includes furnishing and installing new overflow piping as shown in Contract Drawings, including piping, vault, air gap and weir.
 2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in New Clearwell - Overflow Piping and Appurtenances are being completed.
- W. Bid Item No. 23 – New B Tank - Overflow Piping and Appurtenances (Lump Sum)
1. The work under this bid item includes furnishing and installing new overflow piping as shown in Contract Drawings, including piping, vault, air gap and weir.
 2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in New B Tank - Overflow Piping and Appurtenances are being completed.
- X. Bid Item No. 24 – Existing Clearwell Rehab - Overflow Piping Modifications and Appurtenances (Lump Sum)
1. The work under this bid item includes the modification of existing overflow piping as shown in Contract Drawings, including piping, air gap and weir.
 2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in Existing Clearwell Rehab - Overflow Piping Modifications and Appurtenances are being completed.
- Y. Bid Item No. 25 – Existing Steel B Tank Rehab - Overflow Piping Modifications and Appurtenances (Lump Sum)
1. The work under this bid item includes the modification of existing overflow piping as shown in Contract Drawings, including piping, air gap and weir.
 2. Contractor may apply for payment for this Bid Item on a percent complete basis as the items covered in Existing Steel B Tank Rehab - Overflow Piping Modifications and Appurtenances are being completed.
- Z. Bid Item No. 26 – Effluent Booster Pump Station - Transmission Main (DIP) Piping and Appurtenances (Lump Sum)
1. The work under this bid item shall include furnishing and installing ductile iron pipe including all valves, taps, joints, fittings, pipe supports and the tie-in 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.
- AA. Bid Item No. 27 – Clearwell Tank Site - Grading (Lump Sum)

1. The work under this bid item shall include the grading of the Clearwell Tank site as shown on the Contract Drawings and in the Specifications.
 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.
- BB. Bid Item No. 28 – Clearwell Tank Site - Hauling of Excavated Material (Lump Sum)
1. The work under this bid item shall include the hauling of excavated material at the Clearwell Tank site as shown on the Contract Drawings and in the Specifications.
 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.
- CC. Bid Item No. 29 – New Clearwell Subgrade & Foundation (Lump Sum)
1. The lump sum amount for constructing the subgrade and foundation at the new clearwell site as shown and specified in the Contract Documents.
 2. The lump sum price shall be full compensation for the preparation and installation or submittal of these materials, and for all the labor, equipment, tools and incidentals to complete this item. This item shall be paid in proportion to the percentage of the Bid Item No. 29 completed.
- DD. Bid Item No. 30 – New B Tank Subgrade & Foundation (Lump Sum)
1. The lump sum amount for constructing the subgrade and foundation at the new B Tank site as shown and specified in the Contract Documents.
 2. The lump sum price shall be full compensation for the preparation and installation or submittal of these materials, and for furnishing and installing all the labor, equipment, tools and incidentals to complete this item. This item shall be paid in proportion to the percentage of the Bid Item No. 30 completed.
- EE. Bid Item No. 31 – New Clearwell Tank and Appurtenances (Lump Sum)
1. The lump sum amount for constructing the 346,000 gallon welded steel water storage tank and associated appurtenances including interior and exterior coating, inlet, outlet, overflow, and drain piping connections, stairs, safety railing, roof hatch, side manway, vacuum connection, roof vent and sample port as shown and specified in the Contract Documents. This bid item shall include disinfection and sampling.
 2. The lump sum price shall be full compensation for the preparation and installation or submittal of these materials, and for furnishing and installing all labor, equipment, materials, tools and incidentals to complete this item. This item shall be paid in proportion to the percentage of Bid Item No. 31 completed.
- FF. Bid Item No. 32 – Existing Clearwell Rehab and Appurtenances (Lump Sum)
1. The lump sum amount for rehabilitating the existing clearwell and associated appurtenances as shown and specified in the Contract Documents. This bid item shall include disinfection and sampling.
 2. The lump sum price shall be full compensation for the rehabilitation or submittal of these materials, and for furnishing and installing all labor, equipment, materials, tools and incidentals to complete this item. This item shall be paid in proportion to the percentage of Bid Item No. 32 completed.
- GG. Bid Item No. 33 – New B Tank and Appurtenances (Lump Sum)
1. The lump sum amount for constructing the 360,000 gallon welded steel water storage tank and associated appurtenances including interior and exterior coating, inlet, outlet, overflow, and drain piping connections, stairs, safety railing, roof hatch, side manway, vacuum connection, roof vent and sample port as shown and specified in the Contract Documents. This bid item shall include disinfection and sampling.
 2. The lump sum price shall be full compensation for the preparation and installation or submittal of these materials, and for furnishing and installing all labor, equipment,

materials, tools and incidentals to complete this item. This item shall be paid in proportion to the percentage of Bid Item No. 33 completed.

- HH. Bid Item No. 34 – Existing Steel B Tank Rehab and Appurtenances (Lump Sum)
1. The lump sum amount for rehabilitating the existing steel tank and associated appurtenances as shown and specified in the Contract Documents. This bid item shall include disinfection and sampling.
 2. The lump sum price shall be full compensation for the rehabilitation or submittal of these materials, and for furnishing and installing all labor, equipment, materials, tools and incidentals to complete this item. This item shall be paid in proportion to the percentage of Bid Item No. 34 completed.
- II. Bid Item No. 35 – Cathodic Protection on Each Tank (Each)
1. The each amount for furnishing and installing cathodic protection for all four tanks including all labor, equipment, materials, tools, and incidentals.
 2. Work will be paid for by each tank with cathodic protection installed.
- JJ. Bid Item No. 36 – Forced Air Ventilation for Each Tank (Each)
1. The each amount for furnishing and installing forced air ventilation for all four tanks including all labor, equipment, materials, tools, and incidentals.
 2. Work will be paid for by each forced air vent installed.
- KK. Bid Item No. 37 – Electrical Modifications (Lump Sum)
1. The work under this bid item includes furnishing all required labor, materials, project equipment, tools, construction equipment, safety equipment, transportation, test equipment, incidentals, and services to provide complete and operational electrical modifications on the E&I - Series Drawings and Contract Specifications or as required for a fully operating facility.
 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.
- LL. Bid Item No. 38 - Rock Excavation (Cubic Yard)
1. The unit pricing for work to excavate and dispose of rock from site trenching and grading as shown in the Contract Drawings. This bid item shall only be used as authorized by District based on definition described in Section 31 20 00 - Earthwork.
 2. The unit price shall be paid per Cubic Yard for full compensation for the preparation and installation or submittal of these materials, and for all labor, equipment, tools and incidentals to complete this item.
- MM. Bid Item No. 39 - All Remaining Work in the Contract (Lump Sum)
1. The lump sum amount for providing all remaining work (not included in other bid items) as shown and specified in the Contract Documents.
 2. The lump sum price shall be full compensation for the preparation and installation or submittal of these materials, and for furnishing and installing all labor, equipment, materials, tools and incidentals to complete this item. This item shall be paid in proportion to the percentage of Bid Item No. 39 completed.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION 01 20 00

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**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 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. Demolition of existing clearwell
 - 8. Construction of new tanks
 - 9. Rehabilitation of existing clearwell and steel tank
 - 10. Placement of pipe and appurtenances
 - 11. Planned water main outages
 - 12. 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. Provide photographs of site and construction throughout progress of Work.
- B. Submit photographs with applications for payment for Work completed.
- C. 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. COVID-19 safety requirements

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. Concrete testing.
 - 2. Compaction testing.
 - 3. Reinforcing steel inspection.
 - 4. Observation of anchorage installation.
 - 5. Welding
 - 6. Coating
 - 7. Cathodic Protection

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.

1.08 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/>

1.09 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

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**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 B 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 and establish a 100-foot clear zone around the tank perimeter.
- 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

**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. Clean interior of tank, pipe, and fittings before the facility goes into service.
- E. Flush pipe as thoroughly as available water sources will permit.
- F. 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.
- G. Disinfect tank per Section 33 16 00 - Water Utility Storage Tanks and in accordance with AWWA C652.
- H. 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.
- I. 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.
 - 3. Asbestos demolition procedures.

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.

1.05 ASBESTOS DEMOLITION PROCEDURES

- A. B Tank Site has known occurrences of existing AC Pipe from original tank and pump station construction.
- B. Contractor shall conform with the EPA's standard procedures for demolition of asbestos containing materials. Procedures for asbestos work as mandated by the U.S. Environmental Protection Agency can be found here: <https://www.epa.gov/large-scale-residential-demolition/guide-normal-demolition-practices-under-asbestos-neshap-epa-3401>
- C. AC/transite pipe is not regulated asbestos containing material (RACM) if less than 260 linear feet is removed; therefore, cores from AC pipe taps can be disposed of with other construction debris.

- D. Contractor shall submit a manifest documenting the transport, disposal facility, and volume of asbestos disposed if RACM is disposed of off-site.

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. "Copper Cove Phase 1 and 2 Tanks Project"
 - 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. Building demolition excluding removal of hazardous materials and toxic substances.
- B. Selective demolition of built site elements.
- C. Selective demolition of building elements for alteration purposes.
- D. Abandonment and removal of existing utilities and utility structures.

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. 29 CFR 1926 - Safety and Health Regulations for Construction Current Edition.
- B. 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 as required by OSHA and local AHJs.
 - 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.

1.06 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.

PART 2 - PRODUCTS -- NOT USED

PART 3 - EXECUTION

3.01 DEMOLITION

- A. Remove paving and curbs required to accomplish new work.
- B. Within area of new construction, remove foundation walls and footings to minimum 2 feet below finished grade.
- C. Remove fences and gates.
- D. Remove other items indicated, for salvage, relocation, and recycling.
- E. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 22 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. See Section 01 74 19 - Construction Waste Management and Disposal.
2. Hazardous Materials: Comply with 29 CFR 1926 and state and local regulations.
- 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.

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 30 00
CAST-IN-PLACE CONCRETE**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Concrete foundations for water storage tank(s).
- C. Concrete reinforcement.
- D. Joint devices associated with concrete work.
- E. Miscellaneous concrete elements, including equipment pads, equipment pits, light pole bases, flagpole bases, thrust blocks, and manholes.
- F. Concrete curing.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Cast-in-place concrete work will be paid for by the unit price method.

1.03 REFERENCE STANDARDS

- A. ACI 211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide 2022.
- B. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete 1998 (Reapproved 2004).
- C. ACI 301 - Specifications for Concrete Construction 2020.
- D. ACI 302.1R - Guide to Concrete Floor and Slab Construction 2015.
- E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).
- F. ACI 305R - Guide to Hot Weather Concreting 2020.
- G. ACI 306R - Guide to Cold Weather Concreting 2016.
- H. ACI 308R - Guide to External Curing of Concrete 2016.
- I. ACI 318 - Building Code Requirements for Structural Concrete 2019 (Reapproved 2022).
- J. ACI PRC-223 - Shrinkage-Compensating Concrete - Guide 2021.
- K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- L. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
- M. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2021.
- N. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2022a.
- O. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens) 2021.
- P. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete 2017a.
- Q. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2023, with Editorial Revision.
- R. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing 2017.
- S. ASTM C827/C827M - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures 2016.
- T. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete 2016.

- U. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete 2021.
- V. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink) 2020.
- W. ASTM C1116/C1116M - Standard Specification for Fiber-Reinforced Concrete 2010a (Reapproved 2015).
- X. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures 2020.
- Y. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.
- Z. ASTM D471 - Standard Test Method for Rubber Property--Effect of Liquids 2016a (Reapproved 2021).
- AA. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- BB. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs 2017 (Reapproved 2023).
- CC. ICC-ES AC308 - Acceptance Criteria for Termite Physical Barrier Systems 2021, with Editorial Revision (2022).
- DD. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair 2013.

1.04 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
 - 1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
 - 2. For chemical-resistant waterstops, provide data on ASTM D471 test results.
 - 3. For membrane-forming, moisture emission-reducing, curing and sealing compound, provide manufacturer's installation instructions,.
- C. Mix Design: Submit proposed concrete mix design.
 - 1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
 - 2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
 - 3. Indicate proposed mix design complies with fiber reinforcing manufacturer's written recommendations.
 - 4. Indicate proposed mix design complies with admixture manufacturer's written recommendations.
 - 5. Indicate proposed mix design complies with expansive component manufacturer's written recommendations.
- D. Samples for Pigment Color Selection: Submit manufacturer's complete sample chip set, including pigment number and required dosage rate for each color.
- E. Verification Samples: Submit sample chips of specified colors indicating pigment numbers and required dosage rates, for subsequent comparison to installed concrete.
- F. Samples: Submit samples of underslab vapor retarder to be used.
- G. Samples: Submit two, 12 inch long samples of waterstops and construction joint devices.
- H. Test Reports: Submit report for each test or series of tests specified.
- I. Test Reports: Submit termite-resistant sheet manufacturer's summary of independent laboratory and field testing for effectiveness in subterranean termite exclusion.

- J. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- K. Sustainable Design Submittal: If any fly ash, ground granulated blast furnace slag, silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete cast in place, mix design(s) used showing the quantity of portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used.
- L. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.
- M. Warranty: Submit manufacturer warranty and ensure forms have been completed in District's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
 - 1. Maintain one copy of each document on site.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.
- D. For slabs required to include moisture vapor reducing admixture (MVRA), do not proceed with placement unless manufacturer's representative is present for every day of placement.
- E. For slabs indicated to receive membrane-forming, moisture emission-reducing, curing and sealing compound, do not proceed with application unless manufacturer's representative is present for every day of placement.

1.06 WARRANTY

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional warranty requirements.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
 - 2. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT MATERIALS

- A. Class A Concrete Structures
 - 1. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - a. Type: Deformed billet-steel bars.
 - b. Finish: Unfinished, unless otherwise indicated.
- B. Class B Concrete Structures
 - 1. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi)
 - a. Type: Deformed billet-steel bars.
 - b. Type: Deformed billet-steel bars.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type II - Moderate Portland type.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
 - 1. Acquire aggregates for entire project from same source.
- C. Lightweight Aggregate: ASTM C330/C330M.
- D. Fly Ash: ASTM C618, Class C or F.

- E. Calcined Pozzolan: ASTM C618, Class N.
- F. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.
- G. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.
 - 1. Concentration: Base dosage rates on weight of Portland cement, fly ash, silica fume, and other cementitious materials but not aggregate or sand.
 - 2. Packaging: If pigments are to be added to mix at site, furnish pigments in premeasured disintegrating bags to minimize job site waste.
 - 3. Color(s): As selected by Engineer from manufacturer's full range.
- H. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.
- I. Structural Fiber Reinforcement: ASTM C1116/C1116M.
- J. Early Age Crack-Control Fiber Reinforcement: ASTM C1116/C1116M.
- K. Blended Fiber Reinforcement: ASTM C1116/C1116M, engineered blend of two or more sizes of reinforcing fibers.
- L. Expansive Component for Shrinkage-Compensating Concrete: Dry material for batch-plant or on-site production of shrinkage-compensating concrete; comply with ACI PRC-223, Type G.
- M. Packaged Dry Material for Concrete Countertops: Premixed cementitious materials for use in casting countertops and furniture; color and decorative aggregate optional.

2.04 ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

2.05 ACCESSORY MATERIALS

- A. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 - 1. Grout: Comply with ASTM C1107/C1107M.
 - 2. Height Change, Plastic State; when tested in accordance with ASTM C827/C827M:
 - a. Maximum: Plus 4 percent.
 - b. Minimum: Plus 1 percent.
 - 3. Minimum Compressive Strength at 48 Hours, ASTM C109/C109M: 2,000 pounds per square inch.
 - 4. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.
 - 5. Products containing aluminum powder are not permitted.
 - 6. Approved Manufacturers/Models:
 - a. ThoRoc/SP15 Spray Mortar
 - b. BASF/SP15 Spray Mortar

2.06 BONDING AND JOINTING PRODUCTS

- A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.
- B. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

2.07 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
- B. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.

2.08 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
 - 1. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with ACI recommendations.
- B. Proportioning Structural Lightweight Concrete: Comply with ACI 211.2 recommendations.
 - 1. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with ACI recommendations.
- C. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
 - 1. For trial mixtures method, employ independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.
- D. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- E. Fiber Reinforcement: Add to mix at rate of 1.5 pounds per cubic yard, or as recommended by manufacturer for specific project conditions.
- F. Normal Weight Concrete:
 - 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,500 pounds per square inch.
 - 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
 - 3. Calcined Pozzolan Content: Maximum 10 percent of cementitious materials by weight.
 - 4. Silica Fume Content: Maximum 5 percent of cementitious materials by weight.
 - 5. Water-Cement Ratio: Maximum 55 percent by weight.
 - 6. Maximum Aggregate Size: 5/8 inch.

2.09 MIXING

- A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
 - 1. Colored Concrete: Add pigments in strict accordance with manufacturer's instructions to achieve consistent color from batch to batch.
 - 2. Fiber Reinforcement: Batch and mix as recommended by manufacturer for specific project conditions.
 - 3. Expansive Component: Batch and mix as recommended by manufacturer for specific project conditions.
- B. Transit Mixers: Comply with ASTM C94/C94M.
- C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Prepare existing concrete surfaces to be repaired according to ICRI 310.2R.
- E. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in accordance to bonding agent manufacturer's instructions.

1. Use latex bonding agent only for non-load-bearing applications.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete with shrinkage-compensating expansive component in accordance with ACI PRC-223.
- C. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

- A. Locate joints as indicated on Contract Drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. An independent testing agency, as specified in Section 01 40 00, will inspect finished slabs for compliance with specified tolerances.
- B. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
 1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
 2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.
 3. Cork Floated Finish: Immediately after form removal, apply grout with trowel or firm rubber float; compress grout with low-speed grinder, and apply final texture with cork float.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 1. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

3.08 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Surfaces Not in Contact with Forms:
 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
 2. Final Curing: Begin after initial curing but before surface is dry.

3.09 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

3.10 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Engineer and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Engineer. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

3.11 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

3.12 SCHEDULE - CONCRETE TYPES AND FINISHES

- A. Foundation Walls: 4,000 pounds per square inch 28 day concrete, form finish with honeycomb filled surface.

END OF SECTION 03 30 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 structural steel.
 - f. Field prime and finishing of all above grade piping, and bottom of treatment unit.
- B. Section Includes: High-performance coatings and special preparation of surfaces.
- C. See Section 09 97 13.24 - Steel Water Tank Painting for tank painting.

1.02 REFERENCE STANDARDS

- A. American National Standards Institute (ANSI):
 - 1. A224.1, Test Procedures and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
 - 2. Z53.1, Safety Color Code for Marking Physical Hazards
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. D2200-67, Pictorial Surface Preparation Standards for Painting Steel Surfaces, reapproved 1980 (SSPC-Visl-67T).
 - 3. 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. Steel Structures Painting Council (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 10, Near-White Blast Cleaning.
 - 6. TR-3/NACE 6A192 - Dehumidification and temperature control during surface preparation, application and curing for coatings/linings of steel tank.
- 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 mil10 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".
- C. Manufacturer: Eagle Industries, or equal.

1.06 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

- 1. Ferrous Metal Surfaces: Unless otherwise indicated, per Steel Structures Painting Manual, Vol. 2, "Systems and Specifications:"
 - a. Complete fabrication, welding or burning prior to beginning surface preparation:
 - b. Chip or grind off flux, spatter, slag or other laminations left from welding.
 - c. Remove mill scale.
 - d. Grind smooth rough welds and other sharp projections.
 - e. Steel: Structural, pipe, and equipment:
 - f. Non-submerged: SSPC-SP 10.
 - g. Submerged or partially submerged: SSPC-SP 10.
 - h. High temperature surfaces subject to heat in excess of 600 Degrees F: SSPC-SP 10.
 - i. Mill-coated steel pipe:
 - j. Exterior non-submerged: SSPC-SP 10.
 - k. Exterior submerged: SSPC-SP 10.
 - l. Galvanized steel: SSPC-SP 1 for dry surfaces; SSPC-SP 7 for damp surfaces.
 - m. Steel pipe receiving fusion bonded epoxy: SSPC-SP 10.
 - n. Stainless steel: Solvent clean.
- 2. Aluminum:
 - a. Clean surface with mineral spirits.
 - b. Where in contact with concrete: Apply coal tar epoxy after cleaning.
- 3. Copper:
 - a. Buff or polish to bright color.
 - b. Remove flux residue from joints in copper tubing.
 - c. Clean surface with mild phosphoric acid cleaner.
 - d. Apply finish while surface is clean and bright.
- 4. PVC Plastic:
 - a. Remove all wax and oil with solvent in accordance with recommendations of primer manufacturer.
- 5. Wood:
 - a. Sandpaper smooth, then dust.
 - b. Seal all knots, pitch and resinous sapwood after priming coat has dried.
 - c. Putty nail holes and minor defects to match wood color.
- 6. Hardware:
 - a. Remove any visible dirt, corrosion, or foreign material.
- 7. Sandblasting Procedures:

- a. Conduct all blasting in accordance OSHA and Sacramento AQMD regulations.
 - b. Do not allow surfaces to become wet after blasting and before painting.
 - c. Apply primer same day as blasting.
 - d. Depth of sandblasted surface: Not less than 1 mil or greater than 2 mils.
 - e. Air free of water and oil.
 - f. Fully contain sandblast sand and dust to area being prepared.
 - g. Protect nameplates, valve stems, rotating equipment, motors, and other damageable items.
 - h. Do not reuse sand.
 - i. Plug pipe, holes, or openings before sandblasting. Keep covered until sand removed.
 - j. Provide full containment.
 - k. Prevent blasting material from draining offsite or into storm drains.
8. Surface Preparation of Previously Painted Surfaces:
- a. Remove existing paint from entire surface.
 - b. All previously painted surfaces selected for new coating to be prepped per SSPC-SP 10.
9. Protection of Surfaces:
- a. Use drop cloths, masking tape, and other measures to protect all surfaces from accidental spraying, spattering, or spilling of paint.
 - b. Repair all damage caused by painting to other items of Work.
 - c. Immediately remove paint deposited on surfaces not being painted.
 - d. Surface clean bituminous paints spilled or dropped and spot paint with aluminum paint prior to specified paint.
 - e. 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. Section 09 97 13.24 - Steel Water Tank Painting.
- B. 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 3.4A 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.
- C. 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.
- D. All submerged or partially submerged steel surfaces in contact with potable water.
 - 1. In accordance with Section 3.06.A of this specification.
- E. 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.
- F. 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

**SECTION 09 97 13.24
STEEL WATER TANK PAINTING**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This item will consist of repair and preparation of surfaces to be painted, application of complete interior paint system and exterior paint and overcoat paint systems, and paint system materials.

1.02 REFERENCES

- A. Steel Structures Painting Council's Steel Structures Painting Manual and specifications contained within shall be referred to as SSPC.
- B. American Water Works Association Standards shall be referred to as AWWA.
- C. American Society for the Testing of Materials standards and specifications shall be referred to as ASTM.
- D. U.S. Environmental Protection Agency shall be referred to as EPA.
- E. National Association of Corrosion Engineers shall be referred to as NACE.
- F. NSF International shall be referred to as NSF.
- G. American National Standards Institute Standards shall be referred to as ANSI standards.
- H. Code of Federal Regulations shall be designated as CFR.
- I. Occupational Safety and Health Administration shall be designated as OSHA
- J. Consumer Product Safety Act, PART 1303
- K. Underwriters' Laboratory shall be referred to as UL.

1.03 DEFINITIONS

- A. Interior surfaces include the underside of the roof plate, girders, rafters, columns, pipes, bracing, floor, appurtenances (including stairs and ladders), wall, mixing system header and supports, and the tank overflow and inlet/outlet structures.
- B. Exterior surfaces include the outside of the tank roof, appurtenances (including pipe and stairs), outside surfaces damaged due to new or modified tank penetrations, and spot wall areas defined by the District during construction.
- C. Dry Film Thickness (DFT): Thickness of fully cured coating, measured in mils.

1.04 SYSTEM DESCRIPTION

- A. Coating systems shall conform to requirements of the latest edition of AWWA D102 Coating Steel Water-Storage Tanks.
- B. Surface Preparation: Contractor will be required to prepare tank for painting. Contractor shall prepare all surfaces for painting in accordance with the SSPC Steel Structures Painting Manual except as amended herein. The finished quality of the interior surface preparation within the tank shall conform to SSPC-SP 10, "Near White Blast Cleaning." The finished quality of the exterior surfaces shall conform SSPC-SP 6, "Commercial Blast Cleaning".
- C. All paint shall conform to current state and federal regulations applicable to Volatile Organic Compounds (VOC's).
- D. Coating materials shall be certified to NSF 61 and NSF 600.

1.05 SUBMITTALS

- A. Contractor Qualifications: Contractor shall submit written verification to show conformance with the following:
 - 1. Valid state license required for performance of the painting and coating work called for in this section

2. Five years immediately prior to this project successful experience, with references, showing regular engagement in work of similar nature, including but not limited to interior and exterior coating on steel tanks with cathodic protection system.
 3. Project list and references for Superintendent and site workers showing experience and knowledge in surface preparation and application of high performance industrial exterior coatings and interior coatings for submerged drinking water applications.
- B. Containment: Contractor shall submit to the District a written plan describing the type and performance of the proposed containment method to ensure spent abrasive and overspray does not leave the site. Performance data shall include time required to raise and lower containment and containment efficiency. This submittal shall be for informational purposes only. Review of this submittal shall not constitute approval of the proposed method nor place any responsibility for the same upon the District. An engineer licensed in the State of California must seal the containment plan.
 - C. Abrasive Blast Cleaning: Contractor shall submit to the Engineer a written plan describing the materials and methods proposed for use in abrasive blast cleaning. A separate submittal shall be made for each method proposed.
 - D. Paint: Contractor shall submit to the Engineer the manufacturer's technical information including paint label analysis and application instructions for each material to be used. In addition, Contractor shall submit color samples for review of color and texture that closely matches existing colors. All paint, primers and paint thinners, including primer for shop primed components, shall be from the same approved manufacturer. Additionally, Contractor shall submit to the Engineer a finished product sample of the non-skid surface for review of color and texture. Coating technical data shall contain at a minimum the following:
 1. Paint manufacturer's technical data sheet for all products to be applied, including statement of suitability of the material and application thickness for the intended use.
 2. Performance information that demonstrates compliance.
 3. Recommendations for surface preparation for the intended surface conditions.
 4. Material Safety Data Sheets
 5. Technical data on proposed abrasives
 6. Paint manufacturer's storage, handling, mixing and application, and curing instructions.
 7. Details for proposed ventilation, vacuum and cleaning system.
 8. Samples
 - a. Three sets of Samples of all paint, finishes and other coating materials shall be submitted on 8 ½-inch x 11-inch steel sample plates. Each plate shall be completely coated over its entire surface with one protective coating material, type and color.
 - b. One sample of each abrasive proposed to be used for surface preparation shall be provided if requested by Engineer or District's Representative.
 - E. Paint Substitutions: As part of the proof of equality, the Engineer may require at the cost of the Contractor certified reports from a nationally known reputable and independent testing laboratory conducting comparative tests as directed by the Engineer between the product specified and the requested substitution. Two comparative tests shall have been made within two years prior to award of contract.
 - F. Welding Certification: Welding procedures and welding operators shall be qualified in accordance with AWWA D100.
 - G. Air Emission Permits: Contractor shall satisfy all requirements of the Air Quality Management District and shall be responsible for obtaining all necessary permits to operate prior to commencing Work.

1.06 DELIVERY, STORAGE AND HANDLING

- A. All materials shall be brought to the job site in the original sealed and labeled containers of the paint manufacturer, and shall be subject to inspection by the Engineer on the job.
- B. Paint shall be stored in a secured area in compliance with paint manufacturer's recommendation.

- C. The Contractor shall use one convenient location for keeping all materials and doing all mixing, etc. Oily rags and waste shall be frequently removed, and under no circumstances shall they be allowed to accumulate.
- D. All empty paint containers shall be removed by the end of each work week and shall be subject to inspection by the Engineer on the job. Storage and disposal of empty paint containers must comply with California Health and Safety Code and all applicable regulations.

1.07 ENVIRONMENTAL CONTROL CONDITIONS

- A. Interior and Exterior Coatings - All coating systems shall be applied with strict compliance to the manufacturer's recommendations and requirements set forth in the Contract Documents. A manufacturer's representative shall be made available for interpretation of application requirements. The manufacturer's representative shall visit the job site weekly to verify proper application.

1.08 QUALITY ASSURANCE

- A. All materials furnished and all work accomplished under the Contract shall be subject to inspection by Engineer and District's Representative. The Contractor shall be held strictly to the true intent of the Specifications in regard to quality of materials, workmanship, and diligent execution of the Contract. Quality assurance procedures and practices shall be utilized to monitor all phases of work, including but not limited to surface preparation, application and inspection, throughout the duration of the project. Procedures or practices not specifically defined herein may be utilized provided they meet recognized and acceptable professional standards and are approved by the Engineer and District's Representative.
- B. Work accomplished in the absence of the prescribed inspection may be required to be removed and replaced under the proper inspection, and the entire cost of the removal and replacement, including cost of all materials which may be furnished by District and used in the work thus removed, shall be borne by the Contractor, regardless of whether the work removed is found to defective or not. Work covered up without the authority of the Engineer, shall, upon order from the Engineer, be uncovered to the extent required, and the Contractor shall similarly bear the entire cost of accomplishing all the work and furnishing all the materials necessary for the removal of the covering and its subsequent replacement, as directed and approved by the Engineer.
- C. The Engineer or District's Representative will make, or have made, such tests as deemed necessary to assure the work is being accomplished in accordance with the requirements of the Contract. Unless otherwise specified in the Special Conditions, the cost of such testing will be borne by the District. In the event such tests reveal non-compliance with the requirements of the Contract, the Contractor shall bear the cost of such corrective measures deemed necessary by the Engineer, as well as the cost of subsequent re-testing and re-inspection. It is understood and agreed the making of tests shall not constitute an acceptance of any portion of the work, nor relieve the Contractor from compliance with the terms of the Contract.
- D. The Contractor will furnish, until acceptance of coatings and paints, inspection devices in good working condition for detection of holidays and measurement of dry film thickness. Inspection devices shall be as deemed appropriate by Engineer and District's Representative and operated in accordance with these specifications and the manufacturer's instructions. Inspection devices shall be operated by, or in the presences of the District's Representative with location and frequency determined by Engineer or District's Representative.
- E. Compatibility of Coatings: Use products by same manufacturer for prime coats, intermediate coats, and finish coats on same surface, unless specified otherwise and certified in writing by all manufactures of all products that they are compatible.
- F. Service of Coating Manufactures Representative: Contractor shall arrange for coating manufacturer's representative to attend pre-installation conferences requested by Engineer or District's Representative. Make periodic visits to project site to provide consultation and inspection services during surface preparation and application of coatings. Costs for these services shall be borne by the Contractor.

1.09 SAFETY AND HEALTH REQUIREMENTS

- A. Contractor shall submit notarized letter signed by a principal officer of the Corporation certifying the Contractor fully complies with all California Code of Regulations pertaining to the work, including, but not limited to, the following:
 - 1. Illness Injury Prevention Program
 - 2. Confined Space Plan
 - 3. Respiratory Protection
 - 4. Hazard Communication
 - 5. Rolling Scaffolds
 - 6. Employee Safety Instruction
 - 7. Emergency Medical Service
 - 8. Dusts, Fumes, Mists, Vapors and Gases
- B. Contractor assumes the responsibility to accomplish all work in a safe and prudent manner, and to conform to all applicable safety requirements, regulations and guidelines of federal, state and local regulatory agencies, as well as applicable manufacturer's printed instructions and appropriate technical bulletins and manuals. Without anyway limiting that responsibility or assuming responsibility for safety, the District is particularly concerned that the following safety issues and reserves the right to request submittals detailing compliance with regulatory requirements and recognized and acceptable professional standards, for review and approval by Engineer for these and other questionable practices, prior to continuing work:
 - 1. Personal protective life saving equipment;
 - 2. Access facilities;
 - 3. Ventilation;
 - 4. Dehumidification;
 - 5. Head and face protection and respiratory devices;
 - 6. Grounding;
 - 7. Illumination;
 - 8. Toxicity and explosiveness;
 - 9. Protective clothing;
 - 10. Fire; and
 - 11. Sound levels and noise.

1.10 WARRANTY

- A. The Contractor shall warrant the steel tank interior and exterior coating system work to be performed as specified and free of defects attributed to control and workmanship for a period of 2 years from the date of final project acceptance by District. During such time necessary repairs will be for the Contractor's account. This warranty shall be provided in writing and approved by the Engineer. Contractor shall be responsible to complete repair of any defects that occurred during the warranty period, regardless of whether the repair work extends beyond the two year warranty period.
- B. The Paint Manufacturer shall warrant the interior and exterior coating materials for a period of 2 years from the date of final project acceptance by District. This warranty shall be provided in writing and approved by the Engineer. A paint manufacturer's representative shall be made available for an annual inspection of the tank for 2 years from the date of final acceptance of the project by the District at no cost to the District. The maintenance and/or warranty period stipulated within the contract documents shall remain in force.
- C. An inspection of the complete coated surfaces shall be conducted during the first and second year of warranty. The exact dates of those inspections shall be at the District's discretion, approximately the 10th and 22nd months following final acceptance of the project. The District shall provide Contractor a 14 calendar-day written notice of the inspection.
 - 1. On the day of the first inspection (10-month), the tank will remain in service, a representative of the painting contractor shall attend this inspection, and the Contractor shall provide a dive inspector. The Contractor shall provide lighting, ventilation, and any

other equipment that may be required to perform the warranty inspection. All work found to be defective at this time shall be repaired or replaced in accordance with the original specifications and to the satisfaction of the District. The work and material required to repair any defects in the coating will be furnished at no additional cost to the District.

2. On the day of the second inspection (22-month), the tank will be taken out of service and drained. A representative of the painting contractor shall attend this inspection, and District shall provide an inspector. The Contractor shall provide lighting, ventilation, and any other equipment that may be required to perform the warranty inspection. The Contractor shall also provide sufficient staffing and equipment to remove any residual water and/or sediment necessary to complete the inspection of the tank. All work found to be defective at this time shall be repaired or replaced in accordance with the original specifications and to the satisfaction of District. The work and material required to repair any defects in the coating will be furnished at no additional cost to the District. The Contractor shall disinfect the tank as specified in Section 33 16 00 - Water Utility Storage Tanks.
- D. If warranty repairs are necessary, the Contractor shall provide District with a work schedule satisfactory to District. Once the repair work begins, the Contractor shall provide all labor, materials, and equipment in accordance to the original specifications. Work shall be continuous to insure the water tank will be completely repaired and back in service within the scheduled time limits. The Contractor will be responsible for inspection costs related to repair work only. Warranty repair work shall begin within 14 days after the warranty inspection.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Materials specified are those that have been evaluated for the specific service and establish a standard of quality. Equivalent materials of other manufacturers may be submitted on written approval of the Engineer. Refer to Part 1.06.F for other requirements.
- B. Requests for substitution shall include manufacturer's literature for each product giving name, product number, generic type, descriptive information, solids by volume, recommended dry film thickness and certified lab test reports showing results to equal the performance criteria of the products specified herein. In addition, a list of five projects shall be submitted in which each product has been used and rendered satisfactory service.

2.02 MATERIAL PREPARATION

- A. Mix and thin materials according to manufacturer's latest printed instructions.
- B. Do not use materials beyond manufacturer's recommended shelf life.
- C. Do not use mixed materials beyond manufacturer's recommended pot life.
- D. Only mixing of full mixing kits is allowed. Splitting paint kits and mixing of partials kits is not allowed.

2.03 TANK INTERIOR COATING SYSTEM

- A. All inside coating systems must comply with both NSF-61 and NSF-600 standards.
- B. Steel sheets shall be shop blasted and primed prior to delivery to site. Shop primer shall be applied to the top of the tank or roof rafter (and other inaccessible areas prior to field erection).
- C. Shop primer shall match field primer. Contractor shall touch-up shop primer in the field and field apply primer to all field welds. Shop
- D. Coating System Description: The coating shall be a two coat system consisting of a high solids epoxy primer and a high solids epoxy sealer, compatible with cathodic protection system.
- E. Surface Preparation Prior to Abrasive Blast Cleaning: Weld flux and spatter shall be removed by power tool cleaning. Sharp projections shall be ground to smooth contour. All welds shall be ground to a smooth contour as per NACE Standard RP0178 and herein.

F. Surface Preparation: SSPC-SP 10 Near-White Metal Blast Cleaning. Anchor profile shall meet the paint manufacturer's recommendations as per ASTM D 4417, Method C or NACE Standard RP0287.

G. Inside coating system to be AWWA D102 ICS-5 with increased/additional dry mils thickness as indicated below:

Coating System:

1. Primer (either shop and/or field applied): Zinc Rich Minimum 3.0 mils DFT
 - a. Tnemec, Series 91-H20 Hydrozinc
 - b. Sherwin Williams, Corothane Galvapac
2. 1st Coat: High Solids Epoxy Minimum 5.0 mils DFT
 - a. Tnemec, Series N140 Pota-Pox Plus
 - b. Sherwin Williams Sherplate 600
3. 2nd Coat: High Solids Epoxy Minimum 5.0 mils DFT
 - a. Tnemec, Series N140 Pota-Pox Plus
 - b. Sherwin Williams Sherplate 600

H. Total system DFT: 13 mils

2.04 TANK EXTERIOR COATING SYSTEMS

A. Coating System Description: The spot repair coating shall be a three coat system consisting of a high solids epoxy primer, a high solids epoxy sealer, and a polyurethane finish coat.

B. Surface Preparation Prior to Abrasive Blast Cleaning: Weld flux and spatter shall be removed by power tool cleaning. Sharp projections shall be ground to a smooth contour. All welds shall be ground to a smooth contour as per NACE Standard RP0178 and herein.

C. Surface Preparation: SSPC-SP 6 C-SP6 Commercial Blast Cleaning. Anchor profile shall meet the paint manufacturer's recommendations per ASTM D 4417, Method C or NACE Standard RP0287.

D. Outside coating system to conform to AWWA D102, OCS-6 (zinc rich primer, epoxy intermediate, polyurethane finish coat) with increased dry dry mils thickness as indicated below:

1. Zinc Rich Primer 3.0 mils DFT
 - a. Sherwin Williams Corothane GalvaPac
 - b. Tnemec 91-H20 Hydrozinc
2. 1st Coat (Intermediate): Epoxy 4.0 mils DFT
 - a. Sherwin Williams Macropoxy 646
 - b. Tnemec Series V140 Pota-Pox Plus
3. 2nd Coat (Finish): Polyurethane 4.0 mils DFT
 - a. Sherwin Williams Acrolon 218HS
 - b. Tnemec series 1075 Edura-Shield

E. Total system DFT: 11 mils

2.05 EQUIPMENT

A. Agitator: The Contractor shall provide a suitable mechanical agitator and shall agitate all paint until proper dispersion of materials is secured. All paint ingredients shall be in a satisfactory dispersed condition at the time of application. Use equipment that conforms to the paint manufacturer's requirements.

2.06 MATERIALS

A. Blast Cleaning Abrasives: Blasting shall be done with an abrasive material of non-silica composition. This abrasive material shall be clean, dry, and free of clay particles and other extraneous matter and shall include a dust emission reducer, "Dustnet" or approved equal. The District must approve the abrasive material before blasting begins.

B. Compressed Air used for blasting shall be free of detrimental amounts of water and oil. Adequate traps and separators shall be provided at the compressor.

- C. If wet abrasive blasting is used, a Rust Inhibitor compatible with the coating systems shall be included in water for wet blasting.

PART 3 - EXECUTION

3.01 GENERAL

- A. The Contractor and all workers employed by Contractor shall conduct all operations in a clean and sanitary manner and in conformance with all aspects of the General Conditions. Contractor shall at all times provide dust and overspray controls for blasting and painting operations.

3.02 SURFACE PREPARATION

- A. All surfaces shall be prepared in accordance with the paint manufacturer's recommendations and as a minimum shall be cleaned free of all old paint, rust, corrosion, mill scale, oil and grease. During the cleaning or other operations inside the structure, all interior controls, floats, cathodic wiring, etc., to remain must be removed, and a cover shall be provided over the entrance of all pipes to prevent foreign matter from entering the pipes.
- B. After the surfaces have been cleaned to the specified SSPC standard, they shall be inspected by the District for any required structural repairs, and these areas shall be so marked as to enable repairs to be made. Such repairs will include, but are not limited to, leaks at welded seams, the interior ladder and controls.
- C. Spot Cleaning: All rust, peeled or cracked paint, overspray, runs, sags and non-adherent paint shall be removed. All exposed edges of the remaining paint shall be feathered, and spot cleaning shall be conducted in a manner to minimize damage to sound material. All foreign matter shall be removed from seams, pickets, joints and the bottom of the columns and plates.
- D. All surfaces to be painted shall receive a final brush blast immediately before applying the initial coating. The time limit between final blasting and initial coating shall be in accordance with the manufacturer's recommendations, and in no case shall this time period exceed 8 hours, unless there are dehumidification issues. "Dehumidification Issues" claimed by the Contractor must be approved as such by the District's Representative.

3.03 REPAIRS

- A. Seam Welding: All other corrosion shall be repaired and all seams rewelded as necessary to prevent future leaks and to protect the integrity of the coating system. The District's Representative shall determine amount of seam welds that need repairing after initial blasting has occurred.
- B. Surface Grinding: The Contractor shall grind and round all sharp edges created as a result of structural repairs or other work related to this contract.
- C. Weld Grinding: All welds shall be continuous, ground to a curve and free of porosity, pockets, high spots, rough projections and ripples to provide a coatable surface. All welds shall be blended smoothly into plate surface. All weld slag, splatter and flux shall be removed. Grinding of welds shall comply with condition "E" of NACE Standard RP0178.
- D. Weld Splatter: All areas containing existing weld splatter shall be ground down providing a smooth coatable surface.
- E. Door Sheet: If the Contractor proposes to cut a section of the tank wall for entrance into the tank, the door sheet and support must be designed and stamped by a registered structural engineer in the state of California. The location must be approved by the District or its Representative prior to execution. The Contractor must also provide for weld testing once the new section of steel is welded to the existing tank wall in accordance with the radiographic method described in AWWA D100. The new section of steel must match the existing thickness of the tank wall, which is identified in the structural as-built drawings as 1 inch thick, A36 material. Contractor to field verify thickness prior to structural engineer designing the door sheet.

3.04 APPLICATION

- A. Ventilation: The Contractor must provide adequate reverse chimney effect forced air ventilation while painting or coating the interior surfaces of a tank. The ventilation shall be adequate to remove fumes, prevent the possibility of an accumulation of volatile gases, protect workers and prevent damage to the tank. The Contractor shall be held financially responsible for all damage to the tank caused by inadequate ventilation.
- B. Mixing: Splitting paint kits and mixing of partial kits is not allowed. Mix only whole kits and discard any leftover paint. Mixing of all coatings must be performed in strict compliance with the manufacturer's recommendations.
- C. General Application: All paint and finishing materials shall be applied by skilled workmen and shall be brushed or sprayed in even, thorough coats without runs, crazing, sags or other blemishes. All coats, regardless of material, shall be thoroughly dry before applying succeeding coats. Full drying and curing time, as recommended by the manufacturer of the particular paint involved, shall be allowed between coats. All products shall be applied in strict accordance with the manufacturer's recommendations included DFT, curing time, etc. Painting systems shall be applied by one or more of the following described methods. However, spray application will not be permitted for exterior surfaces unless the Contractor contains overspray by a method acceptable to the Engineer.
- D. Brush Application: Only top quality hog hair or synthetic bristle brushes shall be used. All paint shall be applied so as to form a uniform film of a thickness which is consistent with the specified coverage for the paint being used. Sufficient cross brushing shall be used to insure filling of all surface irregularities and complete coverage. Particular care shall be used in painting corners and other restricted places to obtain uniform application. All final brushing strokes shall be made in the same direction and toward the previously applied paint.
- E. Roller Application: Rollers used for applying coatings shall be of the highest quality and must be kept as clean as possible at all times. Any coating rolled on must form a uniform film and must give the same end results as a brushed on coat. Rolling shall be supplemented by brushing in areas where rolling could not give complete coverage, such as corners, edges, welds, crevices, bolts, rivets or other irregular surfaces.
- F. Spray Application: When paint is applied by spraying, the air gun used shall be adjustable for regulation of the air and paint mixture. The equipment shall have a suitable water trap to remove moisture present in the compressed air. Paint pots shall be equipped with a hand agitator to keep the paint well mixed. All equipment shall be thoroughly cleaned at the end of each day's work. The width of the spray shall be not less than 12 inches, or more than 18 inches. The pressure shall be suitable for type of paint used. Frequent checks shall be made to insure maintenance of correct spreading rate; care shall be taken to see that edges, corners, and bolt heads are completely covered, and that there has been no bridging over the film. Airless spray application is acceptable with prior approval of the Engineer.
- G. Roof Plate / Rafter Interface: When paint is applied at the interface between roof plate and rafters, Contractor shall utilize an approved wedge device to separate the two surfaces to ensure proper surface preparation and coating coverage in these areas and rafter tails.
- H. Cleanup: At the completion of the work, the Contractor shall clean off all paint spots, oil and stains from surfaces and leave the entire project in a satisfactory condition. Special attention shall be given to the tank foundation in that it shall be protected at all times from paint splatter. Any overlapping of the paint onto the concrete shall be cleaned by grinding or other methods as approved by the Engineer.

3.05 FINAL CURING OF COATINGS

- A. Upon completion and acceptance of applied coating system by the District's Representative and Engineer, Contractor shall furnish an approved exhaust fan or blower of sufficient capacity to insure removal of solvent vapors during curing process. The fan or blower shall be installed as approved by Engineer of the District's Representative and shall remain in continuous operation until coating is completely cured as determined by the manufacturer of the coating

system. Operation and maintenance of the blower during curing operations shall be the responsibility of the Contractor.

- B. After completion of curing cycle as noted above, the Contractor shall test the applied coating via an "acetone" or "hardness test" to verify to Engineer and the District's Representative adequate curing has been obtained. Contractor shall be responsible for maintaining blower and ventilation until applied coatings passes the tests to the satisfaction of the Engineer and the District's Representative.

3.06 DISINFECTION

- A. Prior to placing the tank in service, the structure shall be thoroughly disinfected as specified in Section 33 16 00 - Water Utility Storage Tanks. Contractor shall strictly adhere to the curing requirements of the specifications and manufacturer's recommendations prior to commencing disinfection and testing.

3.07 FIELD QUALITY CONTROL

- A. General: All work and materials supplied under this specification shall be subject to inspection by the District or its representative. All parts of the work shall be accessible to the inspector. The Contractor shall correct such work or replace such material if found defective. Such inspection will not relieve the Contractor of the responsibility of furnishing qualified labor and materials in strict accordance with the specifications.
- B. Threshold Inspections: At certain stages in the project, the Contractor will not be allowed to proceed until a thorough inspection has been performed by the District's representative and the District's representative has approved the work up to that point. The following threshold inspections will be required:
 - 1. Surface Preparation and Repair Completion: After all repairs have been made and surfaces prepared in accordance with these specifications and the coating manufacturer's instructions. The project site or area to be painted (interior or exterior of tank) shall be cleaned and ready for coating operations to begin.
 - 2. Completion of Each Coat: After each prime coat application and touch up coat; and when the tank is ready to receive the following coat.
 - 3. Substantial Completion: When all work and clean up is completed and prior to contractor moving equipment and work force off the job.
- C. The Contractor will notify the District 48 hours in advance of needing threshold inspection. Prior to scheduling the inspection, the Contractor shall have sufficiently reviewed his work and believe it to be ready for threshold inspection. The cost of additional threshold inspections required because work was not approved at the original threshold inspection will be borne by the Contractor. The threshold inspections will not relieve the Contractor of his responsibility to furnish qualified labor and materials in accordance with the specifications.
- D. Quality Control Log: The Contractor shall maintain a quality control program to include a daily log and at a minimum the following quality control checks:
 - 1. Compressed air blotter test performed at start of day and every 4 hours.
 - 2. Surface preparation visual checks using SSPC VIS 1-89.
 - 3. Surface profile checks periodically using Testex Replica Tape.
 - 4. Wet film thickness, periodically as coating is applied using an approved gauge.
 - 5. Dry film thickness, daily and periodically as coating dries, using an Elcometer Thickness gauge or equal.
 - 6. Holidays, daily and periodically as needed using an approved low voltage holiday detector.
 - 7. Environmental condition, minimum of twice daily, once prior to beginning of work, and again every 4 hours during painting operations:
 - a. Ambient temperature.
 - b. Dew point and relative humidity using a sling Psychrometer and U.S. Weather Bureau Psychrometric Charts.

- c. Steel surface temperatures on at least two opposite sides of tank using surface sensing thermometers.
- d. Wind speed and direction.

The Contractor's daily log shall be kept on site at all times and be made available for review by the District or District's representative on demand. A copy of the daily log shall be faxed to the project inspector at the end of each day work is performed. The daily log shall include as a minimum the following information:

- 8. Date.
- 9. Name of Contractor.
- 10. Project Name.
- 11. Person's Name who Makes Log Entry.
- 12. Specific Progress
 - a. Areas of tank blasted
 - b. Repairs made including location
 - c. Coatings applied and location
 - d. Touch Up work and location
- 13. Environmental conditions as listed in Paragraph 3.05.C.7., and the time readings were taken.
- 14. Locations and results of all quality control checks.
- 15. Product manufacturer and batch numbers of coatings used that day.
- 16. Problems encountered and action taken as a result.

END OF SECTION 09 97 13.24

**SECTION 09 98 00
DEHUMIDIFICATION**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

General provisions of contract, including General and Special Conditions, apply to work of this section.

1.02 DESCRIPTION OF WORK

The Contractor shall provide dehumidification for application of protective coatings, in accordance with the requirements of this Specification and the Contract Documents.

1.03 DEFINITIONS

- A. The term "enclosed structure space" as used herein, is the interior space inside which the humidity and temperatures are to be controlled and protective coatings are to be applied. Enclosed structure spaces may be the interior spaces provided by the structures to be coated, or may be structures erected by Contractor to enclose the structures or objects to be coated.

1.04 QUALITY ASSURANCE

- A. The Contractor and if used, the dehumidification Subcontractor, must meet the following qualifications:
1. Possession of a valid state license as required for performance of the work called for in this Specification.
 2. Regularly engaged in dehumidification for coatings projects for at least three years immediately prior to this Work.
 3. Superintendent with experience and knowledge in dehumidification for the type of the structure included with this project.
- B. The Contractor shall provide 5 project references which document the successful experience, including the project description, and the name, address, and telephone number for the owner of each installation.

1.05 SUBMITTALS

- A. Submittals shall be furnished in accordance with the Special Provisions Section SP-19, except as indicated otherwise below.
- B. Submittals shall include the following information and be submitted at least 15 days prior to anticipated start date of Work.
1. Written list of references providing a minimum 3 years practical experience and successful history in the completion of the specified work.
 2. Calculations that substantiate the selection of equipment size and capacity.
 3. Manufacturer's product information for the dehumidification equipment proposed for the Work, including support equipment such as heaters, generators, and propane storage tanks.
 4. Manufacturer's product information for desiccant materials.
 5. Manufacturer's product information for humidity and temperature recording instruments.
 6. Copies of permits required by state and federal laws and regulations.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Equipment
1. Dehumidification equipment shall be a solid desiccant design having a single rotary desiccant bed capable of continuous fully automatic operation, with a drip-proof electrical control panel. Do not provide liquid, granular, or loose lithium chloride equipment. Heated air shall not be used as a dehumidification measure unless it is used in conjunction with dehumidification equipment.

- B. Relative humidity and temperature environmental recording equipment shall consist of sensor devices and 24-hour strip chart recorder. All equipment shall be as acceptable to the District.
 - 1. If the dehumidification equipment fails, Contractor shall reblast any exposed steel at no additional expense to the District.
 - 2. Standby power and auxiliary equipment shall be adequately sized and capable of providing reliable service.
 - 3. Air filtration collection equipment shall be provided to clean exhaust air in conformance with Laws and Regulations, and to provide discharged air that does not damage adjacent work and property, or in the vicinity of the Project. Design the air filtration system so that it does not interfere with performance of the dehumidification equipment.
 - 4. The equipment control panel shall provide for automatic desiccant regeneration cycles and automatic alarm and remote notification in the event of a power outage or equipment malfunction. The control system shall provide for automatic startup and switchover to the standby power equipment.
 - 5. Heating Equipment
 - a. Heating equipment shall be installed in the air duct between the dehumidification equipment and the enclosed structure space.
 - b. Only electric and indirect fired combustion or steam coil auxiliary heating equipment shall be used. Direct-fired space heaters shall not be used for any phase of the protective coatings operations.
 - c. Heating equipment shall have controls that automatically turn off the heating units if the airflow is interrupted or the internal temperature of the heating equipment or ducting exceeds allowable limits.

2.02 EQUIPMENT PERFORMANCE REQUIREMENTS

- A. Surfaces inside the enclosed structure space shall not be exposed to a relative humidity greater than 30 percent at any time during abrasive blasting, cleaning, coating, or curing operations.
- B. The equipment shall provide a minimum air flow rate equivalent to 2 complete air changes for the enclosed structure space every 60 minutes.
- C. The equipment shall maintain a minimum air temperature inside the enclosed structure space of 60 degrees F.

PART 3 - EXECUTION

3.01 SUPERVISION

- A. Contractor shall provide a Superintendent who is certified to operate the dehumidification equipment.

3.02 PERMITS AND REGULATIONS

- A. Contractor shall obtain in advance of field operations, and maintain in effect during the Work, all permits required by Laws and Regulations.
- B. Regional and local requirements for control of noise, air pollution, fire, safety, and hazardous materials shall be identified and complied with prior to start of Work at the Site. Contractor is responsible for acquiring any required permits.

3.03 DEHUMIDIFICATION SUBCONTRACTOR SERVICES

- A. Contractor shall require the dehumidification Subcontractor to furnish a qualified service representative to visit the project site for technical support as may be necessary to resolve field problems attributable or associated with the equipment.
- B. The dehumidification Subcontractor shall install, test, and place the equipment into operation. During operation, Subcontractor shall service the equipment and provide 24-hour, 7 day per week on-call troubleshooting and maintenance services.

3.04 SYSTEM OPERATION AND PERFORMANCE REQUIREMENTS

- A. The dehumidification and associated support equipment shall continuously control the environment in the enclosed structure space to provide the equipment performance requirements specified. Environmental control shall be maintained continuously for 24 hours per day, 7 days per week, during abrasive blast cleaning, coating application, and the curing period.
- B. During surface preparation, coating, and curing operations the dehumidification equipment shall maintain a minimum air temperature inside the enclosed structure space of 60 degrees F.
- C. During abrasive blasting operations, and when any blasted surfaces have been prepared but not coated, the dehumidification equipment shall maintain conditions so that there is no detectable deterioration or corrosion to the surfaces to be coated. To verify condition of surfaces, Engineer will mask selected surfaces following abrasive blasting and compare the condition of adjacent surfaces before coating. If any degradation of surfaces is detected, Contractor shall perform additional abrasive blasting under the specified environmental conditions to provide surfaces without deterioration or corrosion.
- D. Provide standby power and backup dehumidification equipment necessary to maintain continuous dehumidification operations. The District will not be responsible for additional cost or time requirements due to equipment failure, maintenance, and interruption of electrical power.
- E. If the dehumidification operations are interrupted for any reason, Contractor shall notify Engineer immediately. Contractor may be required to re-blast surfaces or remove coatings adversely affected by interruption of the operations.
- F. Contractor shall operate the environmental monitoring and recording equipment on a continuous basis and provide Engineer with the strip charts at the conclusion of each day. The data shall be used as the basis for adjustments to operation of the dehumidification equipment.
- G. Place the dehumidification equipment as close to the enclosed structure space connection point as possible.
- H. Clean the dehumidification air filters prior to the start of dehumidification operations and thereafter, at intervals not exceeding one week.
- I. Dehumidification Air Ducting
 1. Provide mechanically connected air ducts, with joints sealed with duct tape.
 2. Install the ducting to the center of the enclosed structure space and attach a central diffuser that will distribute air uniformly throughout the space.
 3. Maintain clean ducting free of dust and other foreign materials.
- J. Do not re-circulate air from the enclosed structure space back through the dehumidification unit.
- K. Provide adequate ventilation to maintain solvent vapors below threshold safety limits. Use detection equipment to monitor the enclosed structure space for conformance with health and safety Laws and Regulations.

END OF SECTION 09 98 00

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**SECTION 13 47 13
CATHODIC PROTECTION SYSTEM**

PART 1 - GENERAL

1.1 THIS SECTION INCLUDES

- A. The WORK of this Section includes providing a complete cathodic protection (CP) system for the following structures as outlined in this Section and on the Drawings:
 - 1. 360,000 Gallon New Clearwell
 - 2. 389,000 Gallon Existing Clearwell
 - 3. 360,000 Gallon New B Tank
 - 4. 372,000 Gallon Existing Steel B
- B. Installation of galvanic anodes, junction box, other components associated with the CP system, and all other work described herein and on the Drawings.
- C. Testing of CP system during installation.
- D. Cleanup and restoration of work site.
- E. Final System Checkout: Testing of CP system after installation.

1.2 REQUIREMENTS

- A. If the products installed as part of this Section are found to be defective or damaged or if the WORK of this Section is not in conformance with these Specifications, then the products and WORK shall be corrected at the CONTRACTOR's expense.
- B. Any retesting required due to inadequate installation or defective materials shall be paid for by the CONTRACTOR at no additional cost to the owner.
- C. The WORK also requires that one Supplier or Subcontractor accept responsibility for the WORK, as indicated, but without altering or modifying the CONTRACTOR's responsibilities under the Contract Documents.
- D. The WORK also requires coordination of assembly, installation, and testing between the contractor and any CP material supplier or subcontractor.
- E. All electrical WORK shall be in accordance with NEC and local requirements.

1.3 RELATED SECTIONS

- A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.
 - 1. Site Safety and Regulatory Requirements
 - 2. Cast-In-Place Concrete

3. Protective Coatings

1.4 REFERENCED SPECIFICATIONS, CODES AND STANDARDS

A. The WORK of this Section shall comply with the current editions of the codes and standards referenced in this specification, including the following:

1. ASTM ASTM International
 - a. A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - b. B3 Standard Specification for Soft or Annealed Copper Wire
 - c. B8 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
 - d. B187 Standard Specification for Copper, Bus Bar, Rod, and Shapes and General Purpose Rod, Bar, and Shapes
 - e. B843 Standard Specification for Magnesium Alloy Anodes for Cathodic Protection
 - f. D1000 Standard Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications
 - g. D1248 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
 - h. G97 Standard Test Method for Laboratory Evaluation of Magnesium Sacrificial Anode Test Specimens for Underground Applications
2. NSF National Sanitation Foundation
 - a. NSF 61 Drinking Water System Components
3. NACE International, the Corrosion Society
 - a. SP0196 Galvanic Anode Cathodic Protection of Internal Submerged Surfaces of Steel Water Storage Tanks
4. NFPA National Fire Protection Association
 - a. NFPA 70 National Electric Code (NEC)
5. NEMA National Electrical Manufacturers Association
 - a. 250 Enclosures for Electrical Equipment (1,000 Volts Maximum)
6. UL Underwriters Laboratories
 - a. 6 Rigid Metal Conduits
 - b. 467 Grounding and Bonding Equipment

c. 514B Fittings for Cable and Conduit

- B. Whenever the Drawings or these Specifications require a higher degree of workmanship or better quality of material than indicated in the above codes and standards, these Drawings and Specifications shall prevail.

1.5 PERMITS AND JOB ACCESS

- A. Prior to the start of construction, the CONTRACTOR shall apply to the required authorities for permits required for installation of the CP system.

1.6 QUALITY ASSURANCE

- A. Installation of the CP equipment shall be performed by individuals having at least five years of experience in the installation of the CP equipment described herein.
- B. All testing required to be performed by a "Corrosion Technician" shall be performed by a NACE certified Corrosion Technician under the supervision of a Corrosion Engineer. A Corrosion Technician is a NACE CP2 (CP Technician), CP3 (CP Technologist), or CP4 (CP Specialist). A Corrosion Engineer is a Registered Professional Corrosion Engineer or a NACE CP4 (CP Specialist).

1.7 SUBMITTALS

- A. The following shall be submitted to the ENGINEER prior to any equipment installation.
1. Catalog cuts, bulletins, brochures, or data sheets for all materials specified herein.
 2. Statement that the equipment and materials proposed meet the Specifications and the intent of the Specifications.
 3. Statement of installation experience required.
 4. Schedule, including the expected start date and planned completion date.
- B. The following shall be submitted to the ENGINEER after completion of the WORK.
1. Wire connection testing.
 2. Final System Checkout Report.
 3. Record Drawings shall be submitted to and approved by the ENGINEER before the WORK is considered complete.

1.8 INTERFERENCE AND EXACT LOCATIONS

- A. The locations of anodes, wires, anode suspension, reference electrodes, conduits, and other CP equipment, as indicated, are approximate only. Exact locations shall be determined by the CONTRACTOR in the field subject to the approval of the ENGINEER.
- B. The CONTRACTOR shall field verify all data and final locations of work done under other Sections of the Specifications required for placing of the electrical work.

- C. In case of interference with other work or erroneous locations with respect to equipment or structures, the CONTRACTOR shall furnish all labor and materials necessary to complete the WORK in an acceptable manner to the OWNER. Deviations from the Drawings and Specifications shall be submitted to the OWNER for approval.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials installed must be new. All equipment and materials supplied shall be similar to that which has been in satisfactory service for at least 5 years.
- B. All materials in contact with potable water shall be NSF 61 approved.

2.2 CATHODIC PROTECTION SYSTEM CONTROLLER

- A. Anode header wire, structure drain wire, structure test lead, and reference electrode lead wires shall be terminated in the cathodic protection system controller bolted to the side of the tank for access from ground level. The enclosure shall be NEMA 250 Type 4X and stainless steel with a hinged cover, quick release latches, and a padlock hasp. The cathodic protection system controller shall be a Water Storage Tank Test Station for Sacrificial Anode (Passive) Cathodic Protection Systems from Integrated Rectifier Technologies, Inc. (IRT), Sacrificial Anode Control Panel by Corpro Companies, or an approved equivalent.
- B. The cathodic protection system controller shall have sufficient wiring and lugs to terminate all cables and wires for the CP system. The cathodic protection system controller shall include an integrated digital meter to measure the potential between either stationary reference electrodes and the steel tank. All connection hardware shall be nickel plated brass or stainless steel. All connections shall be double nutted bolts with lock washers.
- C. Terminals shall have the provision to use a portable digital multimeter to measure tank-to-water potential and anode current output. The current measuring shunt shall be rated at 0.1 ohm with a 2-amp capacity.
- D. Wirewound power rheostat shall be rated as 100-watt, 100-ohm.
- E. Provide permanent identification tags affixed to the outside front door of the enclosure. The identification tags shall have white engraving for identification of the rectifier. Minimum height of lettering shall be 3/4 inch. The tags shall have the following legend:

CALAVERAS COUNTY WATER DISTRICT

COPPER COVE WATER SYSTEM IMPROVEMENTS

CATHODIC PROTECTION CONTROLLER

2.3 GALVANIC ANODES

- A. Standard-potential magnesium anodes: Extruded magnesium anodes shall conform to ASTM B843 Type AZ63B (commonly known as H1A). Anodes shall have an open circuit potential of 1.53 to 1.55 volts and current efficiency of 45 to 55% when tested in accordance with ASTM G97. Anodes shall be suitable for use in potable water and be NSF 61 approved. Anodes shall be 3.25 inches in diameter and the length specified on the Drawings. The anodes shall have a minimum weight of 5.5 pounds per linear foot. Anodes shall be supplied by Farwest, Corpro, Mesa, Matcor, or equivalent.

- B. Anode lead wire:
 - 1. The wire attached to the anodes shall be of the size and type indicated on the Drawings. The anode lead wire shall conform to the specifications given for "Wires" in this specification.
 - 2. Connection of wire to the anode shall have a pulling strength that exceeds the wire's tensile strength.
 - 3. Anode lead wires shall be of one continuous length, without splices, except where indicated on the Drawings.

2.4 TERMINAL BOARDS

- A. Terminal boards shall be made of 1/4-inch thick phenolic plastic and sized as indicated on the Drawings.
- B. Connection hardware shall be brass or bronze. All connections shall be double nutted bolts with serrated lock washers.
- C. Copper bus bar shall be 1/8-inch thick and sized to fit. The copper bus bar shall be per ASTM B187 with 98% conductivity.

2.5 MECHANICAL LUGS

- A. Mechanical lugs shall be brass or copper with a brass, copper, or stainless steel set screw. Tin plating on the lugs is optional. Aluminum lugs shall not be permitted. Zinc-plated steel set screws shall not be permitted. The lug shall be listed per UL 467, suitable for direct burial, and appropriately sized for the incoming wires. The lug shall be ILSCO Type XT-6DB, Burndy GKA8C, or an approved equivalent.

2.6 SHUNTS

- A. Shunts shall be selected by the size indicated on the Drawings.
- B. 0.01-ohm, 6-amp shunts shall be manganin wire type, as indicated. Shunts shall be Type RS, as manufactured by Holloway, or equivalent.

2.7 CONDUIT AND FITTINGS

- A. The minimum conduit size shall be 1 inch unless otherwise indicated. Refer to NFPA 70 (NEC) for additional conduit size requirements.
- B. Conduit and fittings placed above grade shall be rigid steel. Rigid Steel conduit shall be galvanized and conform to UL 6.
- C. Conduit clamps shall be galvanized steel, 304 stainless steel, or 316 stainless steel.
- D. Fittings for use with rigid steel conduit shall be galvanized cast ferrous metal with gasketed covers, Crouse Hinds Condulets, Appleton Unilets, or equivalent. Rigid metallic conduit fittings shall be galvanized, conform to NEMA FB 1, and listed to UL 514B.
- E. Union couplings for conduit shall be Erickson or Appleton Type EC, 0-Z Gedney 3-piece Series 4, or equivalent.

2.8 WIRES

- A. Conductors shall consist of stranded copper of the gauge indicated on the Drawings. Wire sizes shall be based on American Wire Gauge (AWG). Copper wire shall be in conformance with ASTM B3 and ASTM B8.
- B. Insulation Type and Colors: As shown on the Drawings.
 - 1. High molecular weight polyethylene (HMWPE) wires shall be rated for 600 volts and shall conform to ASTM D1248, Type 1, Class C, Grade 5.
 - 2. RHW wires shall be UL listed and marked as RHW or RHW-2 and rated for 600 volts. RHW wires shall have crosslinked polyethylene (XLPE) insulation that conforms with ASTM D1248.

2.9 WIRE IDENTIFICATION TAGS

- A. Wire identification tags shall be the wrap-around type with a high resistance to oils, solvents, and mild acids. Wrap-around markers shall fully encircle the wire with imprinted alpha-numeric characters for identification. The letters and number's height shall be 3/16 inch at minimum.

2.10 EXOTHERMIC WELDS

- A. Exothermic welds shall be in accordance with the manufacturer's recommendations. Exothermic welds shall be Cadweld manufactured by Erico, Thermoweld manufactured by Burndy, or an approved equivalent.
- B. Prevent molten weld metal from leaking out of the mold, where necessary, by using Duxseal packing manufactured by Johns-Manville, Thermoweld packing material manufactured by Burndy, Cadweld T403 Mold Sealer manufactured by Erico, or an approved equivalent.
- C. The shape and charge of the exothermic weld shall be chosen based on the following parameters:
 - 1. Structure material
 - 2. Structure shape
 - 3. Wire size and requirement for sleeves
 - 4. Number of wires to be welded
 - 5. Orientation of weld (vertical or horizontal)

2.11 EXOTHERMIC WELD COATING

- A. After exothermic welding, repair coatings, and linings in accordance with the coating and lining manufacturer's recommendation.
- B. Weld caps with integrated primer shall be used to cover the exothermic weld connecting the wire to the structure. The weld cap shall be a 10-mil thick, durable plastic sheet that has a dome filled with a moldable compound to ensure complete encapsulation of the exothermic weld and a layer of elastomeric adhesive with integrated primer. The adhesive and primer shall be compatible with the structure material and structure coating material. Adhesion to steel shall be at least 10 lb/in per ASTM D1000. Weld cap with integrated primer shall be Handy Cap IP manufactured by Royston or equivalent for wire size up to 8 AWG and Handy Cap XL IP manufactured by Royston or equivalent for wire size up to 2 AWG.

2.12 SPLICES

A. Anode-to-lead wire connection:

1. The anode-to-lead wire connection shall be made by the manufacturer and NSF 61 approved.
2. The anode shall be connected to the lead wire using a C-tap. C-tap shall be sized for the lead wire conductor and anode diameters. C-tap shall be copper, listed to UL 467, and listed for direct burial. C-tap shall be Crimpit or HYTAP by Burndy, CTAP by Panduit, C Crimp by IlSCO, or an approved equivalent.
3. The C-tap shall be encased in epoxy to provide a waterproof seal over the connection.
4. The splice shall provide a waterproof seal over the connection.
5. The anode wire connection shall have a pulling strength exceeding the wire's tensile strength.
6. The resistance of each anode wire connection shall not exceed 0.004 ohms. Each anode-to-lead wire connection shall be tested for conformance with these Specifications. A record of tests shall be submitted to the ENGINEER:
 - a. Anode numbering system to identify anode under test
 - b. Anode wire length
 - c. Resistance value, as indicated by test
 - d. Test equipment
 - e. Test method

B. Anode header wire-to-anode lead wire connection:

1. The anode header wire shall be connected to the anode lead wire using a split bolt encased in resin. Splice kit shall be a resin splice kit that completely encapsulates the wire and splice connection and shall be designed for CP splices. Splice kit shall be Scotchcast Wye Resin Splice Kit 82-B1, as manufactured by 3M, or an approved equivalent.

2.13 CLEVIS ASSEMBLIES

- ### A. Clevis, spool, and mounting hardware shall be dimensioned as shown on the Drawings. Clevis, mounting hardware, and other metallic components shall be 316 stainless steel. Spools shall be porcelain.

2.14 PIN INSULATORS

- ### A. Pin insulator assemblies shall be four (4) inches long overall and have a 1/4-inch diameter 316 stainless steel bolt 3/4 of an inch long attached to the flat end with a 316 stainless steel nut and lock washer. The insulator shall be composed of a porcelain, non-conducting material with a hard-glazed finish. The insulator shall have a hole through the bottom no smaller than 1/2 inch in diameter.

2.15 HANDHOLE ASSEMBLIES

- A. The handholes shall be cut with 5-inch diameter.
- B. Handhole grommets shall be used to cover the cut edge of the handhole. Grommets shall be manufactured by Dive Corr or equivalent.
- C. Handhole covers shall be steel painted to match the tank exterior connected to rubber gaskets, both of which shall be 6-inch diameter and 1/8-inch thick. The handhole assemblies shall have 1/2-inch by 1-inch 316 stainless steel bolts and 1/2-inch thick by 1-inch wide by 7 1/2-inch long PVC or G10 clamping bars. Handhole cover assemblies shall be manufactured by GMC Electrical, Inc. or equivalent.

2.16 FASTENERS

- A. All screws, bolts, and miscellaneous fasteners used to attach the CP system components to the tank shell shall be 316 stainless steel.

2.17 PERMANENT REFERENCE ELECTRODE

- A. Reference electrodes shall be copper-copper sulfate and designed for continuous use in water for a minimum of 20 years, as manufactured by Borin Manufacturing or an approved equivalent. The reference electrode shall have a wire which will extend to the CP system controller without splicing, as indicated on the Drawings.

PART 3 - EXECUTION

3.1 MATERIAL AND EQUIPMENT STORAGE

- A. All materials and equipment to be used in construction shall be stored in such a manner to be protected from detrimental effects from the elements. If warehouse storage cannot be provided, materials and equipment shall be stacked well above ground level and protected from the elements with plastic sheeting or another method, as appropriate.

3.2 JUNCTION BOX

- A. Junction box shall be installed at the location indicated on the Drawings. The CONTRACTOR shall field verify all final locations, subject to acceptance by the ENGINEER. Attachment of wire identification tags, wire terminals, and shunts shall be made as indicated on the Drawings. Junction boxes and subsequent connections shall be in conformance with all applicable codes and regulations.
- B. Connect wires to the terminal board as shown on the Drawings. Each wire shall be identified with a permanent wire identifier within four (4) inches of the termination. After installation, all wire connections in the junction box shall be tested by the Contractor to ensure they meet the requirements herein.

3.3 CATHODIC PROTECTION SYSTEM CONTROLLER

- A. Approximate location of CP System Controller is shown on the Drawings. The CONTRACTOR may propose an alternative location to the Calaveras County Water District for review and approval.
- B. The CP System Controller shall be mounted on the side of the reservoir as shown on the Drawings.

3.4 ANODES

- A. Install anodes at the length and in the orientation indicated on the Drawings. The anodes lead wires, and anode header wires shall be suspended from the clevis assemblies bolted to the interior tank roof rafters, adjacent to each handhole. The anode lead wire shall be spliced to the anode header wire using the splice kit specified herein and shown on the Drawings. The splice kit and the anode header wire shall be suspended above the waterline.
- B. For wires entering conduit, maintain sufficient slack in the wire to prevent the wire from being unduly stressed or broken with the reservoir empty or filled.
- C. The ENGINEER shall visually inspect the anode and insulation on the anode lead wire for abrasion or other damage to the insulation, wire, and anode as the anode is installed. Damaged anodes or anodes with damaged insulation or wire are not acceptable and shall not be installed. Splices are not allowed on the anode wire, except at locations indicated on the Drawings.

3.5 WIRES

- A. Each wire run shall be continuous in length and free of joints or splices, unless otherwise indicated. Care shall be taken during installation to avoid punctures, cuts, or other damage to the wire insulation. Damage to insulation shall require replacement of the entire length of wire at the CONTRACTOR's expense.
- B. At least six (6) inches of slack (coiled) shall be left for each wire at the junction box. Wire slack shall be sufficient to allow removal of wire from termination for testing.
- C. Wire shall not be bent into a radius of less than eight times the overall wire diameter.
- D. The wire conduits must be of sufficient diameter to accommodate the wires. This shall be determined by the number and size of wires in accordance with the applicable codes and standards.

3.6 WIRE IDENTIFICATION TAGS

- A. All wires shall be coded with wire identification tags within four (4) inches of the wire end.
- B. Wire identification tags shall be placed on all wires prior to pulling the wires through the conduit for termination at the anode junction box.

3.7 EXOTHERMIC WELD CONNECTIONS

- A. Exothermic weld connections shall be installed in the manner and at the locations indicated. Exothermic welds shall be spaced at least six (6) inches apart from other exothermic welds, fittings, and welds.
- B. Coating materials shall be removed from the surface over an area of sufficient size to make the connection and as indicated on the Drawings. The surface shall be cleaned to bare metal per SSPC SP11 prior to welding the conductor. The use of resin impregnated grinding wheels will not be allowed.
- C. Only enough insulation shall be removed such that the copper conductor can be placed in the welding mold. If the wire conductor diameter is not the same as the opening in the mold, then a copper adapter sleeve shall be fitted over the conductor.

- D. The CONTRACTOR shall be responsible for testing all test lead and bond wire welds. The ENGINEER, at his or her discretion, shall witness these tests. After the weld has cooled, all slag shall be removed, and the metallurgical bond shall be tested for adherence by the CONTRACTOR. A 22-ounce hammer shall be used for adherence testing by striking a blow to the weld. Care shall be taken to avoid hitting the wires. All defective welds shall be removed and replaced in a new location at least six (6) inches away from the original weld location.
- E. All exposed surfaces of the copper and steel shall be covered with insulating materials. A plastic weld cap with integrated primer shall cover the exothermic weld and surrounding area. All surfaces must be clean, dry, and free of oil, dirt, loose particles, and all other foreign materials prior to application of the weld cap.
- F. The CONTRACTOR shall inspect both the interior and exterior of the structure to confirm that all coatings and linings removed or damaged as a result of the welding have been repaired. The CONTRACTOR shall furnish all materials, clean surfaces, and repair protective coatings and linings damaged as a result of the welding. Repair of any coating or lining damaged during welding shall be performed in accordance with coating or lining manufacturer's recommendations.
- G. All test lead pairs shall be tested for broken welds using a standard ohmmeter. The resistance shall not exceed 150% of the theoretical wire resistance, as determined from published wire data.

3.8 SPLICES

- A. Install inline compression splice according to the manufacturer's instructions and using the manufacturer's recommended tool.
- B. Install split bolt according to manufacturer's instructions, including torque specifications.
- C. Install the splice kits in accordance with the manufacturer's instructions.
- D. If splice kits are not NSF 61 approved, then they shall be above the waterline to prevent contact with potable water. Alternatively, the splice kits may be fully encapsulated in an NSF 61 approved coating.

3.9 HANDHOLES

- A. The handholes shall be cut before tank recoating or relining and coordinated by the CONTRACTOR installing the CP system. Handholes shall be cut using a magnetic base, and an electric hole saw. A torch shall not be used to cut or burn the holes in the roof.
- B. Grommets shall be installed to line all handholes. Replace existing grommets found in poor condition.

3.10 HANDHOLE COVERS

- A. Handhole covers shall be installed over each handhole to prevent dirt, debris, or rainwater from entering the tank. The clamping bar shall be installed to ensure the anode lead wire or anode header wire is not clamped between the tank roof and the clamping bar.
- B. Handhole covers shall be coated to match the tank coating.

3.11 PERMANENT REFERENCE ELECTRODES

- A. Reference electrodes shall be installed as shown on the Drawings.
- B. Reference electrode lead wire shall be terminated on the terminal board as shown on the Drawings.

3.12 RESTORATION SERVICES

- A. Cleanup and restore site to match its existing condition.

3.13 WIRE CONNECTIONS

- A. After installation, all wire connections shall be tested to ensure electrical continuity at the test station locations by the CONTRACTOR to ensure that they meet the requirements and intent of the Contract Documents.

3.14 FINAL SYSTEM CHECKOUT

- A. Upon completion of the installation, the CONTRACTOR shall provide testing of the completed system by a Corrosion Technician, and the data shall be reviewed by a Corrosion Engineer to ensure conformance with the Contract Documents and NACE SP0196.
- B. The testing described herein shall be in addition to and not substitution for any required testing of individual items at the manufacturer's plant and during installation.
- C. Testing shall be performed at all test leads within the junction box as soon as possible after installation of the CP system.
- D. Testing shall include the following and shall be conducted in accordance with NACE SP0196:
 - 1. Measure and record native tank-to-water and open-circuit anode-to-water potentials at all test locations. Native potentials must be taken before energizing the CP system.
 - 2. Measure and record the "On" and "Instant Off" tank-to-water potentials at each location after the tank has been given adequate time to polarize.
 - 3. Measure and record the current output of each anode ring when the CP system is initially turned on and again after it has been given adequate time to polarize.
- E. The CONTRACTOR shall provide a written report, prepared by the Corrosion Engineer, documenting the results and analysis of the testing and recommending corrective work, as required to comply with the Contract Documents and NACE SP0196. Any deficiencies of systems tested shall be repaired and re-tested by the CONTRACTOR at no additional cost to the OWNER.
- F. The ENGINEER, at his or her discretion, shall witness these tests or repeat some or all testing to independently verify proper operation of the CP system.

**** END OF SECTION ****

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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 and Device Index located in Appendix "B" which includes the furnishing and installation:
1. Instrumentation and other miscellaneous devices. This includes all wiring and cables.
 2. Provide all necessary conduits, junction boxes, grounding system, field interconnection wiring, hardware, fittings, and devices to connect the designated equipment and wiring.
 3. Installation of primary devices, equipment and instruments are not completely detailed on Contract Drawing plan sheets. Use Device Indexes and Contract Drawings installation details for installation and mounting requirements.
 4. All necessary miscellaneous shut off, sample, and calibration valves to sensors.
 5. Trenching, back filling, compaction and resurfacing to match existing surfaces for each underground conduit route.
 6. Grounding system and equipment grounding.
 7. 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.

1.04 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.

1.05 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.

1.06 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.

1.07 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.

1.08 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.

1.09 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)
DC Control		Dark Blue	Light Blue

Description	Phase/Code Letter	Field Wire or Tape Color	Non-Field Wire Color
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 TERMINAL BLOCKS & FUSES

A. Control Panel Terminal Blocks:

1. General
 - a. Terminal blocks to be clamp type, 6mm spacing, 600 volt, minimum rating of 30 amps, and mounted on DIN rail, Allen-Bradley Bulletin 1492, Entrelec, 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 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.

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.

2.05 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 switches for hand-off-auto (HOA) applications shall have the hand position to the left, off in center, and auto in the right position.
6. On/Off selector switches shall have the "ON" position to the right.

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

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.

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.

2.06 CONTROL PANEL

- A. Modify Control panel to land new I/O for a complete and operational system..
 1. All wiring from the PLC I/O terminals shall be wired to interface terminal blocks, including all spares.
 2. Isolator shall provide complete isolation of the 4-20 mA output signal from the input signal and isolator power supply. Each isolator shall have all solid state circuitry mounted in a plug-in module. The 4-20 mA output signal shall be capable of driving a 600 ohm load. Both accuracy and linearity shall be +/- 0.10% of span. The isolator shall be powered as shown on Contract Drawings. Each isolator shall be as manufactured by AGM Electronics, Action Instruments, or approved equal.
- B. Provide updated as-built drawings in existing control panel.

2.07 FIELD DEVICES

- A. Submersible level probes to be range shown in Instrument Index with minimum accuracy of $\pm 1\%$ with 4-20 mA output loop powered Blue Ribbon Birdcage BC001 to match District standards.
- B. Tank Hatch - Tank hatch intrusion switch shall be pre-wired factory sealed cable of 5 feet for wet applications. Roller level switch shall have 316 stainless steel roller with 1.19" to 3" radius adjustable lever arm. Switch shall be provided with two circuits with clockwise or counter clockwise lever movement operation. Tank hatch switch shall be Allen-Bradley Model 802MC with 802MC-W2B lever or approved equal.

2.08 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 $\frac{3}{4}$ -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 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 $\frac{7}{16}$ ". 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 $\frac{1}{2}$ -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 ($\frac{3}{4}$ ") 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.

2.09 WIRING DEVICES

A. Boxes

1. Device boxes shall be of zinc-galvanized steel type with shape and size best suited for the particular application, rated for the location installed, and shall be supported directly to structure by means of screws, anchors, or bolts.
2. Box dimensions shall be in accordance with size, quantity of conductors, and conduit clearances per NEC articles 314 requirements.
3. Non-Weatherproof Boxes - Surface boxes shall be cast ferrous, deep FD type with threaded hubs.
4. Weatherproof (WP) Boxes - PVC-coated cast ferrous boxes may be used in place of 316 stainless steel boxes, except where boxes contain devices on cover. Boxes shall be deep, FD type with threaded hubs or stainless steel with watertight Myers hubs. Single gang boxes shall have cast hubs.

B. Switches

1. General purpose switches shall be manufactured in accordance with UL 20. Switches shall be one pole rated, 20 amps, at 277 VAC. Bodies shall be of ivory phenolic compound supported by mounting strap having plaster ears. Switches shall have copper alloy contact arm with silver cadmium oxide contacts. Switches shall have slotted terminal screws and a separate green grounding screw. Furnish Hubbell 1221, Leviton 1221, or approved equal.

C. Receptacles

1. Switched and interlocked receptacle shall be prewired with 20A pin and sleeve receptacle. Pin and sleeve shall be interlocked to prevent switch from being turned to the "ON" position unless the plug is fully inserted. Similarly, the plug cannot be removed unless the switch is in the "OFF" position. Receptacle shall be non-metallic, NEMA 4X; hinged and padlockable. Switched and interlocked receptacle shall be Mennekes HMI series or approved equal.

D. Device Plates and Covers

1. General purpose device plates and covers shall be 316 stainless steel. Plates or covers shall be attached with 316 stainless steel screws. Circuit breaker number and panelboard name shall be stamped on each cover.

2. PVC coated device boxes shall have PVC-coated gasketed covers.
3. Weatherproof switch, outlet, and receptacle boxes shall be fitted with gasketed covers rated for wet locations in accordance with NEC 404.4.
4. Weatherproof switch, outlet, and receptacle boxes shall be fitted with cast aluminum gasketed cover rated for wet locations. Each receptacle access cover shall have a gasketed spring door to maintain the weatherproof integrity with plug inserted in accordance with NEC 406.9 for unattended locations. Final decision of type of access cover for specific location shall be per Engineer. Screws and hinge springs shall be 316 stainless steel. Receptacles located outside shall have tumbler key lock.
5. Receptacle & light switch plates shall be stamped or engraved as specified in section Nameplates and Tags.

2.10 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.

2.11 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.

2.12 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 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 1/2 - 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.
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 pedestal, Control Panel, PLC, and 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. No equipment shall be installed without authorization from the Owner Engineer that the factory test has been completed.
17. 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.
18. 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. Panelboard Tests
- 1) Visual and Mechanical Inspection:
 - a) Inspect for physical damage, proper anchorage and grounding.
 - b) Compare equipment nameplate data with design plans and panelboard schedules.
 - c) Compare breaker legend for accuracy.
 - d) Check torque of bolted connections.
 - 2) The Contractor shall fill in Panelboard Test Form TF5 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. Instrumentation Tests
 - 1) The Contractor shall provide a minimum of two (2) hours of field acceptance testing for each instrument. If any instrument has not been fully tested during its allotted time, the Contractor shall provide additional hours for finishing testing of the instrument, to be paid by the Contractor.

- 2) The overall accuracy of each instrument loop shall be checked to ensure that it is within acceptable tolerance.
 - a) As a minimum, all the tests indicated/specified on the test form TF14 in Appendix "A" shall be performed by the Contractor for each of the instruments listed in Appendix "B" Device Index.
 - 3) Test equipment used for testing shall be of suitable quality so as not to mask performance deficiencies. All test equipment shall be traceable to National Bureau of Standards and have been calibrated within six months of test date.
 - 4) Testing shall be accomplished using simulated inputs only with prior written approval of the Owner.
 - 5) Calibration stickers shall be supplied for all equipment and instruments. Calibration stickers shall list the following information:
 - a) Tag number.
 - b) Calibrated by who (name), firm, city and telephone number.
 - c) Date calibrated.
 - d) Calibration range.
 - e) Comments.
- e. 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.

- f. 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".
- 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. Training to include instruction on the use, operation, calibration, and maintenance of the field devices listed in Appendix "B".
- D. 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

TF5 Panelboard Test Form

TF6 Operational Device Checks and Tests Form

TF7 Phase Rotation Test Form

TF10 Motor Test Form

TF11 Factory Test Checkout Form

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: _____

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 : _____ DATE : ___/___/___
 WITNESSED BY: _____

GROUNDING SYSTEM TEST FORM

TEST FORM (TF3)

CALIBRATION EQUIPMENT _____ DATE: _____
 DESCRIPTION : _____

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: _____

PANEL-BOARD TEST FORM

TEST FORM (TF5)

PANEL 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 :	_____	MAIN BKR :	_____

CALIBRATION EQUIPMENT

DATE: _____

DESCRIPTION :

INSULATION RESISTANCE TESTS - MEGOHMS					
A-GND	B-GND	C-GND			

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 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 PROPER LEGEND NAMEPLATES	_____

CALIBRATION TEST EQUIPMENT PART NO.

DATE CALIBRATED:

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: _____

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**

OVERALL PANEL INSPECTION	<u>Pass</u>	<u>Fail</u>
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"/>
POWER-UP INSPECTION		
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"/>
POWER DISTRIBUTION AND GENERAL COMPONENT TESTING		
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"/>
CONTROL COMPONENTS CHECKS		
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: _____

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 # _____		
Indicator Range Input Range Output Range	<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
			Description: _____		
			Calibration Date: _____		
<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

DEVICE INDEX

26 05 00 DEVICE INDEX

E-DWG	P&ID	TAG NAME	DESCRIPTION	TYPE	SPECS	MIN NEMA RATING	SIZE	SP / RANGE	UNITS	VOLT	SUN SHIELD	DWG REF DET MOUNTING	NOTES AND ACCESSORIES	16010 TEST FORM
E10	I100	LT 9152	Level Transmitter	Sub	26 05 00-2.07.A	6P	-	0-32	FT	-		E3-D		TF15
E10	I100	PNL 9110	Panel	SS	43 41 20	3R	-	-	-	120VAC		E3-F		TF7
E10	I100	PNL 9120	Panel	SS	43 41 20	3R	-	-	-	120VAC		E3-F		TF7
E10	I100	ZS 9191	Hatch Intrusion	Hatch	26 05 00-2.07.B	6P	-	-	-	-		E3-D		TF15
E10	I100	ZS 9192	Hatch Intrusion	Hatch	26 05 00-2.07.B	6P	-	-	-	-		E3-D		TF15
E20	I200	LT 252	Level Transmitter	Sub	26 05 00-2.07.A	6P	-	0-32	FT	-		E3-D		TF15
E20	I200	PNL 210	Panel	SS	43 41 20	3R	-	-	-	120VAC		E3-F		TF7
E20	I200	PNL 220	Panel	SS	43 41 20	3R	-	-	-	120VAC		E3-F		TF7
E20	I200	ZS 291	Hatch Intrusion	Hatch	26 05 00-2.07.B	6P	-	-	-	-		E3-D		TF15
E20	I200	ZS 292	Hatch Intrusion	Hatch	26 05 00-2.07.B	6P	-	-	-	-		E3-D		TF15

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**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. Hard Rock Clause:
1. Rock Excavation:
 - a. Excavation of unrippable rock requiring hydraulic hammering will be paid for as an additional cost above and beyond the cost for excavation and trenching for ordinary excavation as authorized by the District. The Construction Manager or Resident Engineer will determine when rock excavation for unrippable rock is required per the definition below:

Equipment Used ^(A)	Excavation Rate ^(B)	
	Ordinary Excavation, including rippable rock	Unrippable Rock
General Equipment - Caterpillar D8N or equivalent (Flywheel power >= 285 HP, Vehicle Mass >= 82,000 lbs) with single shank ripper	>= 5 CY per hour	< 5 CY per hour
Trench Excavation - Caterpillar 235C of equivalent (Flywheel power >= 250 HP, Vehicle Mass >= 92,000 lbs) with a short to medium stick and a rock ripping bucket	>= 5 CY per hour	< 5 CY per hour
^(A) Equipment shall be in good operating condition and operated by experienced personnel		
^(B) As witnessed by Construction Manager or Resident Engineer		

C. 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 - 985 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. None.
 - 2. Remove and handle excavated materials regardless of its type, character, composition, condition, or depth.
 - 3. No blasting allowed.
- B. Fills and Embankments:
 - 1. Crushed rock: ASTM C33, Size No. 67.
 - 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.
 - 3. Earth:
 - a. Unless otherwise approved by Engineer, must be select native earth, well graded with no more than 33 percent passing #200 sieve. Able to be moisture conditioned, uniformly distributed and readily achieve 95 percent relative compaction.
 - 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 form 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.
- 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. Approved select fill.
 - 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.
 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:
 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. 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.
- D. 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.
- E. 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 and UBC requirements.
 7. All sheet pile cut-off walls to be removed at the end of the Project.
- F. 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.
- G. 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.
- H. Trench Excavation:
1. Do not open more trench than is necessary in advance of pipe laying in order to expedite the Work; not more than 100 feet.
 2. Except where tunneling is indicated on the Contract Drawings, specified, or permitted by Engineer, excavate trenches by open cut from the surface.
 3. All trenching shall be backfilled and compacted daily unless the use of trench plates has been approved by District in advance. All open trenches crossing the travel-way, driveways, or running parallel within 4 feet of the edge of the travel-way, or the driveway, must be closed by the end of the shift.
 4. 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.

5. Maintain excavation spoils on uphill side of trench and provide erosion containment measures on downhill side.
6. 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.
7. 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.
8. 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.
9. 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.
- I. 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 placed 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.
- J. 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.
 - 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.
 - 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.
- K. 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.
- L. 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.
- M. Disposal of Excess Excavated Materials:
1. Except as otherwise permitted, dispose of excess excavated materials away from the site of the Work.
- N. 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.

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 22 00
GRADING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Removal and storage of topsoil.
- B. Rough grading the site for water storage tank foundation.
- C. Finish grading.

1.02 RELATED REQUIREMENTS

- A. Section 31 23 16 - Excavation.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 20 00 - Price and Payment Procedures, for general requirements relating to unit prices for this work.

1.04 SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with State of California, Highway Department standards.
 - 1. Maintain one copy on site.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Topsoil: Complying with State of California, Highway Department standards.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.
- B. Verify the absence of standing or ponding water.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect from damage above- and below-grade utilities to remain.
- D. Notify utility company to remove and relocate utilities.
- E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.
- F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.
- G. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; no grading is to be performed inside this line.
- H. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

3.03 ROUGH GRADING

- A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.
- B. Do not remove topsoil when wet.

- C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
- D. Do not remove wet subsoil , unless it is subsequently processed to obtain optimum moisture content.
- E. When excavating through roots, perform work by hand and cut roots with sharp axe.
- F. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key fill material to slope for firm bearing.
- G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.
- H. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

3.04 SOIL REMOVAL

- A. Stockpile excavated topsoil on site.
- B. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

3.05 FINISH GRADING

- A. Before Finish Grading:
 - 1. Verify building and trench backfilling have been inspected.
 - 2. Verify subgrade has been contoured and compacted.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.
- C. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.
- D. Place topsoil where required to level finish grade.
- E. Place topsoil to thickness as indicated.
- F. Place topsoil during dry weather.
- G. Remove roots, weeds, rocks, and foreign material while spreading.
- H. Near plants spread topsoil manually to prevent damage.
- I. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.
- J. Lightly compact placed topsoil.
- K. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

3.06 REPAIR AND RESTORATION

- A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.
- B. Trees to Remain: If damaged due to this work, trim broken branches and repair bark wounds; if root damage has occurred, obtain instructions from Engineer as to remedy.
- C. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.07 CLEANING

- A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.
- B. Leave site clean and raked, ready to receive landscaping.

END OF SECTION 31 22 00

**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 surrounding the new storage tanks and tank access roads 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:
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: Per CalTrans standard specifications, Type B per Section 39.
- D. Prime Coat:
 - 1. Cut-back liquid asphalt.
 - 2. SC-70.
- E. Tack Coat:
 - 1. Emulsified Asphalt, SS-1 or SS-1h

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 PREPARATION

- A. 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.
- B. Loose and Foreign Material:
 - 1. Remove loose and foreign material from compacted subbase surface immediately before application of paving.
- C. 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.
- D. 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.
- E. 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.

3.02 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 350 Degrees F (176.6 C).
- 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.

3.03 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.

3.04 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.

3.05 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 specified density.
- 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.

3.06 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 2023.
- 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 2023.
- F. ASTM F567 - Standard Practice for Installation of Chain-Link Fence 2014a (Reapproved 2019).
- 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.
- 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. Victory Arms: Minimum 2 inch inner diameter formed with a 45 degree angle in the direction of the climber.
- C. Corner and Terminal Posts: Minimum 2.5 inch inner diameter.
- D. Victory Arms and Terminal Posts: Minimum 2.5 inch inner diameter formed with a 45 degree angle in the direction of the climber.
- 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.
- 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.
- B. Disinfection of water storage tanks.

1.02 RELATED REQUIREMENTS

- A. Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.

1.03 REFERENCE STANDARDS

- A. AWWA B300 - Hypochlorites 2018.
- B. AWWA B301 - Liquid Chlorine 2018.
- C. AWWA B302 - Ammonium Sulfate 2016.
- D. AWWA B303 - Sodium Chlorite 2018.
- 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.
- 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/ANSI

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. In the presence of the District, all pressure pipelines shall be tested and all potable water components shall be disinfected.
- C. 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.
- D. 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.

3.04 PREPARATION

- A. Prior to testing, the water main shall be slowly and carefully filled with 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.
- B. 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.
- C. 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.

3.05 TEST SECTION LENGTH

- A. The length of pipe being tested at any one time shall not exceed 2,000 feet unless otherwise approved by the District.

3.06 TEST PRESSURE

- A. The test pressure shall be 150 psi or 50 psi greater than design pressure of the system, whichever is greater, measured at the lowest point of the section of the pressure zone being tested.
- B. 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.

3.07 TEST DURATION

- A. 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.

3.08 REPAIRS

- A. 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.

3.09 DISINFECTION

- A. Follow procedures of AWWA C651 and AWWA C652 and as directed by Engineer. Follow any direction given by the State Division of Drinking Water.
- B. Chlorination and dichlorination 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 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.
 4. Determining the bacteriological quality by laboratory test after disinfecting.
 5. Final connection of the approved new water main to the active distribution system.

3.10 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.

3.11 FILLING AND CONTACT

- A. The main shall be filled at a rate no greater than one (1) foot 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.

3.12 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.
- B. Contract shall submit the method of dichlorination.

3.13 BACTERIOLOGICAL TESTS

- A. After completion of testing and sterilization, and before the new water main is connected to the distribution system, the Contractor will take water samples for bacteriological examination through an approved laboratory. 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. The Contractor shall submit a sampling plan for District approval along with sample sites.
- B. After final flushing and after the water has remained in the new main for at least 16 hours, two consecutive sets of acceptable samples, taken at least twenty-four (24) hours apart, shall be collected from the new main. At least one 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.

3.14 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.

3.15 DISINFECTING CUT-IN CONNECTIONS

- A. When connecting to an existing water main with a cut-in tee, the trench excavation is to be dewatered during the tie-in work. The interior of the pipe, couplings, fittings, valves, and other components that make up the connection assembly shall be swabbed with a minimum 1% solution of chlorine in accordance with AWWA C650.

3.16 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 tanks into service.

END OF SECTION 33 01 10.58

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. Testing medium: Unless otherwise specified in the Piping Specification Schedules, utilize the following test media.

a. Liquid systems:

PIPELINE SIZE (DIA)	GRAVITY OR PRESSURE	SPECIFIED TEST PRESSURE	TESTING MEDIUM
Up to and including 48 inch	Gravity	25 psig minimum	Air or water
All sizes	Pressure	150 psig minimum	Water

2. 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

A. 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

3.06 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. 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. 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 C652.
 - 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.

3.07 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.

3.08 SCHEDULES

System	Service	Notes on Size, Material, Lining, or Coating	Restrained Joint	Spec Section	System
TW	Treated Water	See System Schedule	Y	33 01 21 or 33 01 22	1
OF	Potable Water	See System Schedule	Y	33 01 21 or 33 01 22	1
TP	Transmission Pipeline	See System Schedule	Y	33 01 22	1
SAM	Potable Water Sample	See System Schedule	N	33 01 24	2
SD	Storm Water	See System Schedule	N	33 01 24	2

A. Piping Specification Schedule - System 1

1. General:

a. Piping and Symbol service:

- 1) TW - Treated Water
- 2) OF - Potable Water
- 3) TP - Transmission Pipeline

b. Test requirements:

- 1) Test medium: Water
- 2) Pressure: 150 psig.
 - (a) Exception: Transmission pipeline shall be pressure tested to 300 psig
- 3) Duration: 2 hours.

c. Gaskets:

- 1) Flanged, push-on, mechanical joints (ductile iron): Rubber, AWWA C111.

2. System components:

a. Pipe size: 3 through 12 IN.

1) Exposed service (unless otherwise noted):

- (a) Material: Steel, fabricated pipe.
- (b) Reference: See Section 22 01 21 - Steel Pipe.
- (c) Lining: Cement.
- (d) Coating: Paint.
- (e) Fittings: See Section 22 01 21 - Steel Pipe.
- (f) Joints: Butt welded with rigid ANSI C207 flanges at equipment, valves, and structure penetrations, grooved joints.

2) Buried service:

- (a) Materials: Ductile iron, Class 350.
- (b) Reference: ANSI C151.
- (c) Lining: Cement.
- (d) Coating: Bituminous.
- (e) Fittings: Either ANSI C110 ductile or gray iron. Optional ANSI C153 ductile iron compact fittings for sizes 3 to 16 IN.
- (f) Joints: Push-on joints with mechanical (stuffing box type) joints at fittings and valves.

b. Pipe size: Greater than 12 IN.

1) Inside and Beneath Water Storage Tank:

- (a) Material: Steel, fabricated pipe.
- (b) Reference: See Section 22 01 21 - Steel Pipe.

- (c) Lining: Fusion Bonded Epoxy.
- (d) Coating: Fusion Bonded Epoxy.
- (e) Fittings: See Section 22 01 21 - Steel Pipe.
- (f) Joints: Butt welded with rigid ANSI C207 flanges at equipment, valves, and structure penetrations, grooved joints.
- 2) Exposed service (unless otherwise noted):
 - (a) Material: Steel, fabricated pipe.
 - (b) Reference: See Section 22 01 21 - Steel Pipe.
 - (c) Lining: Fusion bonded epoxy.
 - (d) Coating: Fusion bonded epoxy with extra field coat to match tank finish color.
 - (e) Fittings: See Section 22 01 21 - Steel Pipe.
 - (f) Joints: Butt welded with rigid ANSI C207 flanges at equipment, valves, and structure penetrations, grooved joints.
- 3) Buried Service:
 - (a) Material: Ductile iron, minimum Class 350 - 12 to 24 IN, Class 250 - > 24 IN.
 - (b) Reference: ANSI/AWWA C151.
 - (c) Lining: Cement mortar.
 - (d) Coating: Bituminous.
 - (e) Fittings: ANSI/AWWA C110 or ANSI C153.
 - (f) Joints: Push-on compression with mechanical joints at fittings and valves. Use restrained joints.
 - (g) Exception: For transmission pipeline:
 - (1) TR-Flex with TR-Flex fittings
 - (2) Tyton Joint Pipe with Tyton Joint fitting and U.S. Pipe Field Lock 350 Gaskets
 - (3) Valves connections, Flanged

B. Piping Specification Section - System 2

- 1. Piping Symbol and Service:
 - a. SD - Storm drain
 - b. SAM - Potable Water Sample
- 2. General:
 - a. Test requirements:
 - 1) Test medium: Water.
 - 2) Pressure: 50 psig.
 - 3) Duration: 2 hours.
 - b. Gaskets and O-rings:
 - 1) O-rings and flanged joints: Buna N.
- 3. System components:
 - a. Pipe size: 6 inch and greater
 - 1) Exposed service:
 - (a) Material: PVC, SDR-26
 - (b) References: ASTM D1785.
 - (c) Lining: None.
 - (d) Coating: Paint.
 - (e) Fittings: Solvent welded socket type complying with ASTM D2467.
 - (f) Joints: Solvent welded with unions at valves, penetrations through structures and equipment connections for pipe 2 inch and less and flanges at those locations for pipe above 2 inch.
 - 2) Buried service:
 - (a) Material: PVC, SDR-26.
 - (b) Reference: ASTM D1785.

- (c) Lining: None.
 - (d) Coating: None.
 - (e) Fittings: Solvent welded socket type complying with ASTM D2467.
 - (f) Joints: Solvent welded.
- b. Other Pipe
- 1) PVC Tubing (Carrier Pipe):
 - (a) Provide new PVC tubing for carrier pipe
 - (b) Instrument grade, polyethylene, tubing, black/UV stabilized
 - (c) FDA approved and certified NSF 51 and NSF 61
 - (d) ASTM D-1693 (10% IGEPAL)
 - (e) ASTM-D1248, Type I, Class A, Category 4, Grade E5
 - 2) Containment Materials (Carrier Encasement):
 - (a) 1" Schedule 80, PVC Conduit (NEMA TC-2, ANSI/UL651)
 - (b) Schedule 80, PVC Sweeps and Bends (NEMA TC-3)
 - (c) Provide end balls at terminations and coupling as needed
 - (d) Clean, apply purple primer and then solvent weld all joints

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.

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. 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. Preferred - Provide fusion-bonded epoxy lining and coating in accordance with AWWA C205.
 2. Provide cement mortar lining in accordance with AWWA C205.
 3. Provide cement mortar coating in accordance with AWWA C205.
 4. Wrap pipe in accordance with AWWA C209.
 5. 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
 - a. American Ductile Iron Pipe, McWane Ductile, U.S. Pipe
 - 2. Flanged adapters:
 - a. Ductile iron conforming to AWWA C110/A21.10 and AWWA C153/A21.53.
 - 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. ROMACFCA 501
 - e. ROMAC Macro HP FC
 - 3. Grooved couplings:
 - a. Victaulic (Style 31).
 - b. Tyler.
 - c. Or approved equal.
 - 4. Insulating couplings:
 - a. Rockwell (Style 416).
 - b. Dresser (Style 39).
 - c. Or approved equal.
 - 5. Reducing couplings:
 - a. Rockwell (Style 415).
 - b. Dresser (Style 62).
 - c. Or approved equal.
 - 6. Transition coupling:
 - a. Rockwell (Style 413).
 - b. Dresser (Style 62).
 - c. Or approved equal.
 - 7. Polyethylene encasement tape:
 - a. Chase (Chasekote 750).
 - b. Kendall (Polyken 900).
 - c. 3 M (Scotchrap 50).
 - d. Or approved equal.
 - 8. 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:
 - 1) 24" and less pipe: 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: 250 psi rating
 - 1) Rated to 350-psi per AWWA with use of special gaskets (U.S. Pipe Ring Flange-Tyte, American Toruseal or equal).
 2. Ductile iron grooved fittings: ANSI/AWWA C606, AWWA Fittings, conform to AWWA C110/A21.10 for center-to-center dimensions and AWWA C153/A21.53 for wall thickness,
 - a. 250 psi rating, grooved joint
 3. Comply with requirements for restrained fittings as indicated on Contract Drawings
 4. Cement mortar lining: AWWA C104/A21.4
- C. Pipe Joints:
1. Mechanical joints AWWA C111/A21.11:
 - a. Restraint Glands: Fusion bonded coated ductile iron body, either Romac RomaGrip, Ebba MegaLug 1100, Ebba MegaLug 1100TDM (tandem), or equal. Working pressure rating must exceed field test pressure.
 - b. Hardware: Xylan fluoropolymer coated bolts, t-bolts and nuts
 - 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. Bolts: ASTM A307, ANSI ASTM A181/A181M, chamfered or rounded ends projecting 1/4 inch to 1/2 inch beyond outer face of nut, Xylan fluoropolymer coated (Tripac 2000 Blue or equal)
 - c. Nuts: ASTM A307, hexagonal, ASTM A182/A182M, heavy semi-finished pattern, Xylan fluoropolymer coated (Tripac 2000 Blue or equal)
 - d. Gaskets: ASTM D1330, Grade 1, red rubber, ring type
 - 1) Provide 350-psi rated gaskets (U.S. Pipe Ring Flange-Tyte or American Toruseal) if working and field test pressures exceed 250-psig.
 - e. 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, and ANSI/AWWA C600, 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 80% of manufacturer's recommendation for push-on and mechanical joints.

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. The polyethylene encasement shall 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 01 24
PIPE - PLASTIC**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. PVC Plastic pipe.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. PVC (polyvinyl chloride) materials:
 - 1) ASTM D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
 - 2) ASTM D2464, Threaded (PVC) Plastic Pipe Fittings, Schedule 80.
 - 3) ASTM D2467, Socket Type (PVC) Plastic Pipe Fittings, Schedule 80.
 - 4) ASTM D2564, Solvent Cements for (PVC) Plastic Pipe, Tubing, and Fittings.

1.03 SUBMITTALS

- A. See Section 33 01 15 - Pipe and Pipe Fittings: Basic Requirements.

PART 2 - PRODUCTS

2.01 PVC PRESSURE PIPING

- A. PVC Piping:
 - 1. Pipe:
 - a. Comply with ASTM D3034 SDR 26.
 - b. Inside Nominal Diameter: As shown on Contract Drawings
 - c. Style: Bell and spigot with rubber-ring sealed gasket joint.
 - 1) Fittings: PVC
 - (a) Twin gasketed, high deflection coupling (2.5-degree per side, 5-degree per joint)
 - (b) NAPCO Fluid-Tite
 - 2) Joints:
 - (a) Comply with ASTM F477.
 - (b) Gaskets: Elastomeric.
 - 2. Sample Pipe:
 - a. Schedule 80, PVC

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
- C. Pipe and fittings shall not be stored on surfaces that might damage the pipe.

3.02 RUBBER GASKET STORAGE

- A. All rubber gaskets shall be stored in a cool, well-ventilated place and should not be exposed to the direct rays of the sun. Gaskets shall not be allowed in contact with oils, fuels, petroleum, or solvents.

3.03 IDENTIFICATION

- A. Identify each length of pipe clearly at intervals of 5 feet or less. Include manufacturer's name and trademark. Nominal size of pipe, appurtenant information regarding polymer cell classification and critical identifications regarding performance specifications, and "NSF"

approvals when applicable.

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. 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 (PRESSURE)

- A. Non-Pressure
 - 1. Pipe laying shall proceed upgrade with spigot ends pointing in the direction of flow. The assembly of the joint shall be made in accordance with the instructions of the manufacturer of the pipe.
 - 2. Pipes which are stubbed off for manhole construction or for connection by others shall be plugged or closed off with temporary plugs as specified in the manhole specifications.
 - 3. The Contractor shall take all precautions necessary to prevent the "uplift" or floating of the line prior to the completion of the backfilling operation.

3.08 CUTTING OF PIPE

- A. Non-Pressure
 - 1. Field cuts and connections shall be in accordance with the pipe manufacturer's published instructions.
 - 2. The pipe shall be marked around its entire circumference prior to cutting to assure a square cut. A factory-finished beveled end shall be used as a guide for proper bevel angle and depth of bevel plus the distance to the insertion reference mark. The end shall be beveled using manufacturer recommendations. Sharp edges on the leading edge of the bevel shall be rounded off with a pocketknife or a file.

3.09 FITTINGS

- A. Pipe ends are square cut with no bevels. The pipe insertion depth is to be per the fitting manufacturer's instructions. Fittings shall be wrapped in polyethylene.

3.10 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 24

**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. Butterfly valves are specified separately in Section 33 14 19.03 - Butterfly Valves.
 - 3. 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. Double Disc Gate Valve:
 - 1. Comply with AWWA C509 or AWWA C515 .
 - 2. Ductile iron, NRS, open left, NSF 61 and NSF 372 compliant, 2-inch square operating nut (unless otherwise noted)
 - 3. Fusion epoxy coated and lined
 - 4. Design Requirements:
 - a. 200 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: 125 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: Cast Iron.
 - 2. Cover: Cast 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. Cla-Val 33A
 - 2. ValMatic 101S, 102S
 - 3. Or equal.

2.05 BALL VALVES

- A. Ball valves 1-inch to 2-inch: brass or bronze, above ground use, threaded joint ends, NSF 61 and NSF 372 compliant.

- B. Acceptable Manufacturers:
 - 1. Red-White 5044F, 5049AB LF
 - 2. Crane LF9202
 - 3. NIBCO T-FP600A-LF

2.06 DRAIN PIPE CHECK VALVE

- A. Duckbill style check valve
- B. Slip-on connection
- C. Material of construction: Buna-N rubber
- D. 304 stainless steel compression clamp
- E. Tideflex Series TF-1 check valve or approved equal

PART 3 - EXECUTION

3.01 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.

3.02 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 6 inches above floor, minimum.

3.03 ADJUSTMENTS

- A. Check and adjust valves and accessories for smooth operation in accordance with manufacturer's instructions.

3.04 POLYETHYLENE ENCASEMENT

- A. Valves and all bolted connections shall be encased with polyethylene plastic film wrap.

3.05 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

**SECTION 33 14 19.03
BUTTERFLY VALVES**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope:
 - 1. Provide all butterfly valves for water service as indicated on Contract Drawings.
 - 2. Include all necessary operators, valve stems, valve boxes and accessories for an operable assembly.
 - 3. Valve ends suitable for specific use:
 - 4. Buried: Flanged or mechanical joint as shown on the Contract Drawings.
 - 5. Above grade: Flanged body as shown on the Contract Drawings.

1.02 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. American Water Works Association: AWWA C504 Rubber Seated Butterfly Valves.
 - 2. American National Standards Institute (ANSI):
 - a. ASME B16.5, Pipe Flanges and Flanged Fittings.
 - 3. American Society for Testing and Materials (ASTM):
 - a. ASTM A48/A48M, Specifications for Gray Iron Castings.
 - b. ASTM A126, Gray Iron Castings for Valves, Flanges and Pipe Fittings.
 - c. ASTM A276/A276M, Specifications for Stainless and Heat-Resisting Steel Bars and Shapes.

1.03 ACCEPTABLE MANUFACTURERS

- A. Subject to Compliance with the Contract Documents, the Following Manufacturers are Acceptable to match District standards:
 - 1. Mueller LineSealXPH, Pratt HP 250II, NIBCO T-FP600A-LF, or approved equal.

1.04 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures.
- 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.
 - 7. Wiring and control diagrams for electric actuated operators, and accessories.
- D. Installation Instructions: Complete set of manufacturer's installation instructions.
- E. Operations and Maintenance Data:
 - 1. Maintenance Instructions.
 - 2. Parts list.
 - 3. See Section 01 78 23 - Operation and Maintenance Manuals.

1.05 PRODUCT DELIVERY

- A. Prepare valves in accordance with AWWA C504, Section 6.
- B. Seal valve ends to positively prevent entrance of foreign matter into valve body.
- C. Box, crate, or otherwise completely enclose valves and accessories to protect against damage.

1.06 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 District's final acceptance and start of beneficial use of this equipment in accordance with the Contract Specifications.

PART 2 - PRODUCTS

2.01 BUTTERFLY VALVES

- A. General:
 - 1. AWWA C504, Class 150B:
 - a. One piece shaft construction.
 - b. One piece body construction.
 - 2. Minimum operator torque rating:
 - a. AWWA C504, Class 150B.
 - 3. Resilient-seat, tight-closing, set in valve body.
 - 4. Flanged body construction where indicated specifically in Contract Drawings.
 - 5. Discs seat at 90 Degrees with pipe axis.
 - 6. Buried or submerged service: 0-ring shaft seals or chevron seal.
 - 7. Valve position indicators:
 - a. Provide on each exposed operator.
 - b. Provide on each extension stem operating nut, Mills Engineering "Indico Model 128," Pratt "Diviner," or equal.
 - 8. Operator locking devices:
 - a. Throttling service: Infinitely variable locking device or a totally enclosed geared operator.
 - b. Other lever operators: Readily locked in the open, closed, and not less than five intermediate positions.
 - 9. Disc:
 - a. Cast iron, ASTM A126 Class B, with stainless steel type 316 edge.
 - b. Discs shall be retained by stainless steel pins extending through full diameter of shaft.
 - 10. Shaft: Stainless steel, type 304.
 - 11. Seat: EPDM.

2.02 VALVE BODIES

- A. Flanged, where called for in Contract Documents: ASTM A126 Class B, with 18-8 Type 304 Stainless.
- B. End Connections:
 - 1. Provide the type of end connections for valves as shown on the Drawings.
 - 2. Comply with the following standards:
 - a. Flanged: ASME B16.1 Class 125 unless otherwise noted or AWWA C207.
 - b. Mechanical joint.
- C. Nuts, Bolts and Washers:
 - 1. Wetted or internal to be bronze or stainless steel. Exposed to be zinc or cadmium plated.
- D. On Insulated Piping: Provide valves with extended stems to permit proper insulation application without interference from handle.
- E. Epoxy Interior Coating:
 - 1. Provide epoxy interior coating for all ferrous surfaces in accordance with AWWA C550 and AWWA C504.

2.03 OPERATORS

- A. Provide the type of valve operator as shown on the Contract Drawings.

- B. Manual Operators:
 - 1. Provide manual operators for all valves unless indicated otherwise.
 - 2. General use:
 - a. 6 inches or smaller: Lever operated, 9 position locking minimum.
 - b. Larger than 6 inch: Geared, with handwheel.
 - 3. Buried valve, valves operated through floor boxes, and as indicated on Contract Drawings: Wrench nuts:
 - a. 2 inch operating nut.
 - b. AWWA C500.
 - c. Provide two tee handle operating keys of each required size.
 - 4. Rotation:
 - a. Counterclockwise (to the left) to open.
 - b. The word "OPEN" and an arrow indicating the direction to open cast on each valve body or operator.
 - 5. Exposed valve manual operators:
 - a. Provide for all exposed valves, including those with electric or cylinder actuators.
 - b. Size handwheels for valves in accordance with AWWA C500.
 - c. Provide lever actuators for valves 2 inches to 6 inches.
 - d. Lever actuators for butterfly valves shall have a minimum of 7 intermediate lock positions between full open and full close.
 - e. Gear actuators required for butterfly valves 8-inch diameter and larger.
 - f. Gear actuators to be totally enclosed, permanently lubricated and with sealed bearings.
 - g. Provide cast iron floor stands where shown on Contract Drawings. Stands to be furnished by valve manufacturer with actuator.
 - 1) Stand or actuator to include thrust bearings for valve operation and weight of accessories.
- C. Extension Stems:
 - 1. Provide where indicated on Contract Drawings, specified, required for proper operation and for buried valves with operating nuts more than 4 feet below grade.
 - 2. Buried valves:
 - a. Stem extend to within 6 inches of grade.
 - b. Provide spaces to center stem in valve box.
 - c. Provide wrench nut.
 - 3. Provide concrete pad encasement of valve box as shown for all buried valves.
- D. Valve Boxes:
 - 1. Christy
 - 2. Jensen
 - 3. Or equal

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Install valves and accessories in accordance with the manufacturer's recommendation.
 - 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 the valve it serves with the top of the box flush with finish grade.
 - 5. Fill around box with earth and thoroughly tamp on all sides.
 - 6. Install valves in closed position.
 - 7. Install valves with operator above or at side of valve.

3.02 ADJUSTMENTS

- A. Check and adjust valves and accessories for smooth operation in accordance with manufacturer's instructions.

3.03 FIELD QUALITY CONTROL

- A. Manufacturer's representative to provide onsite inspection of all valves 4-inches and greater and instruct plant personnel on their operation and maintenance.
- B. Manufacturer's representative to observe full open/close cycling operation of each automatic valve and make necessary adjustments to travel stops, rate of travel speed valves, etc.
- C. Provide additional manufacturer's field services for valves scheduled below:
 - 1. Two visits required:
 - a. First visit: Verify equipment installed properly and ready for operation.
 - b. Second visit: Verify proper equipment operation, adjustment and performance and provide operator training.
 - c. Schedule:
 - 1) Electric actuated butterfly valves.
 - 2) 8 inch drying bed supply throttling service valve.
 - 3) Operate valve, verify zero and span positions, verify accurate position report back signed.

END OF SECTION 33 14 19.03

**SECTION 33 16 00
WATER UTILITY STORAGE TANKS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface-mounted steel water tank for domestic water, including fittings, and equipment.
- B. Coat inside and outside of tank.
- C. Tank foundations.
- D. Tank equipment.
- E. The Contractor shall be completely responsible for the design and construction of the water storage tank. Contractor shall submit complete and detailed plans for the tanks and appurtenances including the tank and foundation design, signed registered engineer in the State of California.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete for concrete components.
- B. Section 09 97 13.24 - Steel Water Tank Painting: Coating for tanks.
- C. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Grounding of equipment.
- D. Section 26 05 83 - Wiring Connections: Connection of electrical equipment.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1910, Subpart D - Walking-Working Surfaces, 1910.21-1910.30 Current Edition.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- D. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service 2023a.
- E. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- F. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel 2018, with Errata (2022).
- G. AWWA C651 - Disinfecting Water Mains 2014, with Addendum (2020).
- H. AWWA C652 - Disinfection of Water-Storage Facilities 2019.
- I. AWWA D100 - Welded Carbon Steel Tanks for Water Storage 2021.
- J. AWWA D102 - Coating Steel Water-Storage Tanks 2021.
- K. AWWA D104 - Automatically Controlled, Impressed-Current Cathodic Protection for the Interior Submerged Surfaces of Steel Water Storage Tanks 2017.
- L. AWWA M42 - Steel Water-Storage Tanks 2013.
- M. NFPA 22 - Standard for Water Tanks for Private Fire Protection 2023, with Errata.
- N. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published literature describing capacity, fittings, equipment, and coatings.
- C. Shop Drawings: Fabrication and installation details for tank, supports, fittings, and equipment.
 - 1. Structural analysis data signed and sealed by design engineer.
 - 2. Power, signal, and control wiring diagrams.

- D. Welding Qualification Certificates.
- E. Disinfection Test Reports.
- F. Field Quality Control Test Reports.

1.05 QUALITY ASSURANCE

- A. Design Engineer's Qualifications: Professional engineer licensed to practice in California, employed by tank manufacturer and capable of assuming responsibility for structural design of tank, fittings, and supports, including foundations; engineering design conducted for a different project not more than 5 years earlier will be acceptable provided design conditions are the same.
- B. Welding Qualification: Provide welding personnel qualified to conduct welding in accordance with AWS certification procedures.
- C. Electrical Components: Listed and labelled as defined by NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.06 WARRANTY

- A. Furnish 5 year manufacturers' warranty for welded steel tanks.
- B. In-Place, On-Line Warranty Inspection
 - 1. Provide warranty inspection of all welded steel storage tanks interior, approximately 18 months after substantial completion and before expiration of 2-year warranty period.
 - 2. Storage tanks will be drained by District for access by Contractor and subcontractors to interior of tank for inspection
 - 3. Contractor to Coordinate Inspection with District 4 Weeks Prior to Tank Inspection
 - 4. Inspection to be Witnessed by Owner, Contractor, and Painting Subcontractor
 - 5. All defects and separations, blisters to be repaired and painted in accordance with the Project Specifications and the manufacturer's recommendations.
 - 6. Provide warranty inspection of cathodic protection system by NACE certified technician approximately 11 months after substantial completion and before expiration of 1-year warranty period. Inspect anodes, verify instrument calibration, and make all adjustments required for optimum corrosion protection.

PART 2 - PRODUCTS

2.01 TANK DESIGN CRITERIA

- A. New Clearwell: Cylindrical tank with flat bottom on grade, with roof; including appurtenances.
 - 1. Diameter: 70 feet.
 - 2. Capacity: 346,000 gallons.
 - 3. Shell Height: 16 feet from top of foundation to top of shell.
 - 4. Height: 13.5 feet from top of foundation to overflow level.
 - 5. Structurally designed to comply with applicable building codes including:
 - a. Live and dead loads.
 - b. Design wind speed of 110 miles per hour.
 - c. Seismic movements.
 - 1) Site Modified Spectral Acceleration Values
 - (a) $S_{MS} = 0.507$
 - (b) $S_{M1} = 0.293$
 - 2) Design Spectral Acceleration
 - (a) $S_{DS} = 0.338$
 - (b) $S_{D1} = 0.195$
 - d. Thermal movements resulting from temperature change range of 120 degrees F ambient and 180 degrees F on material surfaces.
 - 6. Designed to comply with NFPA 22.
- B. New B Tank: Cylindrical tank with flat bottom on grade, with roof; including appurtenances.

1. Diameter: 65 feet
2. Capacity: 360,000 gallons
3. Shell Height: 18 feet from top of foundation to top of shell.
4. Height: 15.5 feet from top of foundation to overflow level.
5. Structurally designed to comply with applicable building codes including:
 - a. Live and dead loads.
 - b. Design wind speed of 110 miles per hour
 - c. Seismic movements.
 - 1) Site Modified Spectral Acceleration Values
 - 2) $S_{MS} = 0.507$
 - 3) $S_{M1} = 0.293$
 - 4) Design Spectral Acceleration
 - 5) $S_{DS} = 0.338$
 - 6) $S_{D1} = 0.195$
 - d. Thermal movements resulting from temperature change range of 120 degrees F ambient and 180 degrees F on material surfaces.
6. Designed to comply with NFPA 22.

2.02 STEEL TANKS

- A. Surface Tanks: Steel plates with all seams welded, complying with AWWA D100, with overlapping rafter, single/center column-support roof.
- B. Foundations: Reinforced concrete; see Section 03 30 00.

2.03 TANK FITTINGS

- A. Inlet, Outlet, and Overflow Piping: Welded steel, ASTM A53/A53M Grade B Schedule 40, with steel butt-welded fittings, ASTM A234/A234M Grade WPB Schedule 40.
 1. Expansion Joint:
 - a. Rubber bellows style expansion joint.
 - 1) Tube elastomer: FDA-EPDM.
 - 2) Cover elastomer: EPDM
 - b. Pressure rating: 70 psi at 170 degree Fahrenheit
 - c. Minimum vertical displacement upward: 4 inches
 - d. Minimum vertical displacement downward: 0.5 inches
 - e. Minimum horizontal (radial and tangential) deflection: 2 inches
 - f. Sealing gaskets: EPDM
 - g. PROCO Style 234-L, or approved equal.
- B. Tank Vents: Constructed to prevent entrance of rain, insects, birds, and animals; welded steel pipe, ASTM A53/A53M Grade B Schedule 40, with stainless steel screen.
 1. Total free open area designed in accordance with specified maximum inlet and withdrawal rate.
 2. Number and location as indicated on Contract Drawings.
- C. Stairs, Ladders, Platforms, and Railings: Comply with 29 CFR 1910, Subpart D, Sections 21-30.
 1. Inside tank and other submerged locations, use welded steel in accordance with
 2. Outside tank, use hot-dipped galvanized steel, zinc coated in accordance with ASTM A123/A123M.
 3. Provide handrails at open sides of all platforms and:
 4. Provide ladders in the following locations:
 - a. Inside tank, from bottom to top.
 5. Provide stairs in the following locations:
 - a. Outside of tank, up to roof.
- D. Roof Access: Steel covers with 2 inch flange overlapping opening frame with 4 inch neck; provide hasp and lock.

1. Hatch: 36 inch by 36 inch opening, hinged; provide one, located over interior ladder.
 2. Rain proof.
 3. At locations indications on Contract Documents.
 4. Provide handrail as indicated on Contract Documents.
 5. Provide hasp and padlock.
 6. Provide locking hinge, clasp or other mechanism to prevent hatch from accidentally closing.
- E. Manway:
1. Install 36-inch diameter at locations indicated on Contract Drawings.
 2. Manway to be single bolt open/close style.
- F. Maintenance Port:
1. Install 2-inch maintenance port with exterior ball valve as indicated on Contract Drawings.
- G. Sample Tap
1. Install 1/2" sample tap with temperature gauge and exterior ball valve as indicated on Contract Drawings.

2.04 FABRICATION

- A. Comply with AWWA D100 and AWWA D102; assemble tanks in the shop to the greatest extent possible.
- B. At welded joints, remove weld spatter, flux, slag, burrs, sharp edges, fins, laminations, scabs, and slivers; grind if necessary to produce smooth seams.
- C. Before coating, remove dirt and construction debris, and prepare as specified, whether in the shop or in the field.
- D. Do not apply coating over rust; repeat specified preparation as many times as necessary.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Assemble tank; comply with AWWA D100.
 1. Weld all field connections.
 2. Weld tank and structural members in accordance with AWS D1.1/D1.1M or AWS D1.3/D1.3M, as applicable.
- B. Install fittings and equipment, connect piping and wiring.
- C. Install cathodic protection in accordance with AWWA D104.

3.02 FOUNDATIONS

- A. Provide reinforced concrete perimeter ringwall footing and center column footing.
- B. Aggregate Base/Sand as stated on Contract Drawings.
 1. Grade uniformly to meet intended tank bottom/slope as indicated on Contract Drawings
 2. Provide uniform smoothly raked surface for tank to rest on
 3. Provide under entire tank bottom to specified depth

3.03 FIELD QUALITY CONTROL

- A. Comply with requirements of Section 01 40 00 - Quality Requirements.
- B. Engage an independent testing agency to test tank seam welds and to test for leaks.
 1. Seam Welds: Test using radiographic method in accordance with AWWA D100.
 2. Leak Test: Fill with potable water and test for leaks in accordance with AWWA D100 and NFPA 22; water furnished by District.
 3. Repair defects and retest until no failures are encountered.
 4. Refinish repaired areas using same preparation and coating as specified for original coating.

3.04 CLEANING AND DISINFECTION

- A. Clean interior of tank and disinfect in accordance with AWWA C652.

- B. Provide all necessary equipment, supplies, and materials necessary for disinfection.
- C. Dechlorinate all highly pre-chlorinated water prior to discharge from storage tank.

END OF SECTION 33 16 00

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**SECTION 33 16 00.10
WATER UTILITY STORAGE TANK REHABILITATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rehabilitation of existing surface-mounted steel water tank for domestic water, including fittings, and equipment.
- B. Recoat inside and outside of tank.
- C. Tank equipment.

1.02 RELATED REQUIREMENTS

- A. Section 09 96 00 - High-Performance Coatings: Coating of tank pedestal and other components.
- B. Section 09 97 13.24 - Steel Water Tank Painting: Coating for tanks.
- C. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Grounding of equipment.
- D. Section 26 05 83 - Wiring Connections: Connection of electrical equipment.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1910, Subpart D - Walking-Working Surfaces, 1910.21-1910.30 Current Edition.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- D. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service 2023a.
- E. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- F. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel 2018, with Errata (2022).
- G. AWWA C652 - Disinfection of Water-Storage Facilities 2019.
- H. AWWA D100 - Welded Carbon Steel Tanks for Water Storage 2021.
- I. AWWA D102 - Coating Steel Water-Storage Tanks 2021.
- J. AWWA D104 - Automatically Controlled, Impressed-Current Cathodic Protection for the Interior Submerged Surfaces of Steel Water Storage Tanks 2017.
- K. AWWA M42 - Steel Water-Storage Tanks 2013.
- L. NFPA 22 - Standard for Water Tanks for Private Fire Protection 2023, with Errata.
- M. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published literature describing capacity, fittings, equipment, and coatings.
- C. Shop Drawings: Fabrication and installation details for tank, supports, fittings, and equipment.
 - 1. Structural analysis data signed and sealed by design engineer.
 - 2. Power, signal, and control wiring diagrams.
- D. Welding Qualification Certificates.
- E. Disinfection Test Reports.
- F. Field Quality Control Test Reports.

1.05 QUALITY ASSURANCE

- A. All new tank components and integration with rehabilitation shall be designed and fabricated in accordance with latest revisions of AWWA D100. Tank manufacturer shall note where existing system components may not satisfy latest AWWA D100 standards.
- B. Design Engineer's Qualifications: Professional engineer licensed to practice in California, employed by tank manufacturer and capable of assuming responsibility for structural design of tank, fittings, and supports, including foundations; engineering design conducted for a different project not more than 5 years earlier will be acceptable provided design conditions are the same.
- C. Welding Qualification: Provide welding personnel qualified to conduct welding in accordance with AWS certification procedures.
- D. Electrical Components: Listed and labelled as defined by NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.06 WARRANTY

- A. Furnish 5 year manufacturers' warranty for welded steel tanks.
- B. In-Place, On-Line Warranty Inspection
 - 1. Provide warranty inspection of all welded steel storage tanks interior, approximately 18 months after substantial completion and before expiration of two (2) year warranty bond period.
 - 2. Storage tanks will be drained by District for access by Contractor and subcontractors to interior of tank for inspection
 - 3. Contractor to Coordinate Inspection with Owner Four (4) Weeks Prior to Tank Inspection
 - 4. Inspection to be Witnessed by District, Contractor, and Painting Subcontractor
 - 5. All defects and separations, blisters to be repaired and painted in accordance with the Project Specifications and the manufacturer's recommendations.
 - 6. Provide warranty inspection of cathodic protection system by NACE certified technician approximately 11 months after substantial completion and before expiration of one (1)-year warranty period. Inspect anodes, verify instrument calibration, and make all adjustments required for optimum corrosion protection.

PART 2 - PRODUCTS

2.01 EXISTING CLEARWELL REHABILITATION

- A. Existing Clearwell Dimensions: Cylindrical tank with flat bottom on grade, with roof; including appurtenances.
 - 1. Diameter: 70 feet.
 - 2. Capacity: 375,000 gallons.
 - 3. Height: 11 feet from top of foundation to overflow level.
- B. Existing Clearwell Modifications:
 - 1. Isolate the existing clearwell from the system and drain the existing tank
 - 2. Modify overflow piping to add required air gap per Contract Drawings
 - 3. Modify inlet and outlet per Contract Drawings
 - 4. Remove existing roof deck plates, roof angle ring, rafters, rafter seats, center column and column top and bottom plates.
 - a. Cut down approximately 1.5 feet of existing tank shell per Contract Drawings
 - 5. Modifying tank appurtenances
 - a. Remove the exterior ladder and cage and reconstruct per Contract Drawings
 - b. Install stairs per Contract Documents
 - c. Remove and replace the guard rail and access hatch per Contract Drawings
 - d. Install new cathodic protection per Contract Drawings
 - 6. Add 5.5-foot-tall steel shell to increase the tank height to 16 feet; Maximum operating level to be increased to 13 feet.

7. Shop prime and field paint each new component
8. Furnish and install new center column, column top hat and bottom floor bearing plates, new rafters and rafter seats, top angle ring, roof deck plates and other tank appurtenances per Contract Documents.
9. Install a new forced air ventilation system per 43 41 20 - Forced Ventilation
10. Sandblast and recoat the interior and exterior surfaces of the tank per 09 97 13.24 - Steel Water Tank Painting
11. Install and configure Tank instrumentation
 - a. Pressure transmitter or ultrasonic level transmitter for water level monitoring
12. Provide submittal confirming existing ringwall and center foundation is adequate to support new tank structure.

2.02 EXISTING B TANK REHABILITATION

- A. Existing Steel B Tank Dimensions: Cylindrical tank with flat bottom on grade, with roof; including appurtenances.
 1. Diameter: 65 feet
 2. Capacity: 373,000 gallons (Parallel) and 683,000 gallons (Series)
 3. Height: 31.5 feet from top of foundation to overflow level.
- B. Existing B Tank Modifications
 1. Isolate the existing B Tank from the system and drain the existing tank
 2. Reduce the height of the overflow piping per the Contract Drawings
 3. Modify overflow piping to add required air gap per Contract Drawings
 4. Modify the inlet and outlet per Contract Drawings
 5. Remove existing roof deck plates, top angle ring, rafters, rafter seats, center column, column top hat and bottom floor bearing plates.
 - a. Cut down approximately 1.5 feet of existing tank shell per Contract Drawings
 6. Modifying tank appurtenances
 - a. Remove the exterior ladder and cage and reconstruct per Contract Drawings
 - b. Install stairs per Contract Documents
 - c. Remove and replace the guard rail and access hatch per Contract Drawings
 - d. Install new cathodic protection per Contract Drawings
 7. Cut the side shell down from 32 feet to a height of 30.5 feet; Maximum operating level to be 27.5 feet (Series Operation) and 15 feet (Parallel Operation)
 8. Shop priming and field paint each new component
 9. Furnish and install new center column, column top hat and bottom floor bearing plates, new rafters and rafter seats, top angle ring, roof deck plates and other tank appurtenances per Contract Documents.
 10. Install a new forced air ventilation system per 43 41 20 - Forced Ventilation
 11. Sandblast and recoat the interior and exterior surfaces of the tank per 09 97 13.24 - Steel Water Tank Painting
 12. Install and configure tank instrumentation
 - a. Pressure transmitter or ultrasonic level transmitter for water level monitoring
 - b. Sample tap off tank shell
 13. Provide submittal confirming existing ringwall and center foundation is adequate to support modified tank structure.

2.03 STEEL TANKS

- A. Surface Tanks: Steel plates with all seams welded, complying with AWWA D100, with overlapping rafter, column-supported roof.

2.04 TANK FITTINGS

- A. Inlet, Outlet, and Overflow Piping: Welded steel, ASTM A53/A53M Grade B Schedule 40, with steel butt-welded fittings, ASTM A234/A234M Grade WPB Schedule 40.
 1. Expansion Joint:

- a. Rubber bellows style expansion joint.
 - 1) Tube elastomer: FDA-EPDM.
 - 2) Cover elastomer: EPDM
 - b. Pressure rating: 70 psi at 170 degree Fahrenheit
 - c. Minimum vertical displacement upward: 4 inches
 - d. Minimum vertical displacement downward: 0.5 inches
 - e. Minimum horizontal (radial and tangential) deflection: 2 inches
 - f. Sealing gaskets: EPDM
 - g. PROCO Style 234-L, or approved equal.
- B. Tank Vents: Constructed to prevent entrance of rain, insects, birds, and animals; welded steel pipe, ASTM A53/A53M Grade B Schedule 40, with stainless steel screen.
- 1. Total free open area designed in accordance with specified maximum inlet and withdrawal rate.
 - 2. Number and location as indicated on Contract Drawings.
- C. Stairs, Ladders, Platforms, and Railings: Comply with 29 CFR 1910, Subpart D, Sections 21-30.
- 1. Inside tank and other submerged locations, use welded steel in accordance with
 - 2. Outside tank, use hot-dipped galvanized steel, zinc coated in accordance with ASTM A123/A123M.
 - 3. Provide handrails at open sides of all platforms and:
 - 4. Provide ladders in the following locations:
 - a. Inside tank, from bottom to top.
 - 5. Provide stairs in the following locations:
 - a. Outside of tank, up to roof.
- D. Roof Access: Steel covers with 2 inch flange overlapping opening frame with 4 inch neck; provide hasp and lock.
- 1. Hatch: 36 by 36 inches opening, hinged; provide one, located over interior ladder.
 - 2. Rain proof.
 - 3. At locations indications on Contract Drawings.
 - 4. Provide handrail as indicated on Contract Drawings.
 - 5. Provide hasp and padlock.
 - 6. Provide locking hinge, clasp or other mechanism to prevent hatch from accidentally closing.

2.05 FABRICATION

- A. Comply with AWWA D100 and AWWA D102; assemble tanks in the shop to the greatest extent possible.
- B. At welded joints, remove weld spatter, flux, slag, burrs, sharp edges, fins, laminations, scabs, and slivers; grind if necessary to produce smooth seams.
- C. Before coating, remove dirt and construction debris, and prepare as specified, whether in the shop or in the field.
- D. Do not apply coating over rust; repeat specified preparation as many times as necessary.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Assemble tank; comply with AWWA D100.
 - 1. Weld all field connections.
 - 2. Weld tank and structural members in accordance with AWS D1.1/D1.1M or AWS D1.3/D1.3M, as applicable.
- B. Install fittings and equipment, connect piping and wiring.
- C. Install cathodic protection in accordance with AWWA D104.

3.02 FIELD QUALITY CONTROL

- A. Comply with requirements of Section 01 40 00 - Quality Requirements.
- B. Engage an independent testing agency to test tank seam welds and to test for leaks.
 - 1. Seam Welds: Test using radiographic method in accordance with AWWA D100.
 - 2. Leak Test: Fill with potable water and test for leaks in accordance with AWWA D100 and NFPA 22; water furnished by District.
 - 3. Repair defects and retest until no failures are encountered.
 - 4. Refinish repaired areas using same preparation and coating as specified for original coating.

3.03 CLEANING

- A. Clean interior of tank and disinfect in accordance with AWWA C652.
- B. Prior to placing tank into service, the tank must pass bacteriological and VOC tests and obtain approval from the State Division of Drinking Water.
- C. All chlorinated water must be dechlorinated prior to discharge in accordance with State Water Board General Permit requirements.

END OF SECTION 33 16 00.10

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**SECTION 43 41 20
FORCED VENTILATION**

PART 1 - GENERAL

1.01 SUMMARY

- A. Control Panel shall house main panel disconnect, vent disconnect, motor controls, and all other associated control devices.
- B. Section Includes:
 - 1. Tank force ventilation
 - a. This section also covers external TTHM (Trihalomethanes) removal vents up to 8 Amps in electrical power draw, designed for continual use on water storage tanks. Each vent shall have the ability to function continuously on a year-round basis, to ensure efficient air circulation within the headspace of the tank and proper ventilation by forcing air into the tank interior. The forced ventilation shall consist of a treated, corrosion resistant, steel housing that protects a high efficiency fan blade and includes a steel mesh and frost resistant intake screen manufactured for potable water storage tanks. The vent shall be designed to have the capability to replace an existing tank vent, blowing air into the tank and exhausting it through the same tank penetration.
 - b. Control Panel shall house main panel disconnect, vent disconnect, motor controls, and all other associated control devices.
 - 2. Control panel
 - a. Control Panel shall house main panel disconnect, vent disconnect, motor controls, and all other associated control devices.
- C. Related Requirements:
 - 1. Section 09 97 13.24 - Steel Water Tank Painting: Preparing, priming, and painting of steel storage tanks.

1.02 REFERENCE STANDARDS

- A. National Sanitation Foundation (NSF):
 - 1. NSF Standard 61 – Drinking Water System Components – Health Effects
- B. Underwriters Laboratories Inc., UL 508
- C. Occupational Safety and Health Administration, OSHA
- D. ANSI/AWWA D103-09 Factory-Coated Bolted Carbon Steel Tanks for Water Storage
- E. ANSI/AWWA D100-11 Welded Carbon Steel Tanks for Water Storage
- F. ANSI/AWWA D107-10 Composite Elevated Tanks for Water Storage

1.03 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate Work of this Section with location and placement of tanks.

1.04 SCHEDULING

- A. Section 01 32 16 - Construction Progress Schedule: Requirements for scheduling.
- B. Schedule Work of this Section after tank installation work.

1.05 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. The following sections shall be included in the submittal package:
 - 1. General equipment specifications and data sheets
 - 2. NSF Certification:
 - 3. Test Report on proposed elastomers for Chlorine and Chloramine exposure

4. Copy of test report from an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine per the ASTM D471-98 "Standard Test Method for Rubber Property – Effect of Liquids."
5. Installation instructions
6. Factory-recommended maintenance Schedule
7. 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
8. Detailed electrical three line diagram, elementary control diagrams and interconnection diagrams showing all wiring requirements for each system
9. Wiring diagrams specifying what electrical wiring needs to be done onsite during and prior to the installation, and by which responsible party
10. 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.
11. Enclosure fabrication and color.
12. Enclosure layout and elevation drawings to scale.
13. Quantity and quality requirements for electric power.
14. Materials of construction of components.
15. Nameplate schedule.

1.06 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations and final orientation of tank and accessories.

1.07 MAINTENANCE MATERIAL SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials.

1.08 QUALITY ASSURANCE

- A. Tank Forced Ventilation - The vent system shall be tested prior to deployment according to standard engineering practices at the factory testing facilities.
- B. Control Panel – The Control Panel shall be tested with vent electrically connected prior to deployment according to standard engineering practices at the factory testing facilities.
- C. Certification of this completed testing shall accompany vent installation documentation.

1.09 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Store materials according to manufacturer instructions.
- C. 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.

1.11 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.

- B. Tank Forced Ventilation:
 1. Supplier warrants equipment (and its component parts) against defects in materials and workmanship under normal use for a minimum of 1 year after the date of District's substantial completion in accordance with the Contract Specifications.
- C. Control Panel:
 1. Supplier warrants equipment (and its component parts) against defects in materials and workmanship under normal use for a minimum of 1 year after the date of District's substantial completion and start of beneficial use of this equipment in accordance with the Contract Specifications.

PART 2 - PRODUCTS

2.01 PRODUCT DATA

- A. Tank Forced Ventilation:
 1. PSI Water Technologies Powervent®, PPV-200 or approved equal
 - a. Motor: Standard 240 VAC, 3-Phase, 60 Hz powered by
 - b. Powervent® Control Center
 - c. Power Switch: NEMA 1 safety disconnect switch
 - d. Air Flow: 1,500 CFM @ 0.50 in. H₂O Static Pressure
 - e. Motor Power: 0.5 HP
 - f. Nominal Power Draw: 0.28 kW
 - g. Dimension (L x W x D): 35" x 35" x 27"
 - h. Weight: 148 lbs.
 - i. Material: Powder-coated aluminum
 - j. Filters: Standard one-inch
 2. Or pre-approved equal
- B. Powervent® Control Center with SCADA Compatibility or Forced Ventilation manufacturer approved equal, including:
 1. NEMA 4 Enclosure:
 - a. Lockable and weather resistant
 - b. Overall weight of control center 55 lbs.
 - c. Operating temperature range -4 °F to 129 °F (-20 °C to 55 °C)
 - d. Green and Red LED Indicator lights to display motor status
 - e. White LED Indicator light to display power
 - f. Cooling fan
 2. Motor Controller/VFD:
 - a. Allen Bradley
 - b. Customer Input: 120VAC single phase
 - c. VFD Output: 240VAC three phase rated to 1.0 HP
 - d. HOA Switch
 - e. Manual speed control
 - f. Thermal shut-off protection built-in
 - g. Current overload protection built-in
 - h. 300mA trip level GFCI
 - i. Sine filter
 - j. Branch-circuit protection
 3. SCADA outputs included:
 - a. Digital Output signal indicating motor running
 - b. Digital Output signal indicating fault
 - c. Digital Input/output signal for remote motor on/off
 - d. RS-485 or Dry Contact connections
 - e. 4-20mA signal indicating operating VFD speed to match P&ID

2.02 PERFORMANCE

- A. Tank Forced Ventilation:
1. Ventilation unit must be demonstrated to be effective at lowering TTHM levels as part of a mixing/aeration system in a water storage tank and have been installed in at least 5 other water storage tanks where it has been demonstrated to substantially contribute to the reduction of TTHM levels.
 2. Ventilation unit must be demonstrated to completely ventilate the air volume inside a water storage tank, minimum of 3000 CFM.
 3. The removal vent shall inject air into and vent air out of the same tank penetration
 4. The vent shall comply with AWWA standards on pressure-vacuum relief
 5. Exterior panels shall be heavy gauge powder-coated aluminum.
 6. Screen panels shall be heavy gauge aluminum 4x4 mesh.
 7. The vent unit shall be supplied with a factory-mounted NEMA 1 safety disconnect switch.
 8. The vent unit shall have a 1.0 HP motor and operate on a standard 230VAC, 3-phase power requirement provided by the vent system control center.
 9. Each vent control center shall consist of the following components:
 - a. Enclosure
 - 1) Type 4 (NEMA 4) Lockable
 - 2) Weather Resistant
 - 3) Overall weight of control center not to exceed 50 lbs.
 - 4) Green and Red LED Indicator lights show motor status
 - 5) White Power Indicated LED
 - 6) Cooling Fan
 - b. Motor Controller/VFD
 - 1) Rated to 0.5 HP
 - 2) Operating temperature range -4 °F to 131 °F (-20 °C to 55 °C)
 - 3) HOA Switch
 - 4) Manual speed control
 - 5) Thermal shut-off protection built-in
 - 6) Current overload protection built-in
 - 7) SCADA outputs included:
 - (a) Digital Output signal indicating motor running
 - (b) Digital Output signal indicating fault
 - (c) Digital Input/Output signal allowing remote motor on/off
 - (d) RS-485 or Dry Contact Connections
 - (e) 4-20mA signal indicating operating VFD speed to match P&ID
 10. GFCI-protection
 - a. 230VAC, single-phase, with a 300mA trip level GFCI included inside control center
 11. Panel equipped with a 230VAC 20-Amp main breaker
 12. Sine Filter
 13. Each unit shall be equipped with all necessary controls, inter-wired, to provide the following minimum functions:
 - a. On/Off switch to control power to vent
 - b. Sine filter
 - c. Any other controls shown on electrical and instrumentation drawings

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify layout and orientation of tank accessories, utilities, and piping connections.

3.02 INSTALLATION

- A. The Contractor shall furnish services of a factory-trained installation contractor or crew having experience with installation procedures and operation and maintenance requirements for the type of equipment installed under these specifications.
- B. The installation and startup is performed in accordance with manufacturer Operation and Maintenance Manual and instructions by personnel experienced in the operation of this equipment.

END OF SECTION 43 41 20

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**APPENDIX A:
GEOTECHNICAL ENGINEERING STUDY**

**GEOTECHNICAL ENGINEERING STUDY
CALAVERAS COUNTY WATER DISTRICT
COPPER COVE WATER SYSTEM IMPROVEMENTS PROJECT
COPPEROPOLIS, CALAVERAS COUNTY, CALIFORNIA**

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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/(ft² · 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:



	Tank Site	
	Signal Hill	Clearwell
Redox (mV)	370	340
pH	6.02	6.08
Resistivity (ohm/cm)	7,500	11,000
Chloride (mg/kg)	None detected	None detected
Sulfate (mg/kg)	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):

Soil Resistivity	Corrosivity
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.

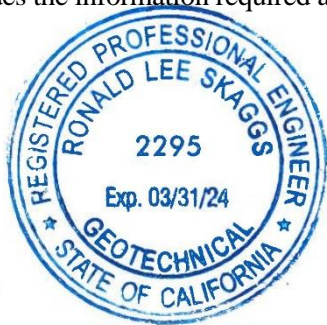
This report was prepared in accordance with the generally accepted standards of environmental and geotechnical engineering practice existing in California at the time it was written. No other warranty, express or implied, is made. It is the owner's responsibility to see that all parties to the project, 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.

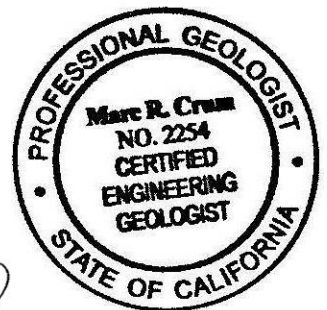
It should be noted that changes in the standards of practice in the field of environmental and geotechnical engineering, changes in site conditions, new agency regulations, or modifications to the proposed project are grounds for this report to be professionally reviewed. In light of this, there is a 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)



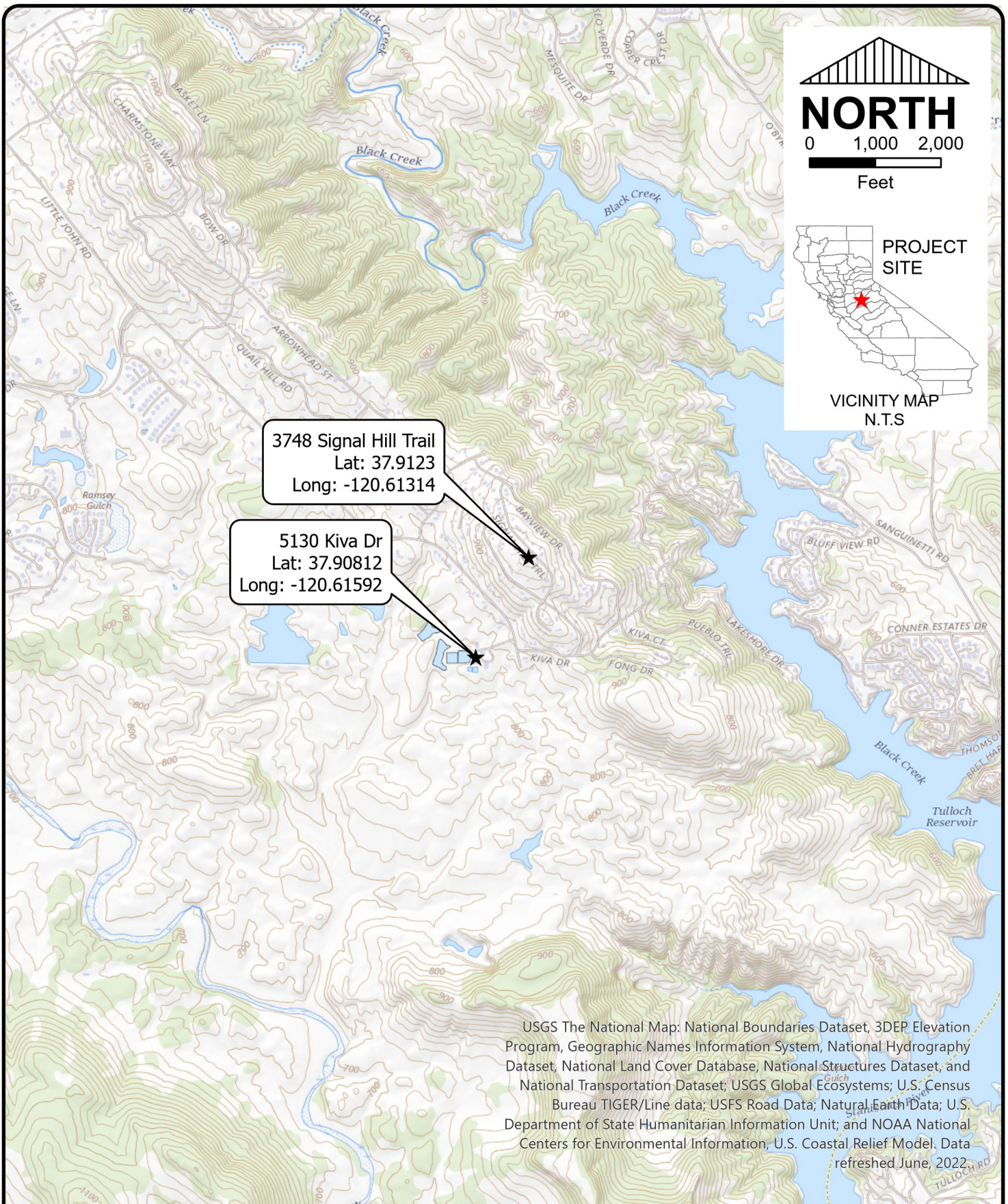
13.0 REFERENCES

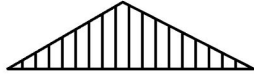

California Building Code, 2022, California Building Standards Commission, and International Conference of Building Officials, 2012.




APPENDIX A
Figures






NORTH
 0 1,000 2,000

 Feet


PROJECT SITE
 VICINITY MAP
 N.T.S

3748 Signal Hill Trail
 Lat: 37.9123
 Long: -120.61314

5130 Kiva Dr
 Lat: 37.90812
 Long: -120.61592

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed June, 2022.



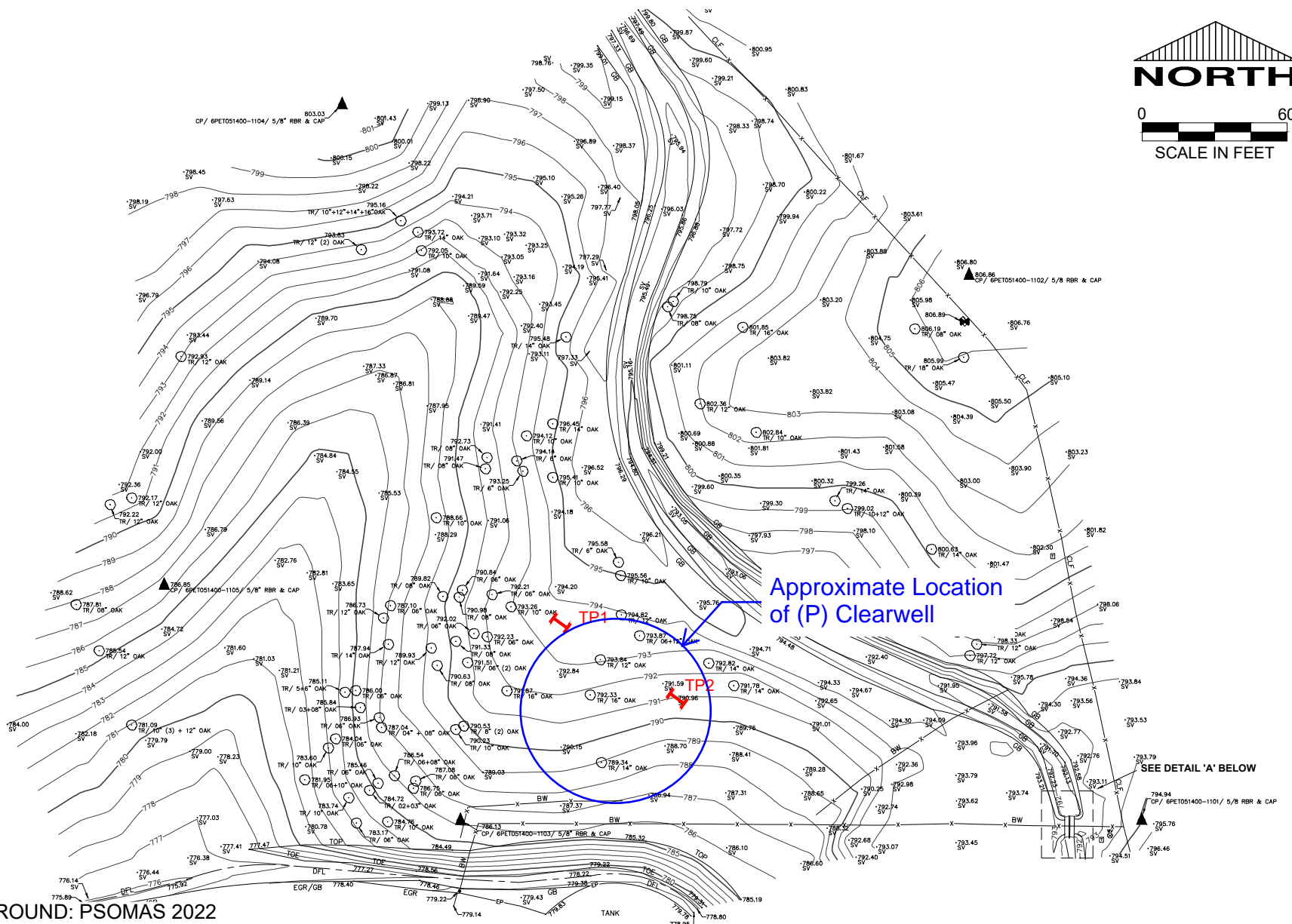
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Job No.	8809
Date	08 Nov 2022
Scale	AS SHOWN
Drawn	JW
Chk'd	LA

VICINITY MAP
CALAVERAS COUNTY WATER DISTRICT
COPPER COVE WATER SYSTEM IMPROVEMENTS
COPPEROPOLIS, CALIFORNIA

FIGURE
1

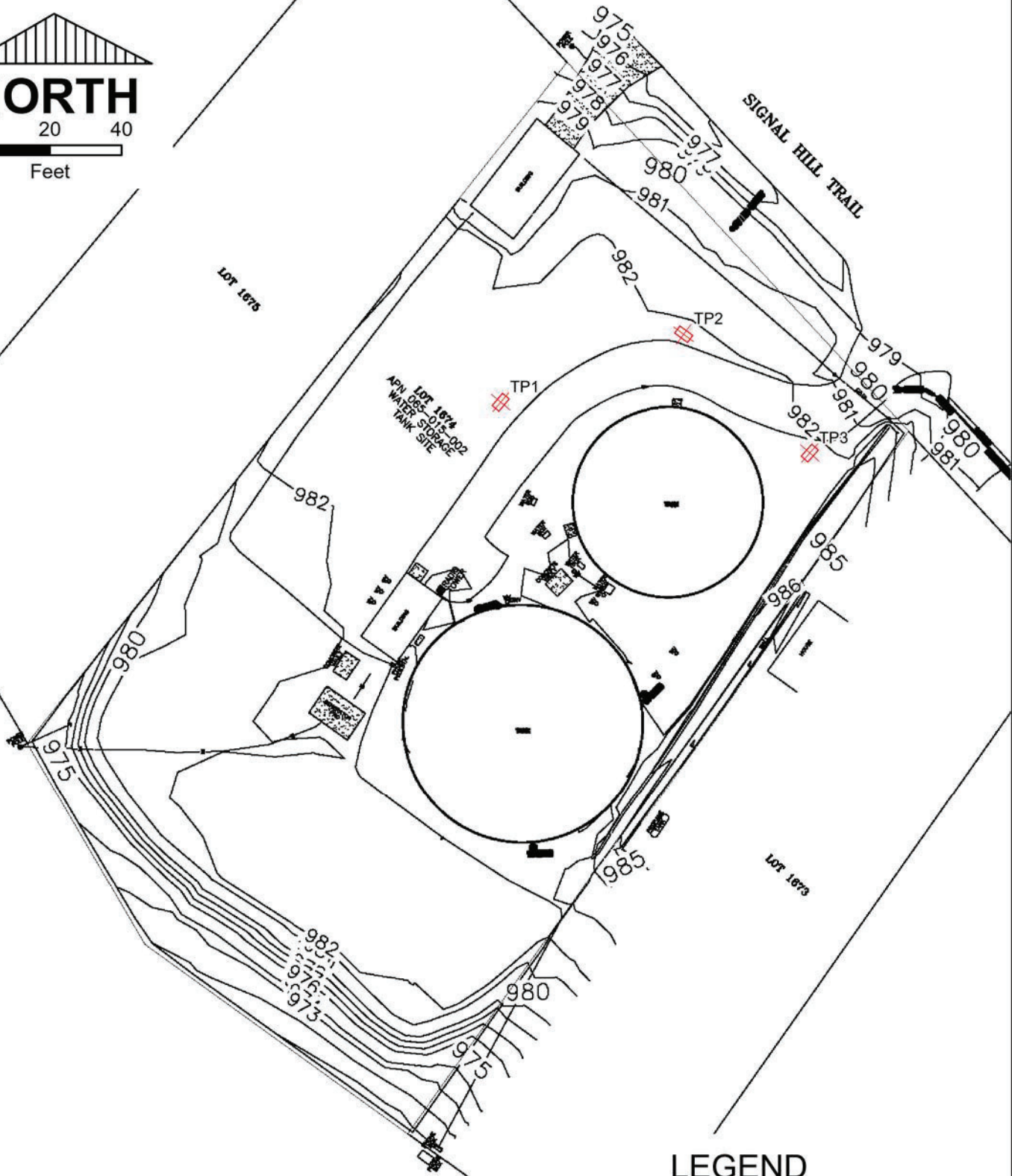
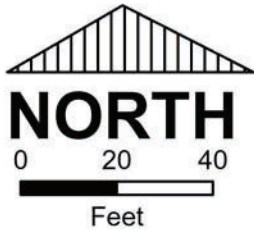
8809_CCWD.aprx



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 FIGURE 2A		CONDOR EARTH	Job No. 8809	SITE MAP WITH TEST PIT LOCATIONS CALAVERAS COUNTY WATER DISTRICT COPPER COVE WATER SYSTEM IMPROVEMENTS COPPEROPOLIS, CALIFORNIA	
		21663 Brian Lane P.O. Box 3905 Sonora, CA 95370 (209) 532-0361 fax(209) 532-0773 www.condorearth.com	Date 8 Nov 2022		
			Scale AS SHOWN		
			Drawn JW		Chk'd LA



LEGEND

APPROXIMATE TEST PIT LOCATIONS

BACKGROUND IMAGE: ESRI DIGITAL GLOBE 2018

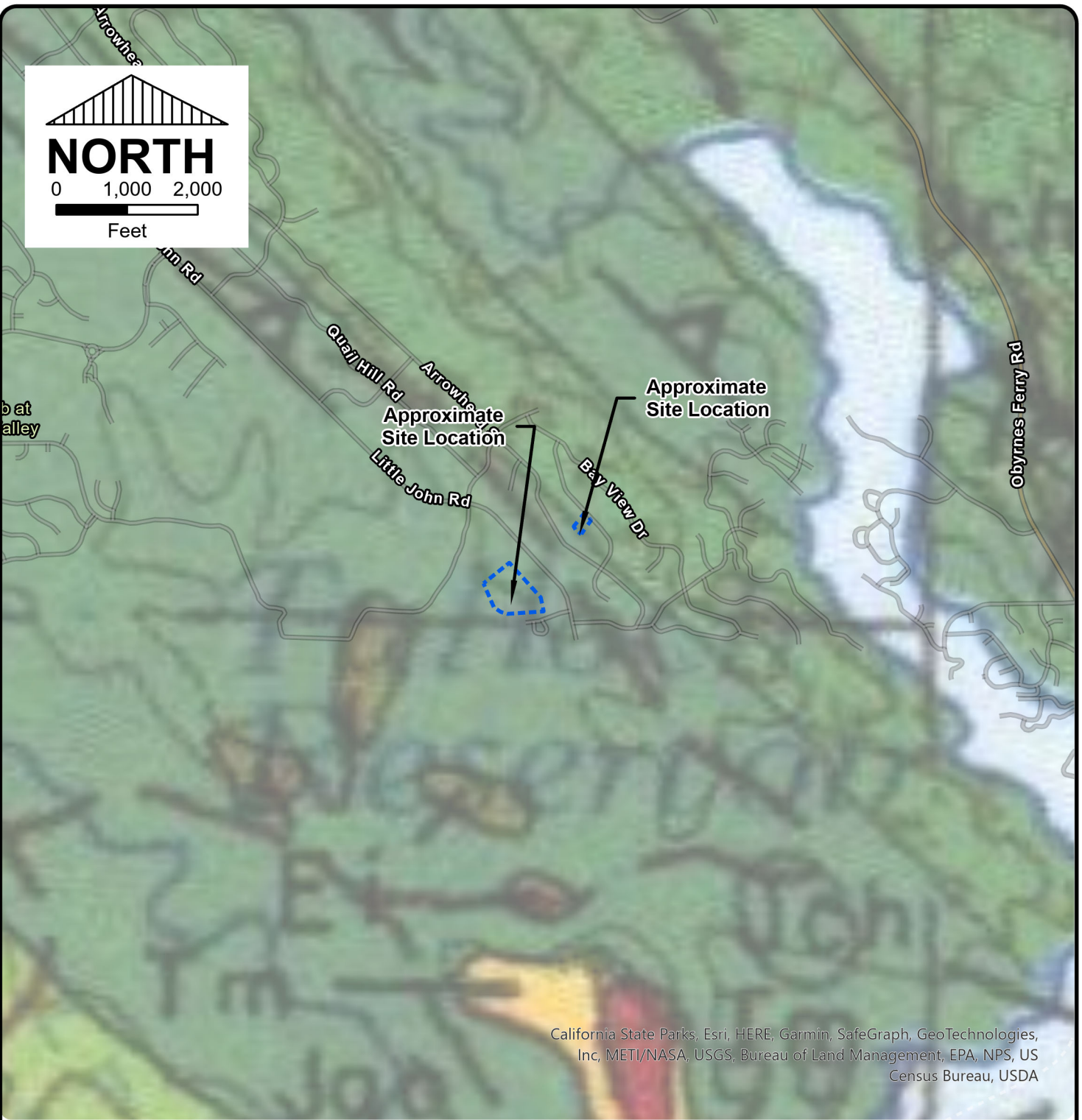
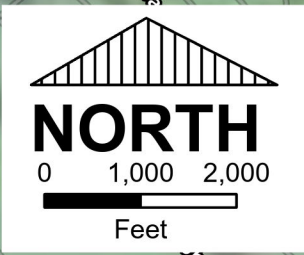
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Date	08 Nov 2022
Scale	AS SHOWN
Drawn	Chk'd
JW	LA

**SITE MAP WITH TEST PIT LOCATIONS
CALAVERAS COUNTY WATER DISTRICT
COPPER COVE WATER SYSTEM IMPROVEMENTS
COPPEROPOLIS, CALIFORNIA**

**FIGURE
2B**

8809_CCWD.aprx



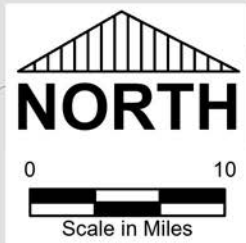
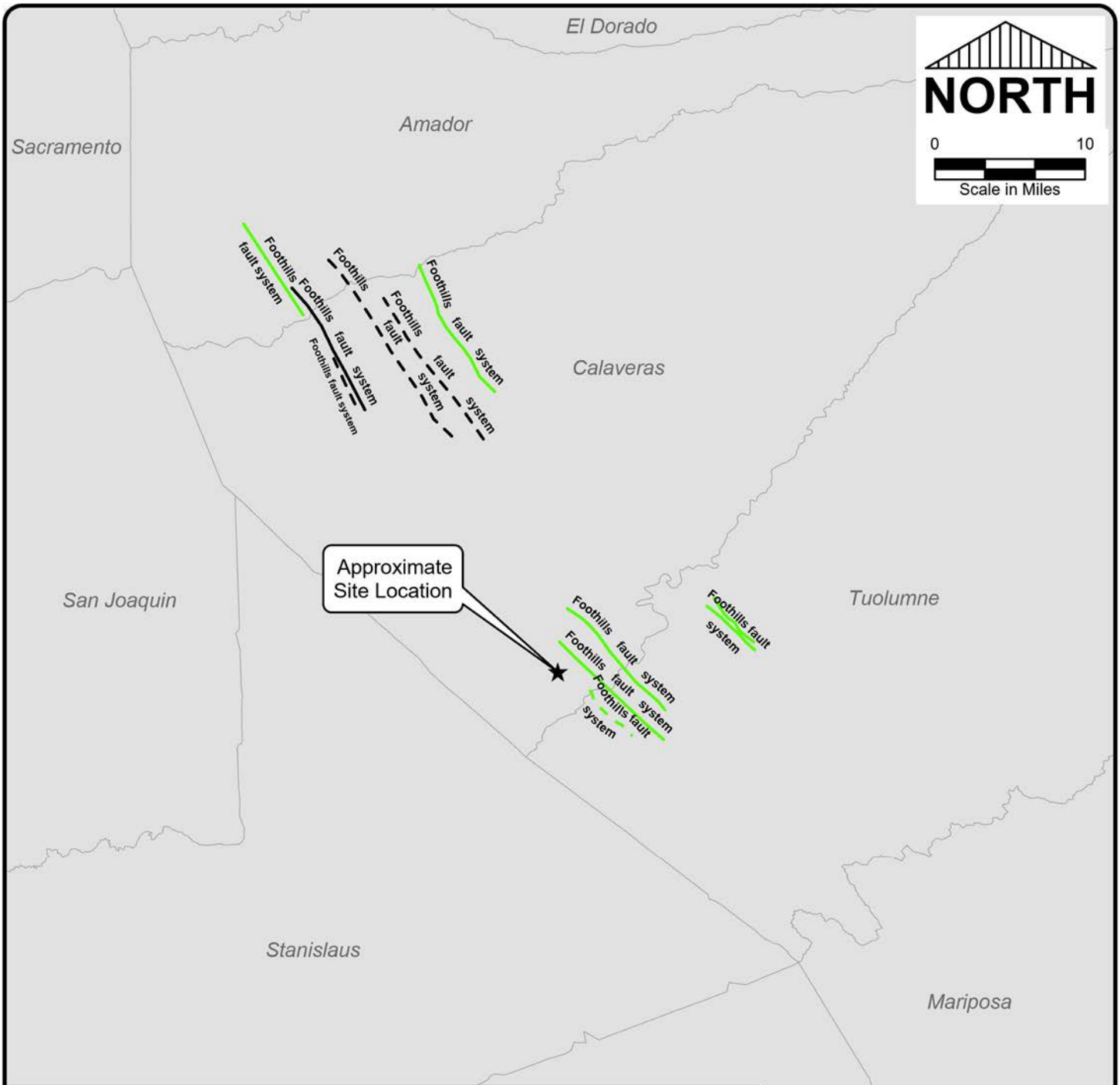
California State Parks, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA

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

 CONDOR EARTH 21663 Brian Lane P.O. Box 3905 Sonora, CA 95370 (209) 532-0361 fax (209) 532-0773 www.condorearth.com	Job No. 8809	GEOLOGIC MAP CALAVERAS COUNTY WATER DISTRICT COPPER COVE WATER SYSTEM IMPROVEMENTS COPPEROPOLIS, CALIFORNIA	FIGURE 3
	Date 08 Nov 2022		
	Scale AS SHOWN		
	Drawn JW		
P:\GIS\Current Project\8809_CCWD\8809_CCWD.aprx		8809_CCWD.aprx	



Approximate Site Location

Legend

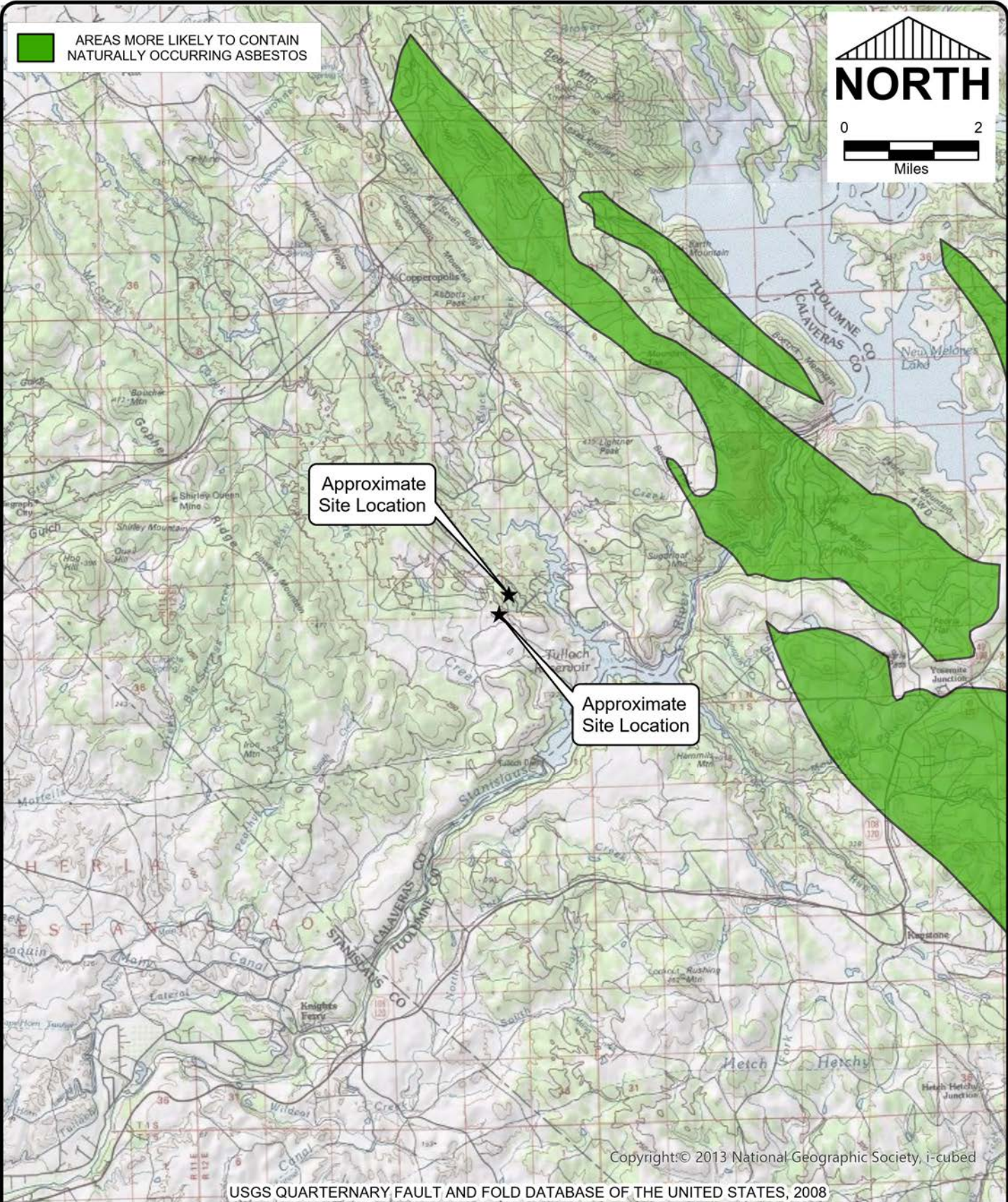
Fault Classification

- "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

 CONDOR EARTH	Job No. 8809	REGIONAL FAULT MAP CALAVERAS COUNTY WATER DISTRICT COPPER COVE WATER SYSTEM IMPROVEMENTS COPPEROPOLIS, CALIFORNIA	FIGURE 4
	Date 08 Nov 2022		
	Scale AS SHOWN		
	Drawn JW		
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AREAS MORE LIKELY TO CONTAIN NATURALLY OCCURRING ASBESTOS



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USGS QUATERNARY FAULT AND FOLD DATABASE OF THE UNITED STATES, 2008



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Job No.	8809
Date	08 Nov 2022
Scale	AS SHOWN
Drawn	Chk'd
JW	LA

**ULTRAMAFIC ROCK MAP
CALAVERAS COUNTY WATER DISTRICT
COPPER COVE WATER SYSTEM IMPROVEMENTS
COPPEROPOLIS, CALIFORNIA**

**FIGURE
5**

8809_CCWD.aprx

APPENDIX B
Test Pit Logs



CONDOR EARTH

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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, 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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- **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: 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.



CONDOR EARTH

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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 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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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.



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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, 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
Coarse-Grained Soils (more than 50 percent retained or the No. 200 sieve)	Gravel (% gravel > % sand)	GW	Well-graded Gravel (with Sand)
		GW-GM	Well-graded Gravel with Silt (and Sand)
		GW-GC	Well-graded Gravel with Clay (and Sand)
		GP	Poorly graded Gravel (with Sand)
		GP-GM	Poorly graded Gravel with Silt (and Sand)
		GP-GC	Poorly graded Gravel with Clay (and Sand)
		GM	Silty Gravel (with Sand)
		GC	Clayey Gravel (with Sand)
	Sand (% sand ≥ % gravel)	SW	Well-graded Sand (with Gravel)
		SW-SM	Well-graded Sand with Silt (and Gravel)
		SW-SC	Well-graded Sand with Clay (and Gravel)
		SP	Poorly graded Sand (with Gravel)
		SP-SM	Poorly graded Sand with Silt (and Gravel)
		SP-SC	Poorly graded Sand with Clay (and Gravel)
		SM	Silty Sand (with Gravel)
Fine-Grained Soils (50 percent or more passing the No. 200 sieve)	Silt or Clay LL < 50	ML	Silt (with Sand or Gravel), Sandy Silt (with Gravel), Gravelly Silt (with Sand)
		CL-ML	Silty Clay (with Sand or Gravel), Sandy Silty Clay (with Gravel), Gravelly Silty Clay (with Sand)
		CL	Lean Clay (with Sand or Gravel), Sandy lean Clay (with Gravel), Gravelly lean Clay (with Sand)
		OL	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)
	Silt or Clay LL ≥ 50	MH	Elastic Silt (with Sand or Gravel), Sandy elastic Silt (with Gravel), Gravelly elastic Silt (with Sand)
		CH	Fat Clay (with Sand or Gravel), Sandy fat Clay (with Gravel), Gravelly fat Clay (with Sand)
		OH	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)
Highly Organic Soils		PT	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)

Very little fractured	Greater than 48
Occasionally fractured	12 to 48
Moderately fractured	6 to 12
Closely fractured	1.25 to 6
Intensely fractured	0.5 to 1.25
Crushed	Less than 0.5

THICKNESS OF SEDIMENTARY ROCK BEDS

(Thickness in Inches)

Very thickly bedded	Greater than 72
Thickly bedded	24 to 72
Medium bedded	8 to 24
Thinly bedded	2.5 to 8
Very thinly bedded	0.75 to 2.5
Laminated	0.25 to 0.75
Thinly laminated	Less than 0.25

FRACTURE OR LAYER SEPARATION

(Thickness of Separations in Millimeters)

Very tight	< 0.1 mm
Tight	0.1 – 0.5 mm
Moderately open	0.5 – 2.5 mm
Open	2.5 – 10 mm
Very wide	> 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

Atterberg Limits
 PL= 22 LL= 27 PI= 5

Coefficients
 D₉₀= 10.8834 D₈₅= 8.6156 D₆₀= 1.7566
 D₅₀= 0.8149 D₃₀= 0.1023 D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= SC-SM AASHTO= A-2-4(0)

Remarks

F.M.=3.05

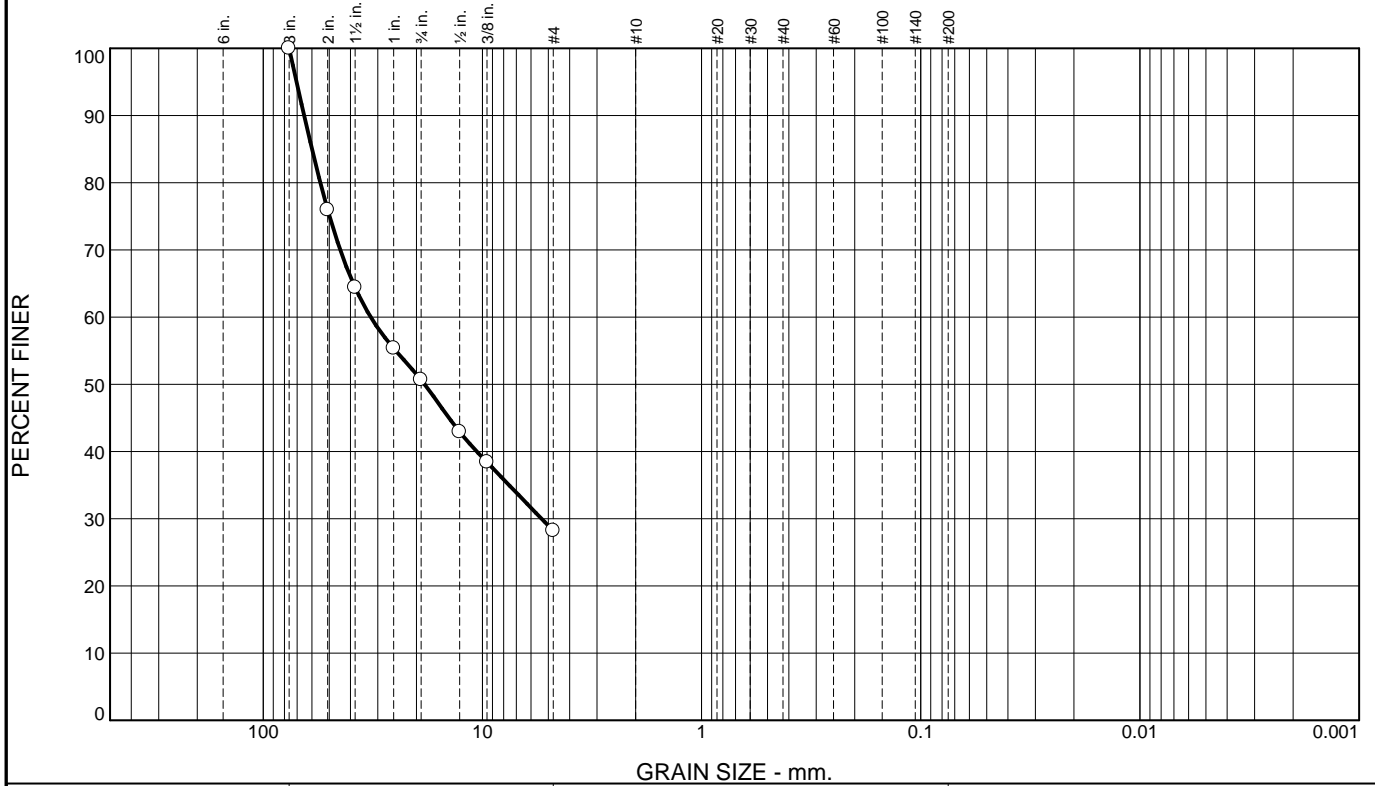
* (no specification provided)

Location: Signal Hill Tank Site, TP-1 **Depth:** 1'-2' **Date:** 11/28/2022
Sample Number: SA-1 (CT-1, PI-1)

CONDOR EARTH TECHNOLOGIES, INC. Stockton, California	Client: Calaveras County Water District Project: Copper Cove Water System Improvements Project No: 8809
Figure	

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

D₉₀= 65.0834 D₈₅= 59.9309 D₆₀= 32.3292

D₅₀= 18.3711 D₃₀= 5.3730 D₁₅=

D₁₀= C_u= C_c=

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

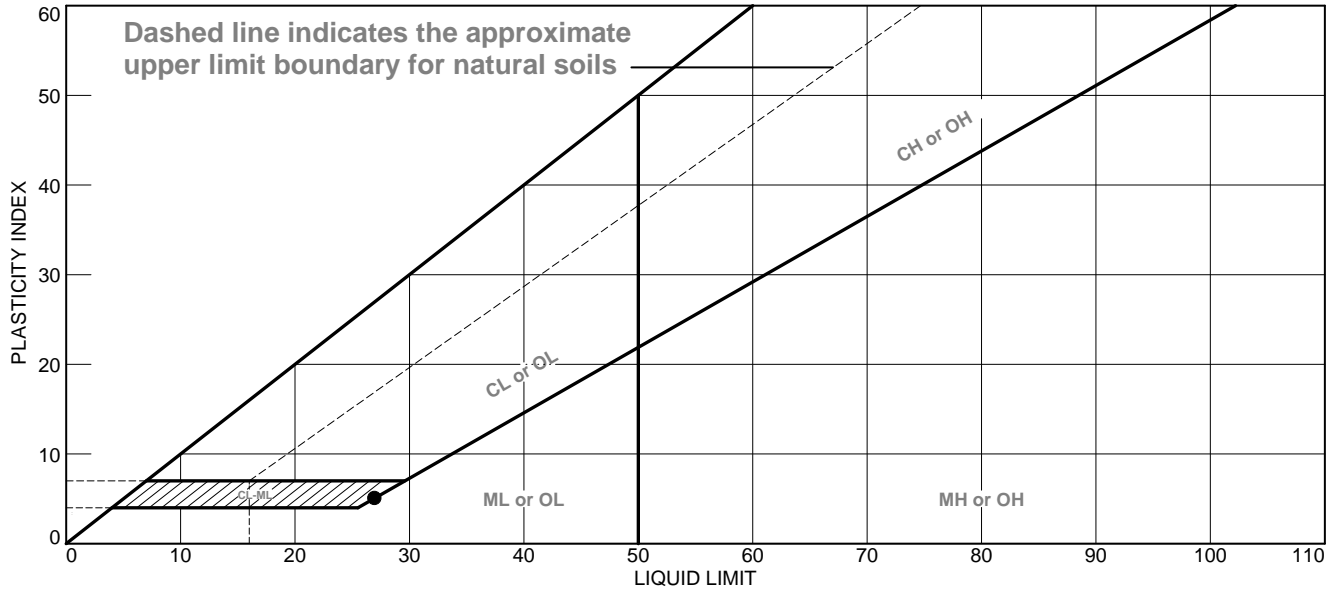
**CONDOR
EARTH TECHNOLOGIES, INC.
Stockton, California**

Client: Calaveras County Water District
Project: Copper Cove Water System Improvements
Project No: 8809

Figure

Tested By: E. Carrasco **Checked By:** R. Skaggs

LIQUID AND PLASTIC LIMITS TEST REPORT



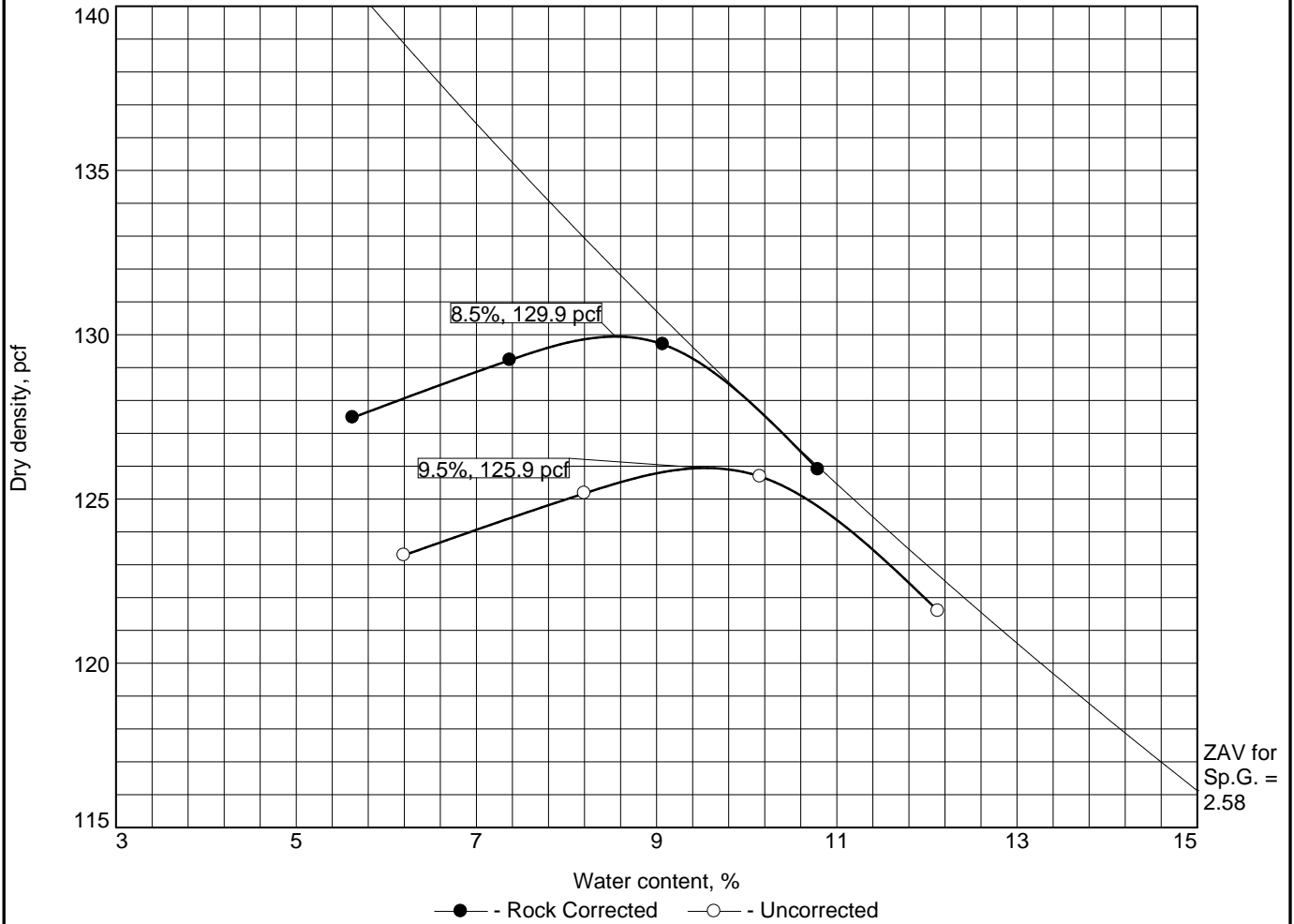
	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Reddish Light Brown Silty Clayey Sand with Gravel	27	22	5	42.7	27.8	SC-SM

Project No. 8809 Client: Calaveras County Water District Project: Copper Cove Water System Improvements Location: Signal Hill Tank Site, TP-1 Sample Number: PI-1 (CT-1, SA-1) Depth: 1'-2' CONDOR EARTH TECHNOLOGIES INC. Stockton, California	Remarks: ● 11/28/2022
--	---------------------------------

Tested By: E. Carrasco **Checked By:** R. Skaggs

Figure

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 %	

Project No. 8809 Client: Calaveras County Water District Project: Copper Cove Water System Improvements Location: Signal Hill Tank Site, TP-1 Sample Number: CT-1 (PI-1, SA-1)	Remarks: 11/23/2022
CONDOR EARTH TECHNOLOGIES INC. 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.

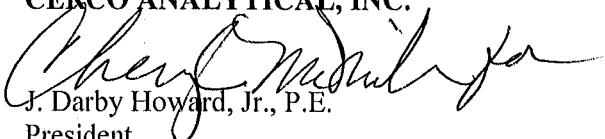
The pH of the soils ranged from 6.02 to 6.08 which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

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# 12247 Client Project I.D. 8009

Schedule Date Sampled 11/11/22 Date Due RUSH
Analyte

Full Name Laura Arista Phone 209 728 x 4237
Fax

Company and/or Mailing Address Condor Earth Technologies Cell

Sample Source Copper Cove Water System Improvements

Lab No. Sample I.D. Date Time Matrix Contain. Size Preserv. Qty.

Lab No.	Sample I.D.	Date	Time	Matrix	Contain.	Size	Preserv.	Qty.
1	CCWD-Signal Hill Tank TP-1 & 1'-2'	11/11	9:00a	S	Bag	9x9	None	1
2	CCWD-Clearwell Plant TP-2	11/11	9:00a	S	Bag	9x9	None	1

Redox Potential	ANALYSIS					ASTM				
	pH	Sulfate	Chloride	Resistivity-100% Saturated	Brief Evaluation					
X	X	X	X	X	X					

RUSH
Date Due _____

MATRIX: DW - Drinking Water, GW - Ground Water, SW - Surface Water, WW - Waste Water, Water, SL - Sludge, S - Soil, Product

ABBREVIATIONS: HB - Hosebib, PV - Petcock Valve, PT - Pressure Tank, PH - Pump House, RR - Restroom, GL - Glass, PL - Plastic, ST - Sterile

SAMPLE RECEIPT: Total No. of Containers , Rec'd Good Cond/Cold , Conforms to Record , Temp. at Lab -°C , Sampler

Relinquished By: [Signature] Date 11/11/22 Time 9:00am

Received By: [Signature] Date 11/16/22 Time 1600

Relinquished 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

Received By: _____ Date _____ Time _____

Relinquished By: _____ Date _____ Time _____

Received By: _____ Date _____ Time _____

APPENDIX D
U.S. Seismic Design Maps





CCWD Clearwell Tank Site

Latitude, Longitude: 37.90895972, -120.61587451



Date	4/14/2023, 10:38:48 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	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



Date	4/14/2023, 10:51:16 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	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:
Water Pollution Control Plan**

WATER POLLUTION CONTROL PROGRAM (WPCP)

For

Copper Cove Water System Improvements Phase 1 and Phase 2 Tanks

Prepared for:

Calaveras County Water District
120 Toma Court, San Andreas
CA 95249
(209) 754-3543

Submitted by:

Peterson Brustad Inc.
80 Blue Ravine Road, Suite 280
Folsom, CA 95630
Office: 916.608.2212

Project Site Address:

Tank A – Clearwell Site and WTP
Tank B – Along Signal Hill Trail

Contractor's Water Pollution Control (WPC) Manager:

Bret Smith QSD #24439

**Contractor's Designated Water Pollution Control Inspector
(if different from WPC Manager)**

To Be Determined

Estimated Project Dates:

<u>Start of Construction</u>	<u>Completion of Construction</u>
TBD	TBD

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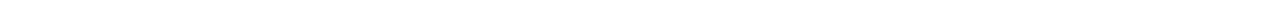
7.4 Illicit Connection/Illegal Discharge Reporting 14

Attachment A: Water Pollution Control Drawings

Attachment B: Water Pollution Control Schedule

Attachment C: Water Pollution Control Amendment

Attachment D: Stormwater Training Documentation



PROJECT INFORMATION

The design criteria of this project is to install two additional water tanks and the rehabilitation of two existing water tanks for the Calaveras County Water District. The Clearwell Site is located at the Water Treatment Plant and the other tank is located along Signal Hill Trail in Calaveras County.

This Water Pollution Control Program (WPCP) is designed to assist the contractor in maintaining minimal BMPs for a construction site that is less than one acre and is designed to address the following:

- Pollutants and their sources, including sources of sediment associated with construction, construction site erosion and other activities associated with construction activity are controlled;
- Where not otherwise required to be under a Regional Water Quality Control Board (Regional Water Board) permit, all non-storm water discharges are identified and either eliminated, controlled, or treated;
- Site BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from construction activity to the Best Available Technology/Best Control Technology (BAT/BCT) standard;

1.0 Pollution Sources and Control Measures

1.1 Inventory of Materials and Activities that May Pollute Stormwater

The following is a list of construction materials that will be used and activities that will be performed that will have the potential to contribute pollutants, other than sediment, to stormwater runoff.

- Paving and Grinding
- Saw Cutting (cement and brick dust, saw cut slurries)
- Concrete Curing (curing and glazing compounds Concrete Waste Management
- Material Use
- Material Delivery and Storage
- Adhesives
- Plumbing

The following is a list of construction activities that have the potential to contribute sediment to stormwater discharges include:

- Clearing and Grubbing
- Stockpiling Excavation
- Utilities
- Excavation

2.0 Soil Stabilization (Erosion Control) and Sediment Control

2.1 Soil Stabilization BMPs

The following soil stabilization BMPs should be implemented to control erosion on the construction site. Implementation and locations of temporary soil stabilization BMPs are shown on the WPCDs and

described in this section. The following list of BMPs and narrative explain how the selected BMPs will be incorporated into the project.

- EC-1 Scheduling - The weather forecast will be monitored and BMPs will be inspected and maintained prior to forecasted storm events. Construction activities with potential to disturb soil or discharge non-visible pollutants will be minimized prior to and during storm events. The BMP schedule will be updated as appropriate.
- EC-2 Preservation of Property / Preservation of Existing Vegetation - Existing vegetation shall be preserved to the maximum extent practicable within project boundaries. Orange construction fencing or equivalent will be installed under the direction of the WPCM around the applicable project perimeters to delineate the staging/work areas or vegetation. This device may also be used in the staging area to delineate areas used for staging and those that need preserved.
- EC-6 Temporary Erosion Control (Straw Mulch with Stabilizing Emulsion) - This BMP may be used to stabilize any disturbed areas prior to rain event. Sufficient drying time will be allotted to allow the tackifier to dry (24 hours before event).
- EC-7 Geotextiles - This BMP may be used to stabilize disturbed soil areas within the project limits prior to a predicted storm event. This BMP may also be used in final stabilization to cover disturbed areas. Products such as jute blanket, curlex blanket and filter fabric are recommended for this project.

2.2 Sediment Control BMPs

The following sediment control BMP should be implemented to control sediment on the construction site. Implementation and locations of temporary sediment control BMPs are shown on the WPCDs and described in this section. The following list of BMPs and narrative explain how the selected BMPs will be incorporated into the project.

- SE-5 Fiber Rolls - Fiber rolls will be the primary perimeter control used on the site. It may also be used to prevent run-on from entering disturbed areas and prevent sediment-laden run-off from leaving work areas during precipitation. Fiber rolls may be installed up-gradient in sections of the Project area for additional run-on control if inspections deem it necessary. Fiber rolls may also be utilized during grading activities to contain sediments in the area of origin. Fiber rolls shall be placed around stockpiles left on site overnight.
 - SE-6 Temporary Gravel Bag Berm - This device may be used as an improvised check dam in areas where flows could cause rill erosion or where the flow will need to be slowed prior to discharge from the site.
 - SE-7 Street Sweeping - Street sweeping shall be implemented on affected nearby roadways and intersections for the duration of the Project. If track-out, sediment or construction materials are observed on the roads, hand brooms or mechanical street sweeping will be performed by the end of each day. Construction entrances/exits will be inspected daily. If track-out is observed on asphalt paved roads during construction activities, the following requirements will apply:
 - Washing of streets is prohibited.
 - Road vacuuming may occur as necessary to keep the street clear of soil and debris.
-

- If street-vacuuming equipment is ineffective, either by design or mechanical condition, it will be replaced with equipment or operations that adequately address the needs of the project.
- A suitable site will be selected for disposal of accumulated sediment.
- SE-10 Storm Drain Inlet Protection - Storm Drain Inlet Protection shall be used as shown on the WPCP Plans for existing and proposed inlets, where sediment laden surface run-off may enter inlets and where disturbed drainage areas have not yet been permanently stabilized.

2.3 Tracking Control BMPs

The following tracking control BMPs should be implemented to reduce sediment tracking from the construction site onto private or public roads. Implementation and locations of tracking control BMPs are shown on the WPCDs and described in this section. The following list of BMPs and narrative explain how the selected BMPs will be incorporated into the project.

- SE-7 Street Sweeping - See the previous section.
- TC-1 - Temporary Construction Entrance - A stabilized entrance (*or similarly effective device*) shall be used as required.
 - This device is anticipated to be the primary point of ingress or egress to the construction work area and staging area. Street sweeping (SE-7) shall be used in conjunction with the construction of an aggregate entrance and/or rumble rack/rumble strip entrance to prevent track-out issues. The aggregate entrance constructed could be supplemented with rumble racks of steel panels with ridges to reduce or prevent re-occurrence.

2.4 Wind Erosion Control BMPs

The following wind erosion control BMPs should be implemented to control wind erosion on the construction site. Implementation and locations of wind erosion control BMPs are shown on the WPCDs and/or described in this section. The following list of BMPs and narrative explain how the selected BMPs shall be incorporated into the project.

- WE-1 Wind Erosion Control - Wind Erosion Controls will be implemented to reduce airborne particles. As necessary, water will be applied to keep soil moist and control dust during soil or asphalt disturbing activities. Water shall be applied at rates that moisten the soil but do not generate runoff.

3.0 Construction Site Management

3.1 Non-Stormwater Management BMPs

The following BMPs have been selected to control non-stormwater pollution on the construction site. Implementation and locations of non-stormwater control BMPs are shown on the WPCDs and described in this section.

- NS-1 Water Control and Conservation - Activities that use water during construction on a project shall be performed in a manner that avoids causing erosion and/or the transport of pollutants
-

off-site. Maintenance of equipment should include repairs of leaks in water hoses and fittings. Operations which require the use of water shall be monitored during activities to identify and prevent unnecessary discharges of water.

- Water supplies shall be checked for leaks and repaired promptly.
 - Avoid the use of water to clean construction areas. Do not use water to clean pavement.
 - Paved areas shall be swept.
 - Direct construction water run-off to areas where it can infiltrate into the ground, where Feasible.
 - Apply water for dust control in accordance with WE-1, "Wind Erosion Control".
 - NS-3 Paving, Sealing, Saw-cutting and Grinding Operations - Many types of construction materials associated with paving and grinding operations, including mortar, concrete, and cement and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements. These procedures are implemented where paving, surfacing, resurfacing, or saw-cutting, may pollute storm water runoff or discharge to watercourses. Avoid paving during the wet season when feasible.
 - Reschedule paving and grinding activities if rain is forecasted.
 - Train employees and sub-contractors in pollution prevention and reduction.
 - Store materials away from drainage courses to prevent storm water run-on (see WM-1, Material Delivery and Storage).
 - Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.
 - Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses.
 - These materials should be stored consistent with WM-3, Stockpile Management.
 - NS-6 Illegal Connection and Illegal Discharge Detection Reporting - Contractors and project personnel shall notify the Owner if illegally deposited materials or illicit connections are observed within the project vicinity. The Owner shall document the materials or activity, determine the appropriate course of action to take and shall be responsible for notifying federal state and local authorities as necessary.
 - NS-9 & 10 Vehicle and Equipment Fueling and Maintenance - Fueling and maintenance shall occur off-site whenever feasible. If these activities occur onsite, they shall occur within the staging area and appropriate facilities shall be created for the activity. An adequate supply of drip pans, absorbent materials and spill kits will be stored on-site in the event they are needed for a spill response or cleanup. Equipment and vehicles will be maintained in good working condition and checked regularly for leaks. If a leak is found that cannot be repaired on-site, the equipment/vehicle will be removed from the site.
 - NS-12 Concrete Curing - Potential concrete curing will be applied after the installation of any curb, gutter, sidewalk or building pad. Apply the material in a manner that it does not migrate into any waterway, storm drain inlet or water course. Prohibit the application prior to or during a
-

rain event. All excess materials will be stored in the proper secondary containment with a covering.

3.2 Waste Management and Materials Pollution Control BMPs

The following BMP implementation table indicates the BMPs that have been selected to control pollutants from construction site wastes and materials. Implementation and locations of materials handling and waste management BMPs are shown on the WPCDs. The following list of BMPs and narrative explain how the selected BMPs will be incorporated into the project.

- WM-1 & 2 Material Delivery, Storage and Use - Materials typically delivered to sites include construction materials, backfill/patching materials, and petroleum products such as fuel, oil and grease. These materials are typically used soon after delivery. Minimize exposure of construction materials to precipitation with the exception of materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, bricks, etc.). Chemicals shall be stored in watertight containers or in a completely enclosed storage shed. In the event fuel, chemicals or hazardous materials are stored on-site, the materials will have secondary containment and regular inspections will be conducted on the designated area. Employees and subcontractors will be trained on the proper storage, handling and use of these materials.
 - WM-3 Stockpile Management - Stockpiles include materials delivered and stored (including soil stockpiles) at the site for construction of the Project. Spoil piles shall be placed no closer than 50 feet from any watercourse and shall be bermed and covered when not actively in use to protect against wind and rain. Sufficient site-appropriate stockpile covering (i.e. jute netting, plastic sheeting, erosion control blankets, etc.) to cover all spoil piles and exposed areas shall be kept on-site and accessible for immediate implementation if necessary. If stockpiles are anticipated to contain "Non-visible Pollutants" (concrete, asphalt, or certain soil binders, if used) care shall be taken to ensure storm water does not come in contact with the stockpiles. If stockpiles are placed on paved surfaces, the surface shall be cleaned when stockpiles are removed. Stockpiling on paved surfaces shall be avoided during inclement weather. Stockpiles shall be securely covered and encircled with fiber rolls when not actively in use and prior to anticipated storm events.
 - WM-4 Spill Prevention and Control - Equipment and materials for cleanup of spills shall be available on-site at all times and appropriate spill training of personnel shall be conducted by the WPCM for hazardous substances associated with the project activities. Typical construction site spill kits include:
 - Sorbent pads
 - Sorbent booms
 - Sorbent socks
 - Granular sorbent
 - Neoprene drain cover
 - Disposable bags
 - Shovel
 - Broom
 - Safety goggles
-

- Nitrile gloves
- Disposable coveralls
- 55-gallon poly drum or equivalent storage container

4.0 Water Pollution Control Drawings

The Water Pollution Control Drawings (WPCDs) show the necessary BMPs for the project to be in compliance with water pollution control requirements. The WPCDs provide field staff with the information on where to install BMPs so that they are effective. The WPCDs and Water Pollution Control Schedule provide the necessary tools for a contractor to plan and implement BMPs to meet the requirements of the project WPCP.

WPCDs are provided for all areas that are directly related to the construction activity, including but not limited to staging areas, storage yards, material borrow areas and storage areas, access roads, etc., whether or not they reside within the Caltrans rights-of-way.

The WPCDs shall show the construction project site in detail, including:

- Construction site perimeter.
- Geographic features within or immediately adjacent to the site, including surface waters such as lakes, streams, springs, wetlands, estuaries, ponds, and the ocean.
- Permanent (post-construction) BMPs

The WPCDs shall show the following site information:

- Outline of all areas of existing vegetation, soil cover, or native vegetation that will remain undisturbed during the project.
- Outline of all areas of planned soil disturbance (disturbed soil areas, DSAs).
- Any potential non-stormwater discharges and activities, such as dewatering operations, concrete saw-cutting or coring, pressure washing, waterline flushing, diversions, cofferdams, and vehicle and equipment cleaning. If operations can't be located on the WPCDs, a narrative description is provided.

The WPCDs show proposed locations of all construction site BMPs. Additional detail drawings are provided if necessary to convey site-specific BMP configurations. The WPCDs shall show construction site BMPs including the following:

5.0 Water Pollution Control Schedule

The Water Pollution Control Schedule (WPCS) is the component of the project WPCP that shows the timeline for when BMPs will be installed so that the project is in compliance with water pollution control requirements. The WPCS provides field staff with the information necessary to plan for adequate materials and crews to install BMPs at the right time so that they are effective. The Water Pollution Control Schedule and Water Pollution Control Drawings provide the necessary tools for a contractor to plan and implement BMPs to meet the requirements of the project WPCP.

The WPCS shall contain an adequate level of detail to show major activities sequenced with implementation of construction site BMPs, including:

- Project start and finish dates, including each stage of the project.
- Mobilization dates and mass clearing and grubbing/roadside clearing dates.
- major grading/excavation dates.

The WPCS shall show implementation dates by location for deployment of:

- Temporary soil stabilization BMPs
- Temporary sediment control BMPs
- Wind erosion control BMPs
- Tracking control BMPs
- Non-stormwater BMPs
- Waste management and materials pollution control BMPs

The WPCS shall include:

- Paving, saw-cutting, and any other pavement related operations.
- Major planned stockpiling operations.
- Dates for other significant long-term operations or activities that may cause non-stormwater discharges such as dewatering, grinding, etc.
- Final stabilization activities for each disturbed soil area of the project

6.0 WPCP Implementation

6.1 Water Pollution Control Manager Responsibilities

The Water Pollution Control Manger (WPC Manager) shall have primary responsibility and authority to implement the WPCP. The WPC Manager is responsible for WPCP implementation and amending the WPCP. The Contractor has assigned authority to the WPC Manager to mobilize crews and subcontractors as necessary for WPCP compliance.

Duties of the contractor's WPC Manager include but are not limited to:

- Ensuring compliance with the WPCP
 - Implementing all elements of the WPCP and contract specifications, including but not limited to implementing:
 - Prompt and effective erosion and sediment control measures
 - Non-stormwater management, and materials and waste management activities such as: monitoring discharges (dewatering, diversion devices); general site clean-up; vehicle and equipment cleaning, fueling and maintenance; spill control; ensuring that no materials other than stormwater are discharged in quantities, which will have an adverse effect on receiving waters or storm drain systems, etc.
 - Overseeing and ensuring that the following site inspections and visual monitoring is conducted:
 - Daily required BMP inspections
 - Weekly routine stormwater site BMP inspections
 - quarterly non-stormwater site inspections
-

- Pre-storm inspections for forecasted storm events
- daily inspections during forecasted storm events
- Post-storm inspections for qualified rain events that produce project site runoff
- Monitoring NWS Forecast Office forecasts for both storm events and qualified rain events; these events are defined as follows:
 - Forecasted storm event is defined as a 50% or greater likelihood that 0.10 inches or more of precipitation will fall within a 24-hour period
 - qualifying rain event is defined as a rain event that may produce or has produced ½ inch or more of precipitation.
 - Preparing Amendments to the WPCP when required.
 - Ensuring elimination of all unauthorized discharges.
 - Mobilizing crews in order to make immediate repairs to the control measures to assure all of the necessary corrections/repairs are made immediately, and that the project complies with the WPCP and approved plans at all times.
 - Preparing and submitting Notices of Discharge Reports.
 - Preparing and submitting Illicit Connections or Illegal Discharge Reports.

6.1 Weather and Forecast Monitoring

The Contractor shall have primary responsibility of monitoring the National Weather Service Forecast Office for forecasted precipitation based on project site location. Precipitation forecast information shall be obtained from the National Weather service Forecast Office available at:

<http://www.srh.noaa.gov/>

The Contractor shall monitor the weather forecast on a daily basis for predicted precipitation within the following 96 hours. The Contractor shall monitor the forecast for the next 24, 48, 72 and 96 hours to determine if the forecast for precipitation is 50 percent or greater for any 6-hour period. If the forecast for precipitation is 50 percent or greater, the Contractor shall calculate the amount of precipitation forecasted for each 24-hour period and the total precipitation for the forecasted storm event and record the information.

When there is a forecasted fifty percent (50%) or greater chance of likely precipitation of 0.10 inch” or more then a pre-storm stormwater site inspection is required and the Contractor shall ensure that the site is prepared for the forecasted storm event. Site preparation for a forecasted storm event shall include, but is not limited to, the installation of soil stabilization and sediment best management practices on active disturbed soil areas and stockpiles.

- 48-hours prior to a rain event, visual monitoring of the site will include observations of the following locations:
 - Storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources.
 - All BMPs for maintenance

6.2 Best Management Practices Status Report

The Contractor shall prepare a weekly status report of the water pollution control best management practices installed on the project site. Because the WPCP and WPCDs are based on the entire project site and all construction activities, the weekly BMP status report should be a “snapshot” of what best

management practices could be expected to be seen on the project site that week. The weekly status report will be used by stormwater inspectors and contractor personnel to ensure WPCP compliance.

The weekly status report will be used to ensure that weekly training meetings cover BMPs that are required for work activities during the week. The weekly status report will be provided to regulatory agency staff who visit the project site to indicate which BMPs should be in place and which are scheduled to be implemented during the week.

6.4 Stormwater Site Inspections and Site Visual Monitoring

Stormwater site inspections and visual monitoring are necessary to ensure that the project is in compliance with WPCP.

6.5 Stormwater Site Inspections

Project site inspections of stormwater BMPs are conducted to identify and record:

- That BMPs are properly installed.
- What BMPs need maintenance to operate effectively.
- What BMPs have failed.
- What BMPs could fail to operate as intended.

Routine stormwater site inspections shall be conducted by the Contractor or other appropriately trained staff at the following minimum frequencies:

- Daily for required BMPs.
- Weekly

Deficiencies identified in site inspection reports and correction of deficiencies will be tracked by the Contractor.

Project site inspections of BMPs are conducted to identify and record;

- BMPs are properly installed.
- Do the BMPs require maintenance?
- Have any BMPs failed?
- What BMPs could fail to operate as intended?

Routine stormwater site inspections shall be conducted weekly.

6.6 Site Visual Monitoring

Stormwater site visual monitoring inspections shall be conducted at the following minimum frequencies:

- Prior to a forecasted storm event.
 - At 24-hour intervals during extended forecasted storm events.
 - Post qualifying rain event that generated site runoff.
 - Quarterly for non-stormwater discharges.
-

Site visual monitoring inspections for non-stormwater discharges will be conducted once during each of the following periods: January-March, April-June, July-September, and October-December.

If visual monitoring of the site is unsafe because of dangerous weather conditions, such as flooding and electrical storms, the stormwater site inspector shall document the reason for the exception.

Site visual monitoring inspections shall be conducted at the following frequencies:

- 48 hours prior to a forecasted storm event.
- Every 24 hours during extended storm events.
- Post storm if the event generated runoff.

6.6.1 Visual Monitoring Prior To a Forecasted Storm Event

Visual monitoring of the project site is required when the forecast for precipitation is greater than 50 percent within the next 24, 48, 72, or 96 hours and the amount of precipitation forecasted for any 24-hour period during the forecasted storm event is 0.10 inch or greater. Site visual monitoring for precipitation events shall be conducted within 48 hours prior to a forecasted storm event. The pre-storm site visual monitoring inspection shall visual observe:

- All stormwater drainage areas to identify any spills, leaks, or uncontrolled pollutant sources.
- Any stormwater storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.
- All BMPs for proper installation and adequate maintenance

6.6.2 Visual Monitoring During Extended Forecasted Storm Event

Stormwater visual monitoring site inspections shall be conducted at least once each 24-hour period during extended forecasted storm events. The during storm site visual monitoring inspection shall visual observe:

- Stormwater discharges at all discharge locations.
- Any stored or contained stormwater that is derived from and discharged subsequent to the forecasted storm event. Stored or contained stormwater that will likely discharge after working hours due to anticipated precipitation shall be observed prior to the discharge during working hours.

Stormwater discharges and stored or contained stormwater will be observed for the presence or absence of floating and suspended materials, sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

A during forecasted storm event visual monitoring site inspection will include observation of all site BMPs for:

- Proper installation
 - Maintenance
 - Failure
 - BMPs that could fail to operate as intended.
 - Effectiveness so that design changes can be implemented as soon as feasible.
-

Required corrective actions will be initiated within 72 hours after they are identified and completed as soon as possible.

6.6.3 Monitoring Within 48 Hours After A Qualifying Rain Event Generating Runoff

Site visual monitoring post precipitation events shall be conducted within 48 hours of any qualifying rain event that causes site runoff. The post-storm site visual monitoring inspection shall visual observe:

- Stormwater discharges at all discharge locations.
- Any stored or contained stormwater that is derived from and discharged subsequent to the qualifying rain event. Stored or contained stormwater that will likely discharge after working hours due to anticipated precipitation shall be observed prior to the discharge during working hours.

Stormwater discharges and stored or contained stormwater will be observed for the presence or absence of floating and suspended materials, sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

Post qualifying rain event stormwater visual monitoring site inspection will include observation of all site BMPs for:

- Proper installation
- Maintenance
- Failure
- BMPs that could fail to operate as intended.
- Effectiveness so that design changes can be implemented as soon as feasible.

Any photographs used to document observations will be referenced on stormwater site inspection report.

Any corrective actions will be completed as soon as possible but if BMPs require design changes the implementation of changes will begin within 72 hours of identification and the changes will be completed as soon as possible.

7.0 Reporting Requirements

7.1 Record Keeping

Records shall be retained for a minimum of three years for the following items:

- Accepted WPCP and Amendments
 - Stormwater Site Inspection Reports
 - Site Inspection Report Corrective Actions Summary
 - Notice of Discharge Reports
-

7.2 Discharge Reporting

If a discharge or evidence of a prior discharge is discovered by the contractor, the contractor shall notify the Calaveras County Water District within 6 hours of the discharge event or discovery. The written report will contain the following items:

- The date, time, location, and type of unauthorized discharge.
- The nature of operation that caused the discharge.
- Initial assessment of any impacts caused by the discharge.
- The BMPs deployed before the discharge event.
- The date of deployment and type of BMPs deployed after the discharge event, including additional measures installed or planned to reduce or prevent re-occurrence.
- Steps taken or planned to reduce, eliminate and/or prevent recurrence of the discharge.

7.3 Regulatory Agency Notice or Order Reporting

If the project receives a written notice or order from any regulatory agency, the contractor will notify the Calaveras County Water District within 6 hours of receiving the notice or order and will file a written report within 48 hours of receiving the notice, or order. Corrective measures will be implemented immediately following the notice or order.

The report to the Calaveras County Water District will contain the following items:

- Date, time, location, and cause or nature of the notice or order.
- BMPs deployed prior to receiving notice or order.
- Date of deployment and type of BMPs deployed after receiving the notice or order, including additional BMPs installed or planned to reduce or prevent re-occurrence.
- An implementation and maintenance schedule for any affected BMPs

7.4 Illicit Connection/Illegal Discharge Reporting

If the contractor discovers an illicit connection to a storm drain system or any pipe discharging on to the project site not shown on the project plans the contractor shall notify the Calaveras County Water District within 6 hours of the discovery and will file a written report within 48 hours of the discovery.

If the contractor discovers any illegal discharge including illegal dumping of material on the project site, the contractor shall immediately notify the Calaveras County Water District and will file a written report within 3 days of discovery.

The report to the Calaveras County Water District will contain the following items:

- Date, time, and location of the discovery.
 - Details of the illicit connection or illegal discharge, including any photographs taken.
 - Any actions taken to contain illegal discharge.
 - Any sampling and testing to determine material dumped or discharged.
-

ATTACHMENT A: WATER POLLUTION CONTROL DRAWINGS

Place printed NOAA weather forecasts in this Attachment.



Clearwell Tank Site (demo)

All BMP locations are approximate. The Contractor will verify actual locations based upon time of year, terrain, and functionality with the designer of this plan.

Sediment Controls: (during demo) Shall consist of SE-5 Fiber Rolls downgradient of tree and tank removal "as needed."

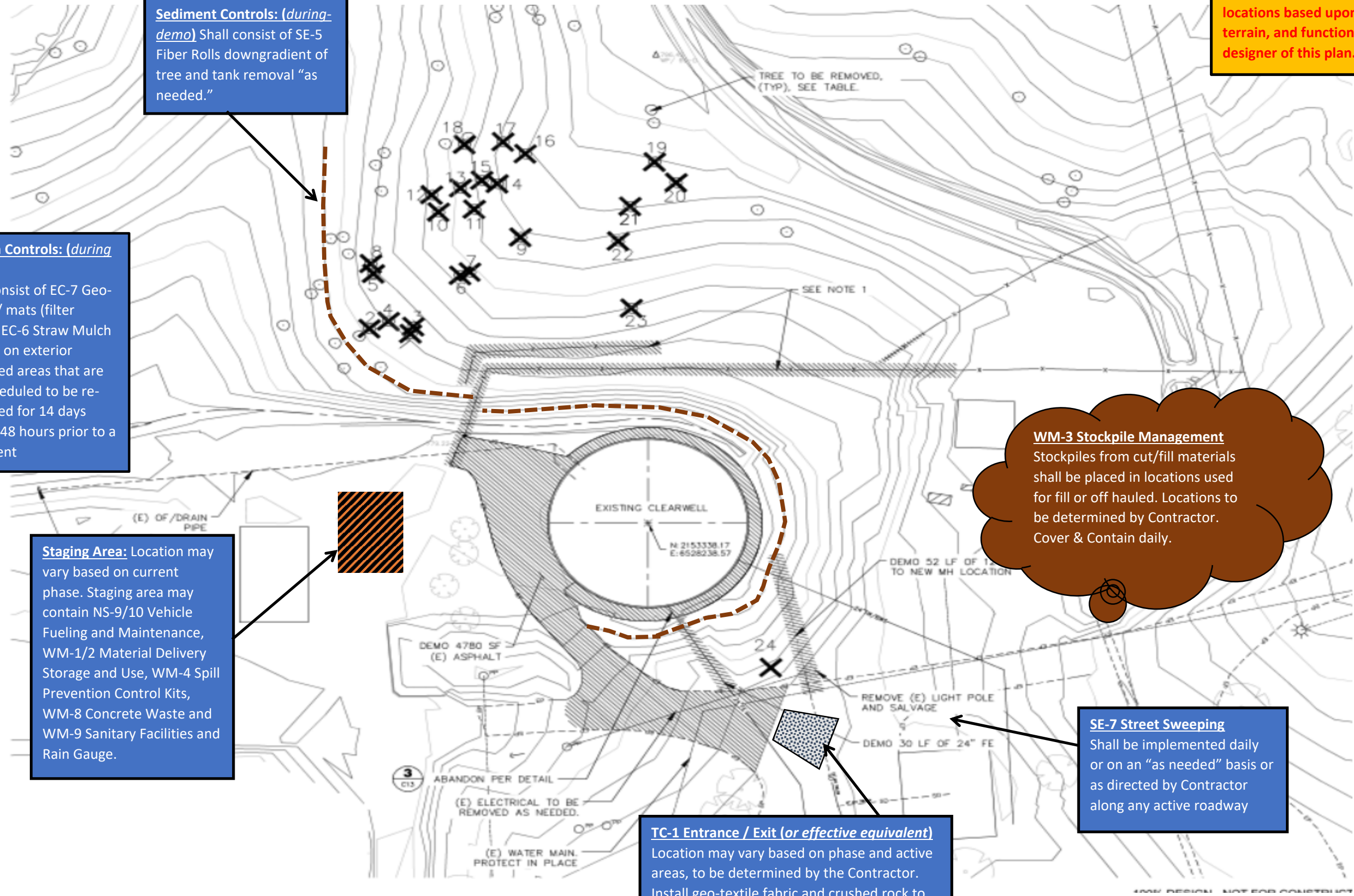
Erosion Controls: (during demo) Shall consist of EC-7 Geotextile / mats (filter fabric), EC-6 Straw Mulch applied on exterior disturbed areas that are not scheduled to be re-disturbed for 14 days and/or 48 hours prior to a rain event

Staging Area: Location may vary based on current phase. Staging area may contain NS-9/10 Vehicle Fueling and Maintenance, WM-1/2 Material Delivery Storage and Use, WM-4 Spill Prevention Control Kits, WM-8 Concrete Waste and WM-9 Sanitary Facilities and Rain Gauge.

WM-3 Stockpile Management
Stockpiles from cut/fill materials shall be placed in locations used for fill or off hauled. Locations to be determined by Contractor. Cover & Contain daily.

SE-7 Street Sweeping
Shall be implemented daily or on an "as needed" basis or as directed by Contractor along any active roadway

TC-1 Entrance / Exit (or effective equivalent)
Location may vary based on phase and active areas, to be determined by the Contractor. Install geotextile fabric and crushed rock to the dimensions provided in the cut sheet



Clearwell Tank Site (vertical)

All BMP locations are approximate. The Contractor will verify actual locations based upon time of year, terrain, and functionality with the designer of this plan.

EC-2 Preservation of Existing Vegetation
During grading, protect trees out to dripline that are close to slope grading.

Sediment Controls: (during-demo) Shall consist of SE-5 Fiber Rolls downgradient of tree and tank removal "as needed."

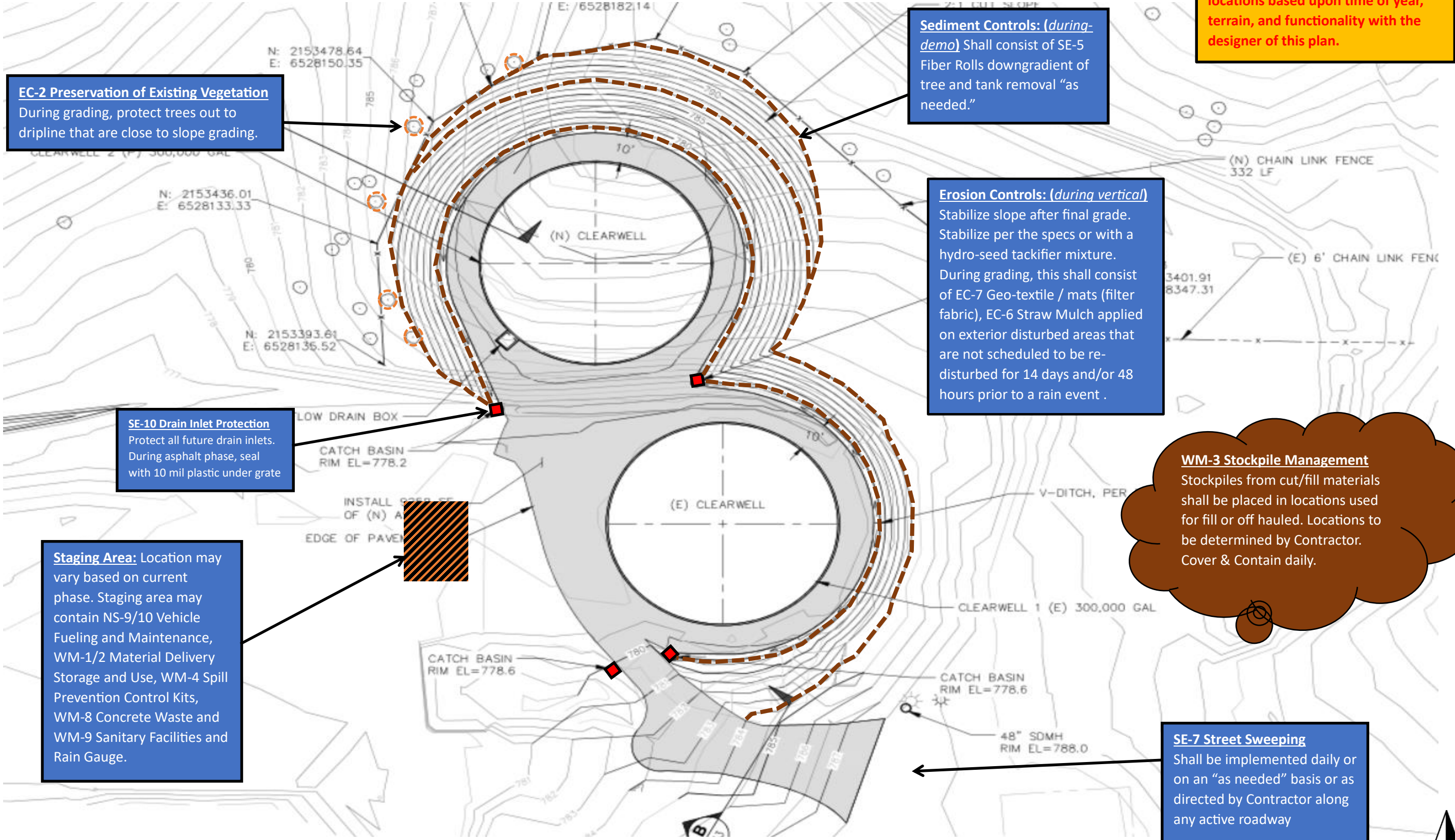
Erosion Controls: (during vertical)
Stabilize slope after final grade. Stabilize per the specs or with a hydro-seed tackifier mixture. During grading, this shall consist of EC-7 Geo-textile / mats (filter fabric), EC-6 Straw Mulch applied on exterior disturbed areas that are not scheduled to be re-disturbed for 14 days and/or 48 hours prior to a rain event .

SE-10 Drain Inlet Protection
Protect all future drain inlets. During asphalt phase, seal with 10 mil plastic under grate

WM-3 Stockpile Management
Stockpiles from cut/fill materials shall be placed in locations used for fill or off hauled. Locations to be determined by Contractor. Cover & Contain daily.

Staging Area: Location may vary based on current phase. Staging area may contain NS-9/10 Vehicle Fueling and Maintenance, WM-1/2 Material Delivery Storage and Use, WM-4 Spill Prevention Control Kits, WM-8 Concrete Waste and WM-9 Sanitary Facilities and Rain Gauge.

SE-7 Street Sweeping
Shall be implemented daily or on an "as needed" basis or as directed by Contractor along any active roadway



B Tank Site (demo)

All BMP locations are approximate. The Contractor will verify actual locations based upon time of year, terrain, and functionality with the designer of this plan..

Staging Area: Location may vary based on current phase. Staging area may contain NS-9/10 Vehicle Fueling and Maintenance, WM-1/2 Material Delivery Storage and Use, WM-4 Spill Prevention Control Kits, WM-8 Concrete Waste and WM-9 Sanitary Facilities and Rain Gauge.

Erosion Controls: (during demo) Shall consist of EC-7 Geo-textile / mats (filter fabric), EC-6 Straw Mulch applied on exterior disturbed areas that are not scheduled to be re-disturbed for 14 days and/or 48 hours prior to a rain event

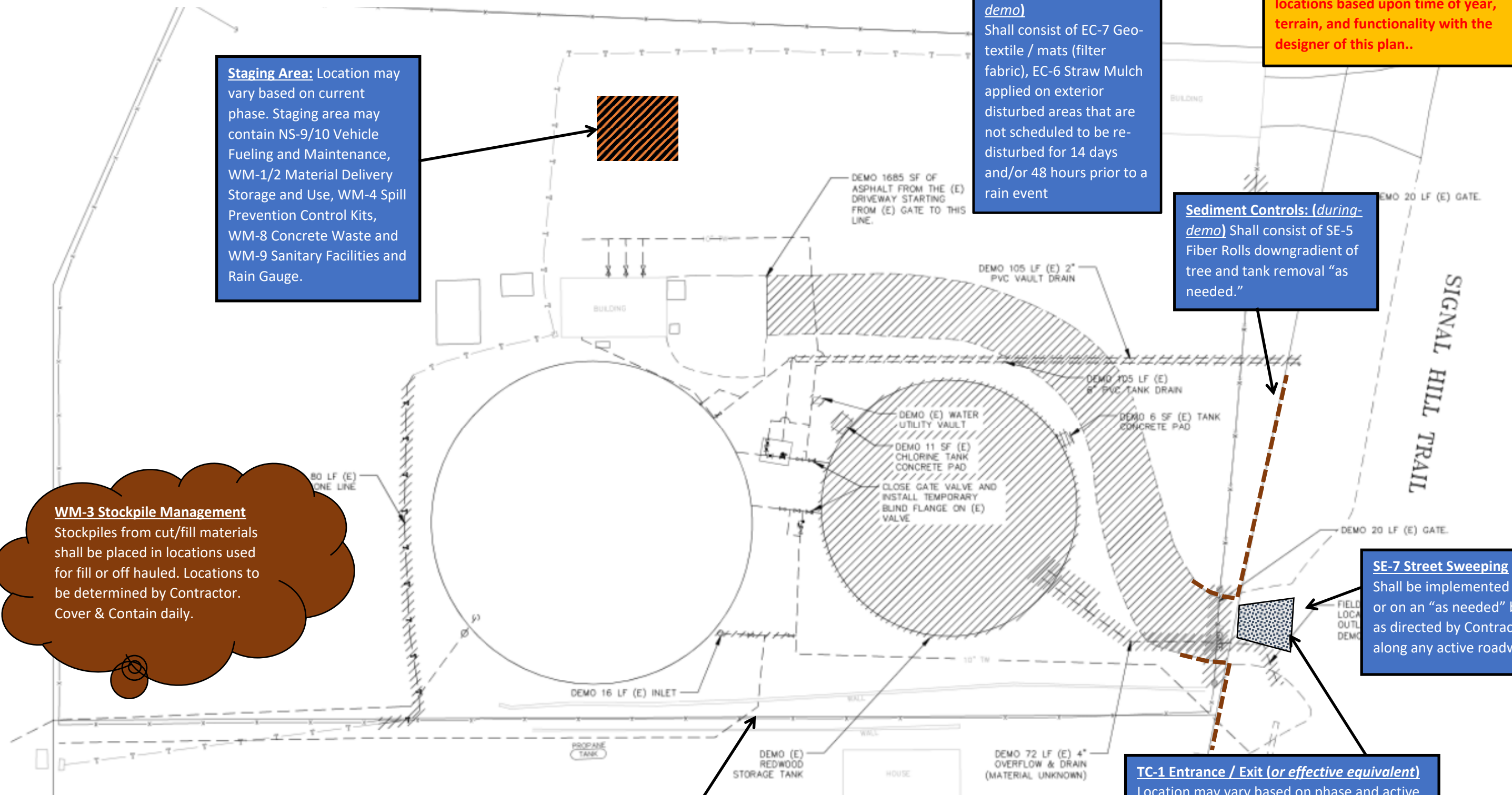
Sediment Controls: (during demo) Shall consist of SE-5 Fiber Rolls downgradient of tree and tank removal "as needed."

SE-7 Street Sweeping Shall be implemented daily or on an "as needed" basis or as directed by Contractor along any active roadway

TC-1 Entrance / Exit (or effective equivalent) Location may vary based on phase and active areas, to be determined by the Contractor. Install geo-textile fabric and crushed rock to the dimensions provided in the cut sheet

WM-3 Stockpile Management Stockpiles from cut/fill materials shall be placed in locations used for fill or off hauled. Locations to be determined by Contractor. Cover & Contain daily.

Retaining wall to act as perimeter BMP control



B Tank Site (rehab)

Staging Area: Location may vary based on current phase. Staging area may contain NS-9/10 Vehicle Fueling and Maintenance, WM-1/2 Material Delivery Storage and Use, WM-4 Spill Prevention Control Kits, WM-8 Concrete Waste and WM-9 Sanitary Facilities and Rain Gauge.

Erosion Controls: (during rehab) Shall consist of EC-7 Geo-textile / mats (filter fabric), EC-6 Straw Mulch applied on exterior disturbed areas that are not scheduled to be re-disturbed for 14 days and/or 48 hours prior to a rain event .

All BMP locations are approximate. The Contractor will verify actual locations based upon time of year, terrain, and functionality with the designer of this plan.

INSTALL 5700 SF OF (N) AGGREGATE BASE SEE NOTE 1

INSTALL 2373 SF OF (N) ASPHALT DRIVEWAY SEE NOTE 1

(N) STEEL B TANK

(E) REDWOOD B TANK

N: 2154614.84
E: 6528988.91
983.33

N: 2154622.21
E: 6529028.25
983.33

SIGNAL HILL TRAIL

SE-7 Street Sweeping Shall be implemented daily or on an "as needed" basis or as directed by Contractor along any active roadway

Sediment Controls: (during-demo) Shall consist of SE-5 Fiber Rolls "as needed."

Retaining wall to act as perimeter BMP control

WM-3 Stockpile Management Stockpiles from cut/fill materials shall be placed in locations used for fill or off hauled. Locations to be determined by Contractor. Cover & Contain daily.



ATTACHMENT B: WATER POLLUTION CONTROL SCHEDULE

ATTACHMENT C: WATER POLLUTION CONTROL AMENDMENTS

WPCP Amendment No. _____

Project Name:

WDID Number:

**Qualified SWPPP Developer's Certification of the
Water Pollution Control Plan Amendment**

"This Water Pollution Control Plan and attachments were prepared under my direction to meet the requirements of the California Construction General Permit (SWRCB Order No. 2009-009-DWQ as amended by 2010-0014-DWQ). I certify that I am a Qualified SWPPP Developer in good standing as of the date signed below."

QSD's Signature

Date

QSD Name

QSD Certificate Number

Title and Affiliation

Telephone

Address

Email

ATTACHMENT D: STORMWATER TRAINING DOCUMENTATION

Trained Contractor Personnel Log

Storm Water Management Training Log and Documentation

Project Name: Copper Cove Water System Improvements

Storm Water Management Topic: (check as appropriate)

- Erosion Control
- Wind Erosion Control
- Non-Storm Water Management
- Storm Water Sampling
- Sediment Control
- Tracking Control
- Waste Management and Materials Pollution Control

Specific Training Objective: _____

Location: _____

Date: _____

Instructor: _____

Telephone: _____

Course Length (hours): _____

Attendee Roster (Attach additional forms if necessary)

Name	Company	Phone

**APPENDIX C:
AS-BUILTS**

OWNER: Calaveras County Water District
 423 E. St. Charles Street, P.O. Box 846 San Andreas, CA 95249
 Phone: (209)754-3534
 Fax: (209)754-1069

ENGINEER: KASL Consulting Engineers, Inc.
 4200 North Freeway Blvd., Suite 1 Sacramento, CA 95834
 Phone: (916)929-8127
 Fax: (916)929-0621
 Mr. John Scroggs

GENERAL CONTRACTOR: Auburn Constructors, Inc.
 730 West Stadium Lane Sacramento, CA 95834
 Phone: (916)924-0344
 Fax: (916)924-1800
 Mr. Ron Riecken

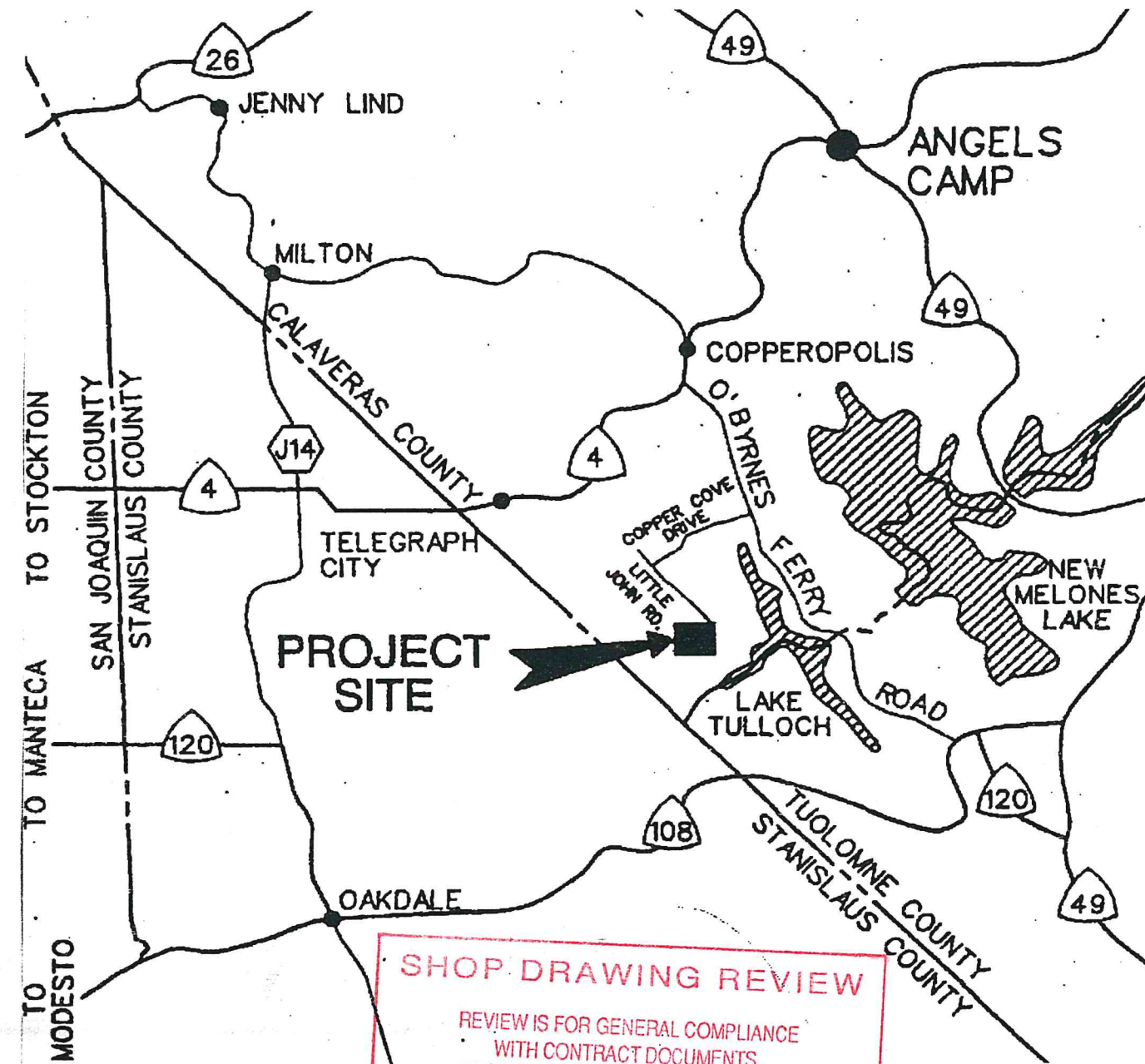
TANK AND PAINT CONTRACTOR: TRUSCO TANK INC.
 4388 Santa Fe Road San Luis Obispo, CA 93401
 Phone: (805)544-9155
 Fax: (805)546-8105
 Project Coordinator: Mr. Jeff Gordon

FIRE EMERGENCY _____ 911
 PARAMEDIC & MEDICAL EMERGENCY _____ 911
 POLICE EMERGENCY _____ 911

HOSPITAL:
 MINOR EMERGENCY: Copperopolis Medical Clinic
 60 Copper Cove Drive Suite D Copperopolis, CA
 Phone: (209)785-7000
 MAJOR EMERGENCY: Mark Twain Saint Joseph's Hospital
 768 Mountain Ranch Road San Andreas, CA
 Phone: (209)754-3521

UNDER GROUND SERVICE ALERT (800) 642-2444

CONSTRUCTION PLANS FOR THE CALAVERAS COUNTY WATER DISTRICT COPPER COVE 0.345 MG RESERVOIR IN LAKE TULLOCH, CALAVERAS COUNTY 70'-0" DIA. x 12'-0" T.O.S. CONE ROOF TANK



*CCWTP
 Subm. #101*

SHOP DRAWING REVIEW

REVIEW IS FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS.
 NO RESPONSIBILITY IS ASSUMED FOR CORRECTNESS OF DIMENSIONS OR DETAILS

FURNISH AS SUBMITTED	
FURNISH AS NOTED	X
REVISE & RESUBMIT	
REJECTED, RESUBMIT	
REVIEW NOT REQUIRED	

KASL CONSULTING ENGINEERS, INC.
 4200 North Freeway Blvd., Suite 1
 Sacramento, California 95834

Date: 3/27/98 By: *[Signature]*



Trusco Tank Inc
 4388 Santa Fe Road
 San Luis Obispo, CA 93401
 (805) 544-9155

Revisions :

A
B
C

COVER SHEET		
COPPER COVE 0.345 MG LAKE TULLOCH, CA		
Drawn: JMG	Date: 2-12-98	Job No. : 622880010
File Name: 001\C	1 OF 13	

TANK APPURTENANCES

ITEM	DESCRIPTION	QTY.	SHT.
SC	1 1/4" SPARE COUPLING	1	2
PT	PRESSURE TRANSDUCER COUPLING	1	2
OF	18" OVERFLOW	1	3
O	24" OUTLET	1	3
I	24" INLET	1	4
DR	12" DRAIN	1	4
OL	OUTSIDE LADDER	1	8
GU	GUARDRAIL	1	8
IL	INSIDE LADDER	1	8
LD	10' LADDER DOOR	1	9
MW	30" MONOBOLT MANWAY	2	10
NP	STD. AWWA TANK NAMEPLATE	1	10
RH	30" ROOF HATCH	1	11
RV	37" ROOF VENT	1	12
LG	TRUSCO HALF SCALE LEVEL GAGE	1	13

PRIOR TO SETTING THE FIRST RING, THE FIELD FOREMAN SHALL DETERMINE THE LOCATION OF ALL SHELL PENETRATIONS AND SHALL PROVIDE A MINIMUM OF 10" CLEARANCE BETWEEN ALL VERTICAL JOINTS AND ANY REINFORCEMENT PLATE OR APPURTENANCE ATTACHMENT.

MATERIAL LIST

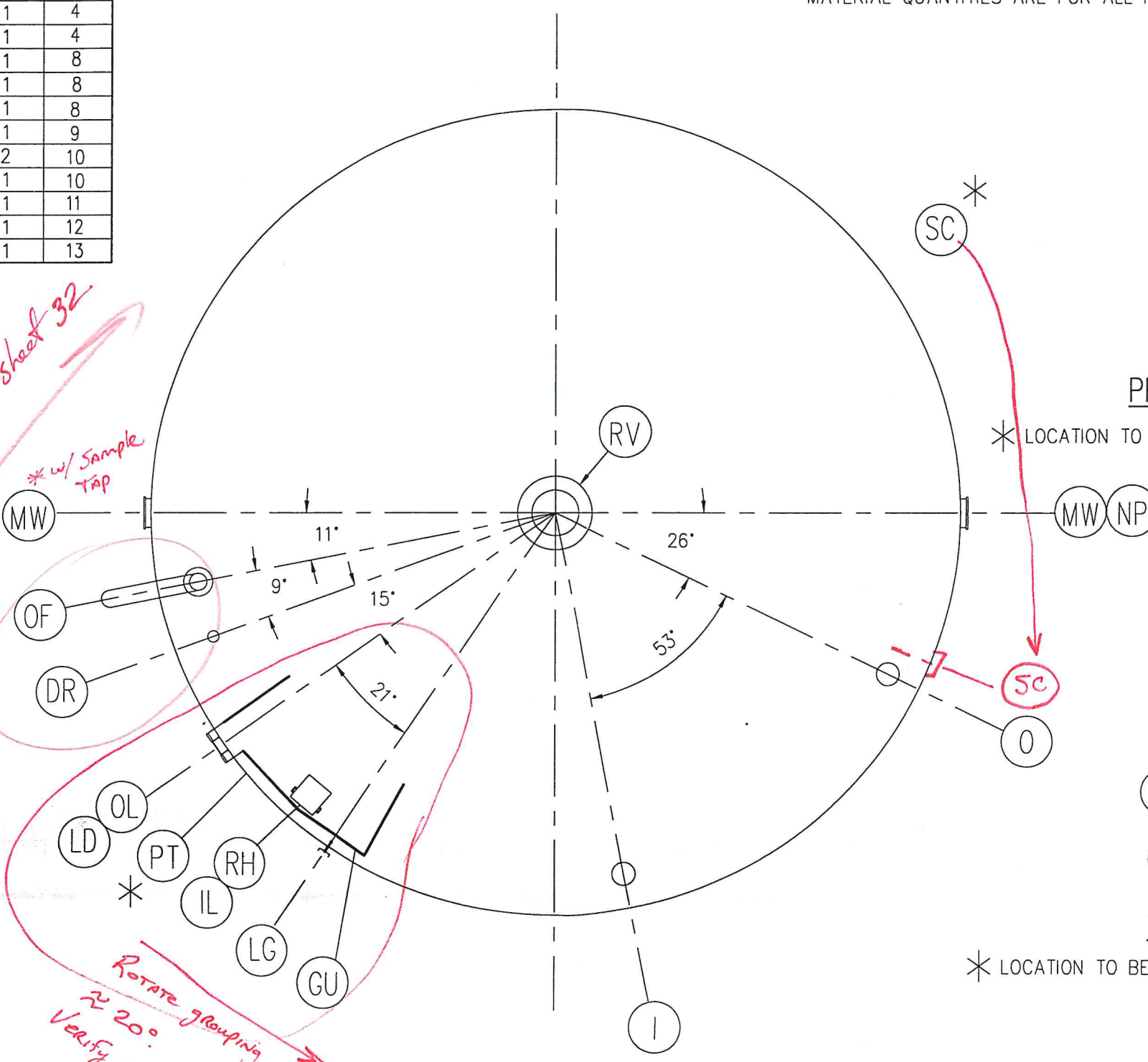
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---	2	1 1/4" PVC PLUG & TEFLON TAPE	PVC	2	
---	3	1" X 3000# HALF COUPLING	A105	1	

MATERIAL QUANTITIES ARE FOR ALL PARTS

Relocate see attached plan sheet 32

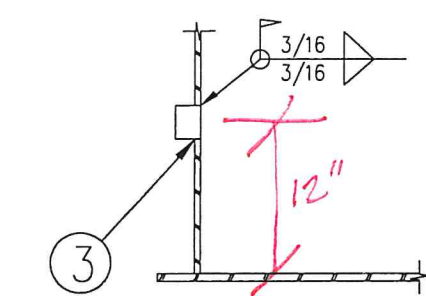
** w/ Sample Tap*

Rotate grouping ~ 20° Verify onsite



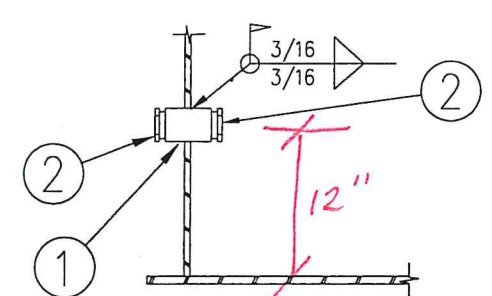
TANK PLAN

WELDER SHALL USE FILLET GAGE TO INSURE FULL FILLET SIZE ON ALL "THRU THE SHELL" PENETRATIONS.



PRESSURE TRANSDUCER TAP

* LOCATION TO BE DETERMINED BY CUSTOMER FIELD REPRESENTATIVE

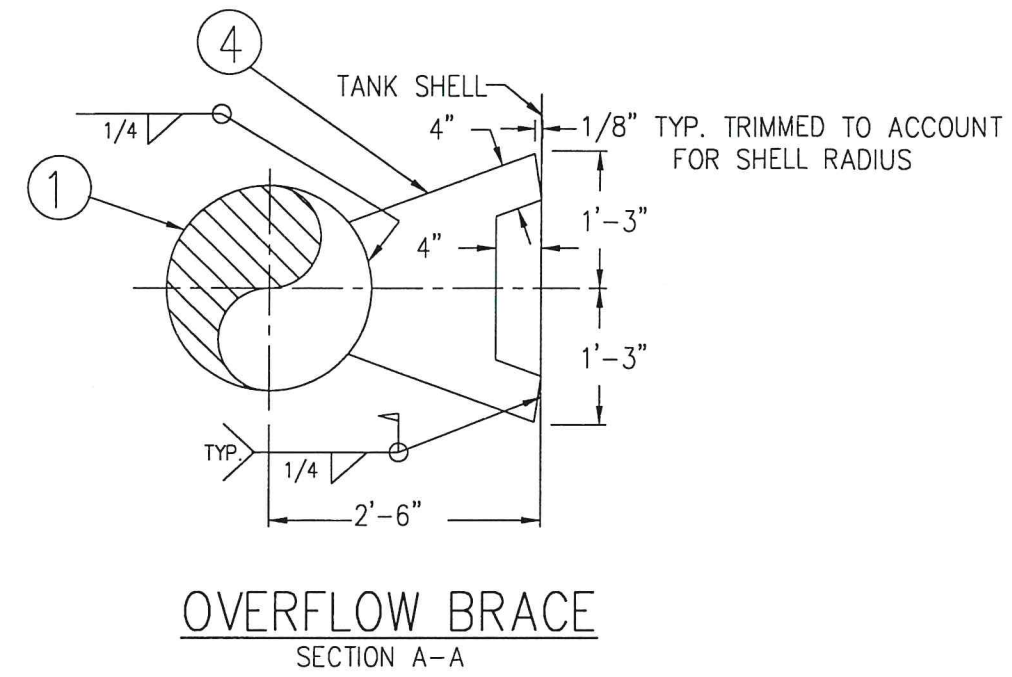
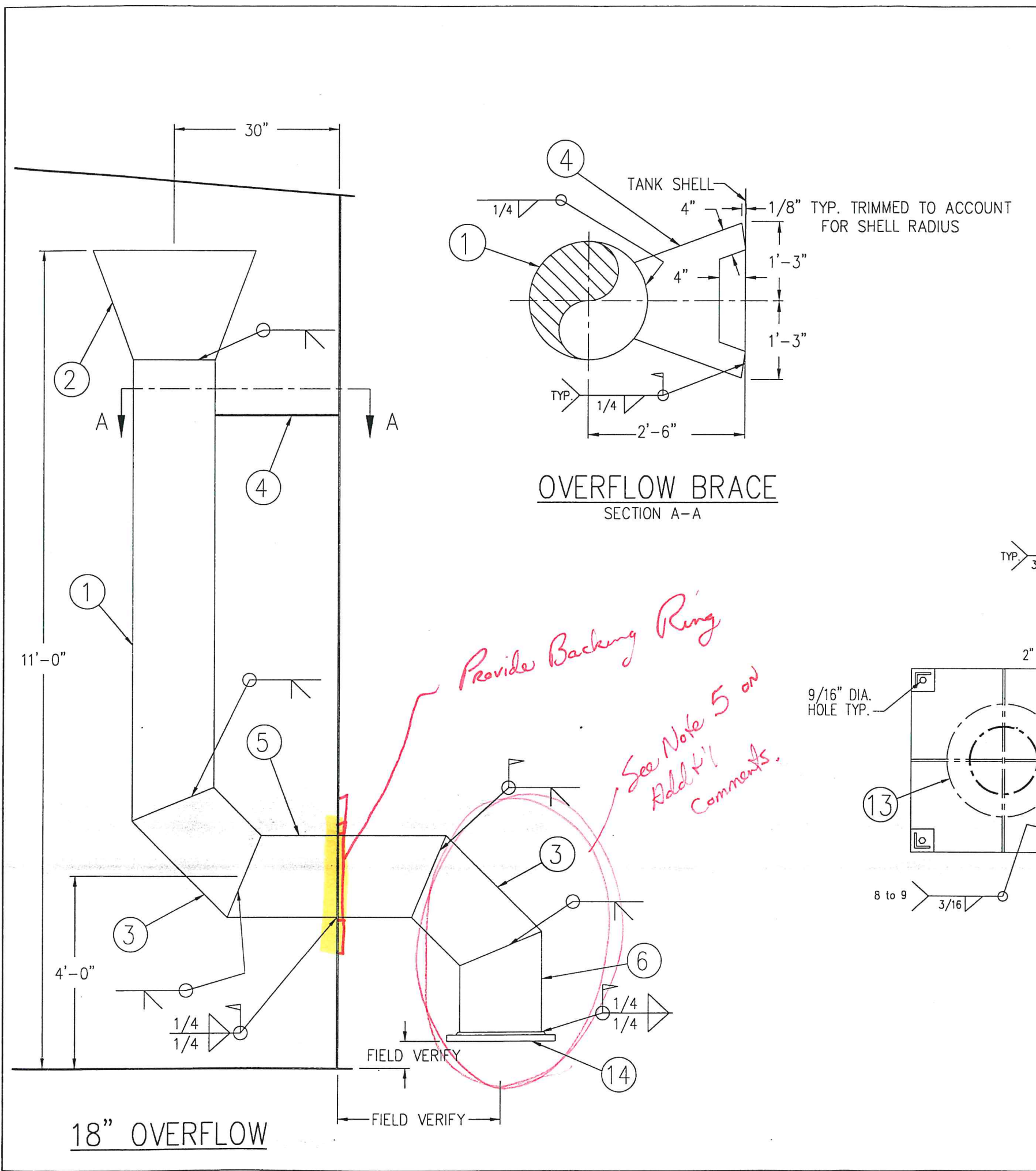


1 1/4" SPARE COUPLING

* LOCATION TO BE DETERMINED BY CUSTOMER FIELD REPRESENTATIVE

DEGREES	STRAP	CHORD
9°	5'-6 1/16"	5'-5 29/32"
11°	6'-8 23/32"	6'-8 1/2"
15°	9'-2 3/32"	9'-1 21/32"
21°	12'-10 1/8"	12'-9 1/16"
26°	15'-10 13/16"	15'-8 31/32"
53°	32'-4 31/32"	31'-2 13/16"
360°	220'-2 3/32"	----

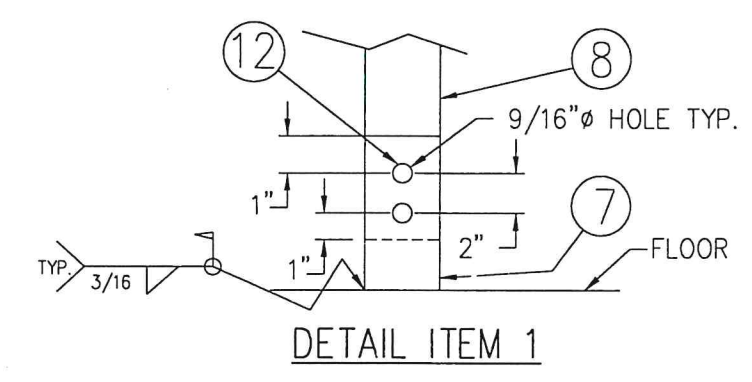
<p>Trusco Tank Inc 4388 Santa Fe Road San Luis Obispo, CA 93401 (805) 544-9155</p>	PT	SC	TANK PLAN			
				COPPER COVE 0.345 MG LAKE TULLOCH, CA		
	Revisions :		Drawn:	Date:	Job No. :	
A		JMG	2-9-98	622880010		
B		File Name:		2 OF 13		
C		001\TP				



MATERIAL LIST

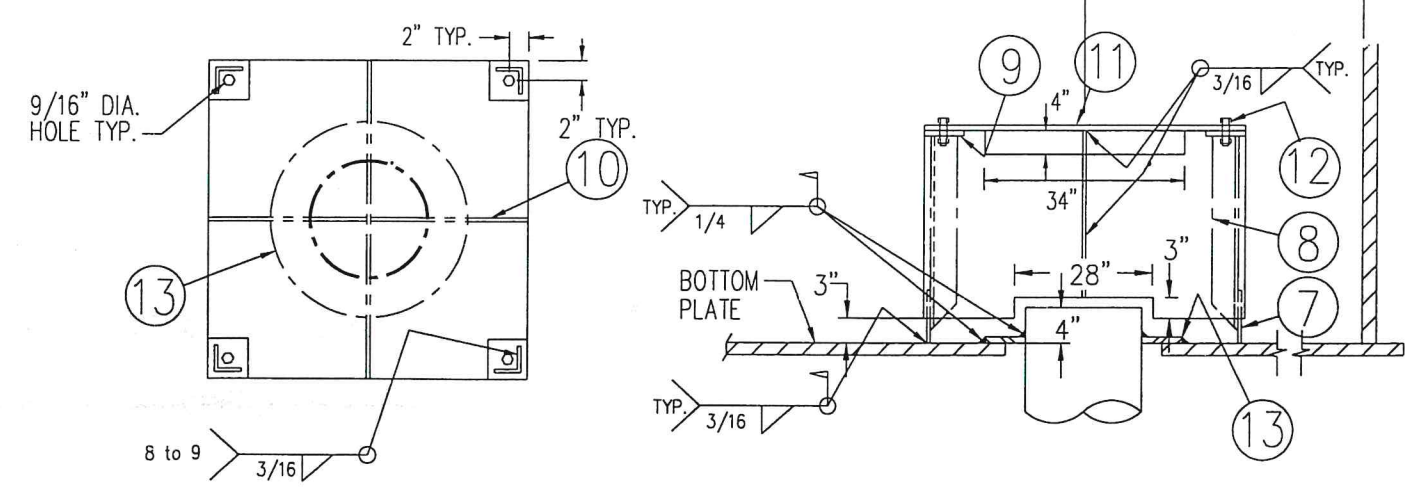
PcWt	ITEM	DESCRIPTION	Matl	Reqd	PO#
189#	1	PIPE 18" x 1/4" WALL x 3'-11 29/32" LG.	A53-B	1	
129#	2	PLATE CONE, 1/4" X 30" OD X 18" OD X 24" HT.	A36	1	
118#	3	PIPE, 18" X 1/4" WALL X 2'-5 13/16" LG	A53-B	2	
64#	4	PLATE, 1/4" X 30" X 30"	A36	1	
167#	5	PIPE, 18" X 3/8" WALL X 2'-11 13/16" FIELD VERIFY	A53-B	1	
134#	6	PIPE, 18" X 1/4" WALL X 2'-9 31/32" FIELD VERIFY	A53-B	1	
2#	7	FLAT BAR, 3/8" X 3" X 5" LG. DRILL AS SHOWN	A36	4	
7#	8	ANGLE, 1/4" X 3" X 3" X 17" LG. DRILL AS SHOWN	A36	4	
1#	9	FLAT BAR, 1/4" X 4" X 4" DRILL AS SHOWN	A36	4	
38#	10	PLATE, 1/4" X 15" X 42" CUT AS SHOWN	A36	2	
125#	11	PLATE, 1/4" X 42" X 42"	A36	1	
---	12	BOLT AND NUT, 1/2" X 1 1/2"	SS	12	
40#	13	PLATE, 1/4" X 36" OD X FIELD CUT ID.	A36	1	
109#	14	FLANGE, 18" X 150# X SOFF	A181	1	

QUANTITIES REQUIRED IN MATERIALS LIST ARE FOR ALL PARTS
PIPE LENGTHS IN MATERIALS LIST ARE OVERALL



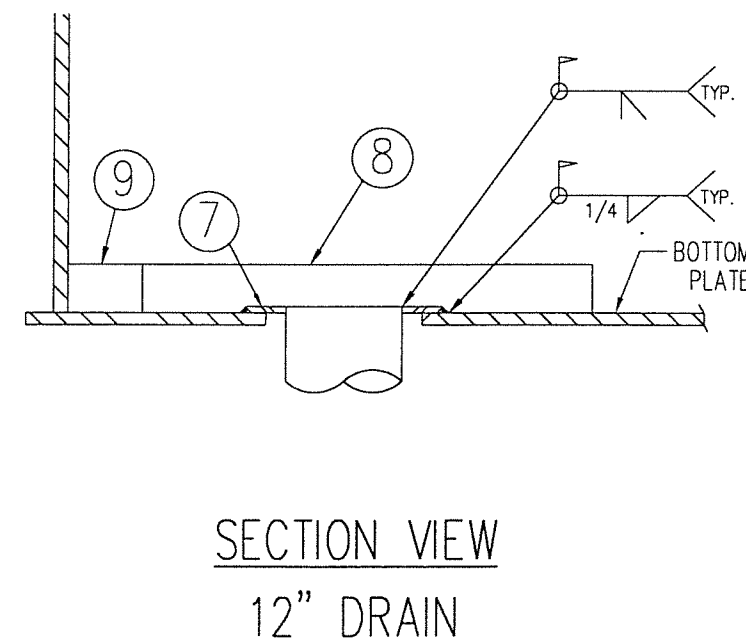
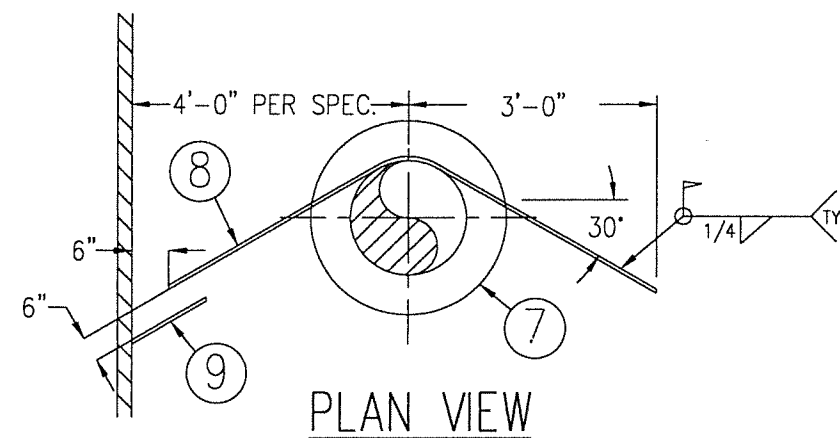
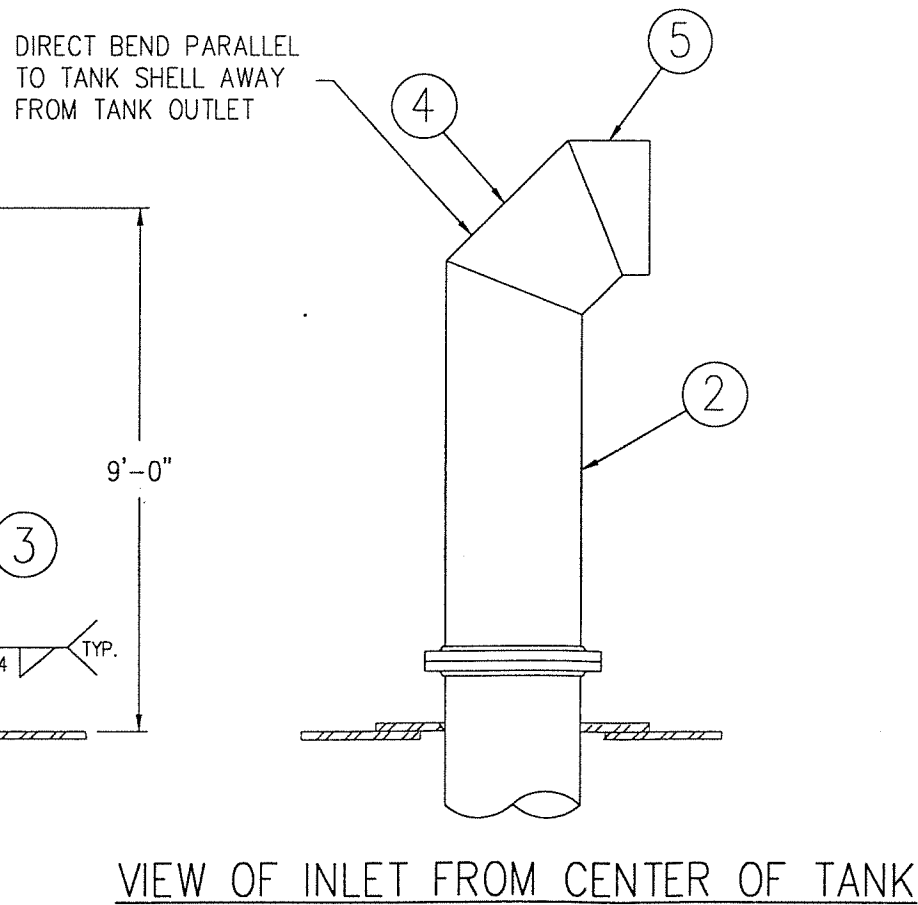
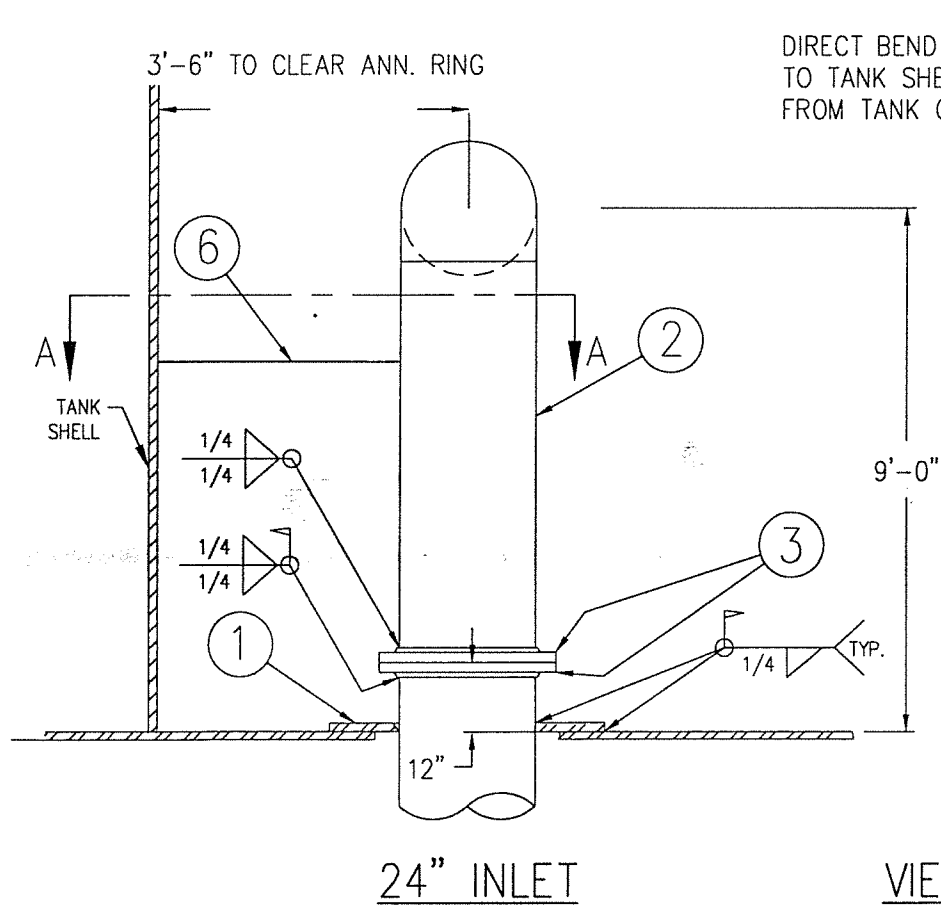
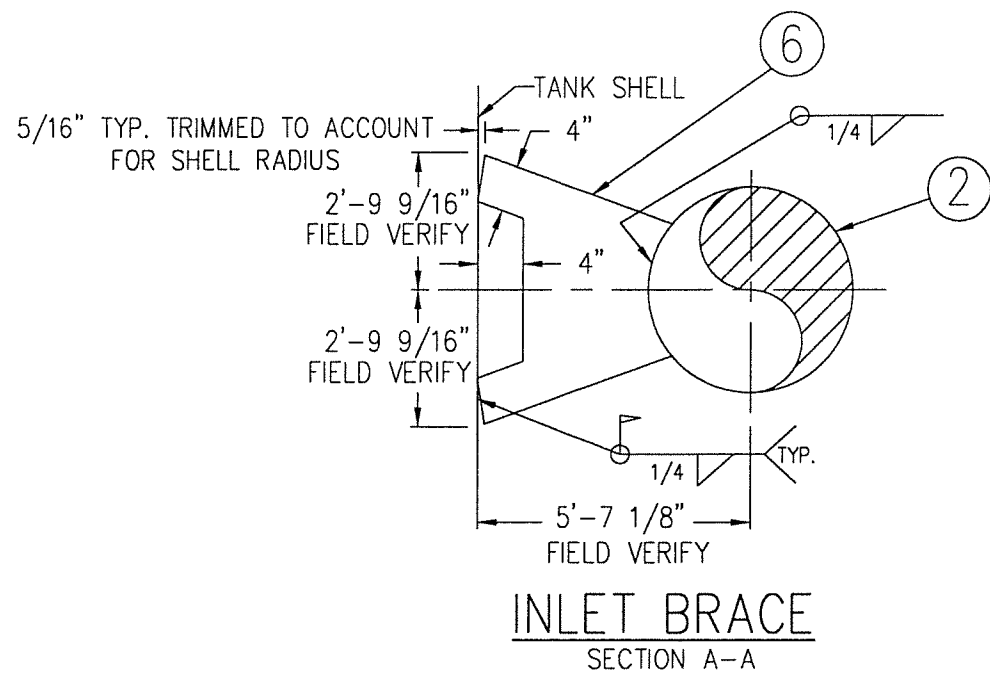
Provide Backing Ring

See Note 5 on Add'l Comments.



18" OVERFLOW


 Trusco Tank Inc 4388 Santa Fe Road San Luis Obispo, CA 93401 (805) 544-9155	0	OF	APPURTENANCES	
			COPPER COVE 0.345 MG LAKE TULLOCH, CA	
	Revisions :	Drawn:	Date:	Job No. :
	A	JMG	2-10-98	622880010
B	File Name:		3 OF 13	
C	001\AP			

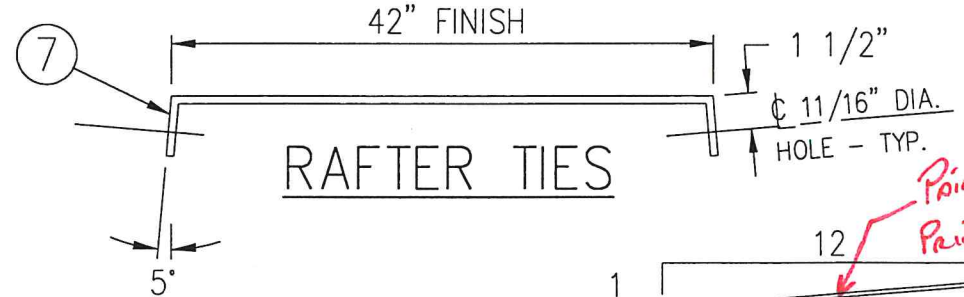
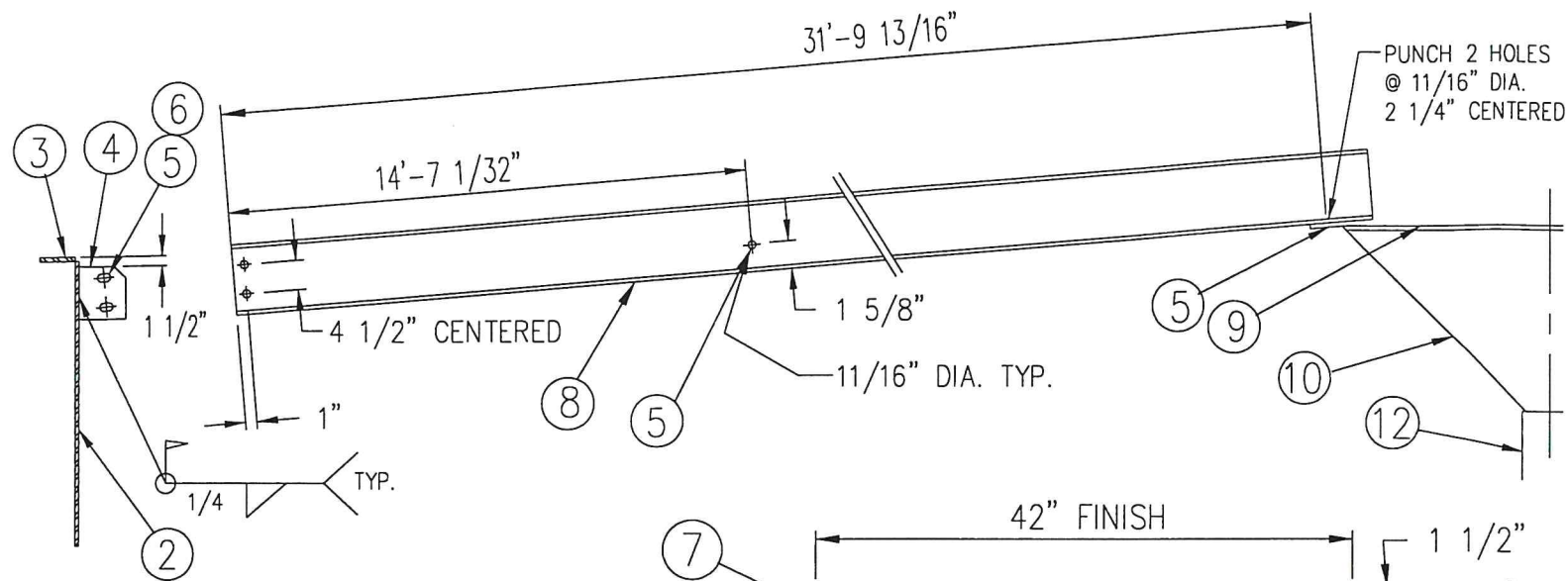


MATERIAL LIST

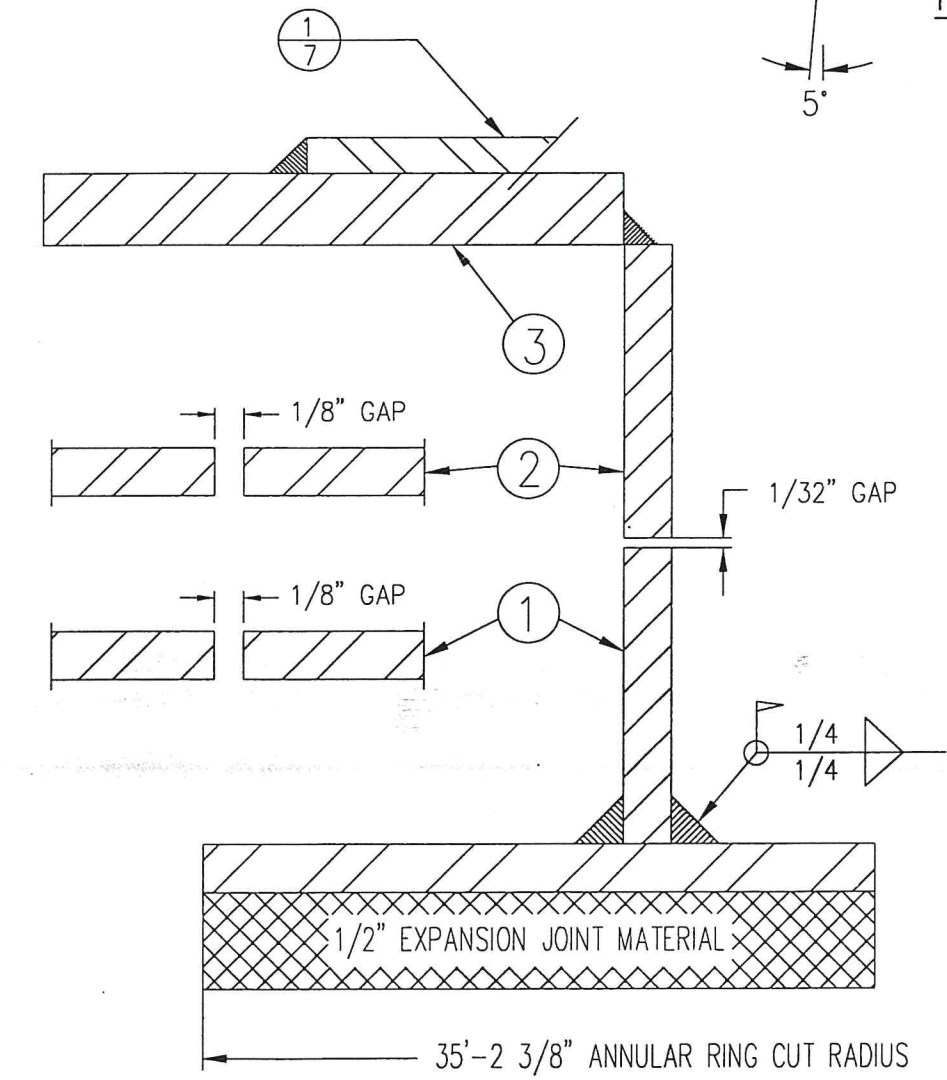
PcWt	ITEM	DESCRIPTION	Matl	Reqd	PO#
40#	1	PLATE, 1/4" X 36" OD X FIELD CUT ID	A36	1	
459#	2	PIPE, 24" X 1/4" WALL X 7'-2 29/32" LG.	A53-B	1	
204#	3	FLANGE, 24" X 150# X SOFF WITH GALV BOLTS & NUTS AND GASKET SET	A181	2	
160#	4	PIPE, 24" X 1/4" WALL X 2'-6 3/16" LG.	A53-B	1	
79#	5	PIPE, 24" X 1/4" WALL X 1'-2 29/32" LG.	A53-B	1	
319#	6	PLATE, 1/4" X 67 1/8" X 67 1/8" FIELD VERIFY	A36	1	
24#	7	PLATE, 1/4" X 24" OD X FILED CUT ID	A36	1	
30#	8	FLAT BAR, 1/4" X 4" X 7'-5 7/16" LG., ROLL AS REQUIRED	A36	1	
2#	9	FLAT BAR, 1/4" X 4" X 8" LG.	A36	1	

QUANTITIES REQUIRED IN MATERIALS LIST ARE FOR ALL PARTS
PIPE LENGTHS IN MATERIALS LIST ARE OVERALL

 <p>Trusco Tank Inc</p> <p>4388 Santa Fe Road San Luis Obispo, CA 93401 (805) 544-9155</p>	<p>I DR</p> <p>Revisions :</p> <p>A</p> <p>B</p> <p>C</p>	APPURTENANCES		
		COPPER COVE 0.345 MG LAKE TULLOCH, CA		
		Drawn: JMG	Date: 2-10-98	Job No. : 622880010
		File Name: 001\AP2	4 OF 13	



RAFTER TIES



THE FIELD FOREMAN SHALL ACCURATELY STRAP THE FIRST RING OF THE TANK 3'-0" ABOVE THE BOTTOM AFTER ALL THE FIRST RING VERTS ARE 100% WELDED AND REPORT THIS DIMENSION TO THE PROJECT COORDINATOR.

THE FIELD FOREMAN SHALL ACCURATELY STRAP THE TOP CIRCUMFERENCE OF THE TANK AFTER THE TOP RING VERTS ARE 100% WELDED AND REPORT THIS DIMENSION TO THE PROJECT COORDINATOR.

ALL VERTICAL JOINTS SHALL BE BUTT WELDED ACHIEVING 100% PENETRATION & FUSION.

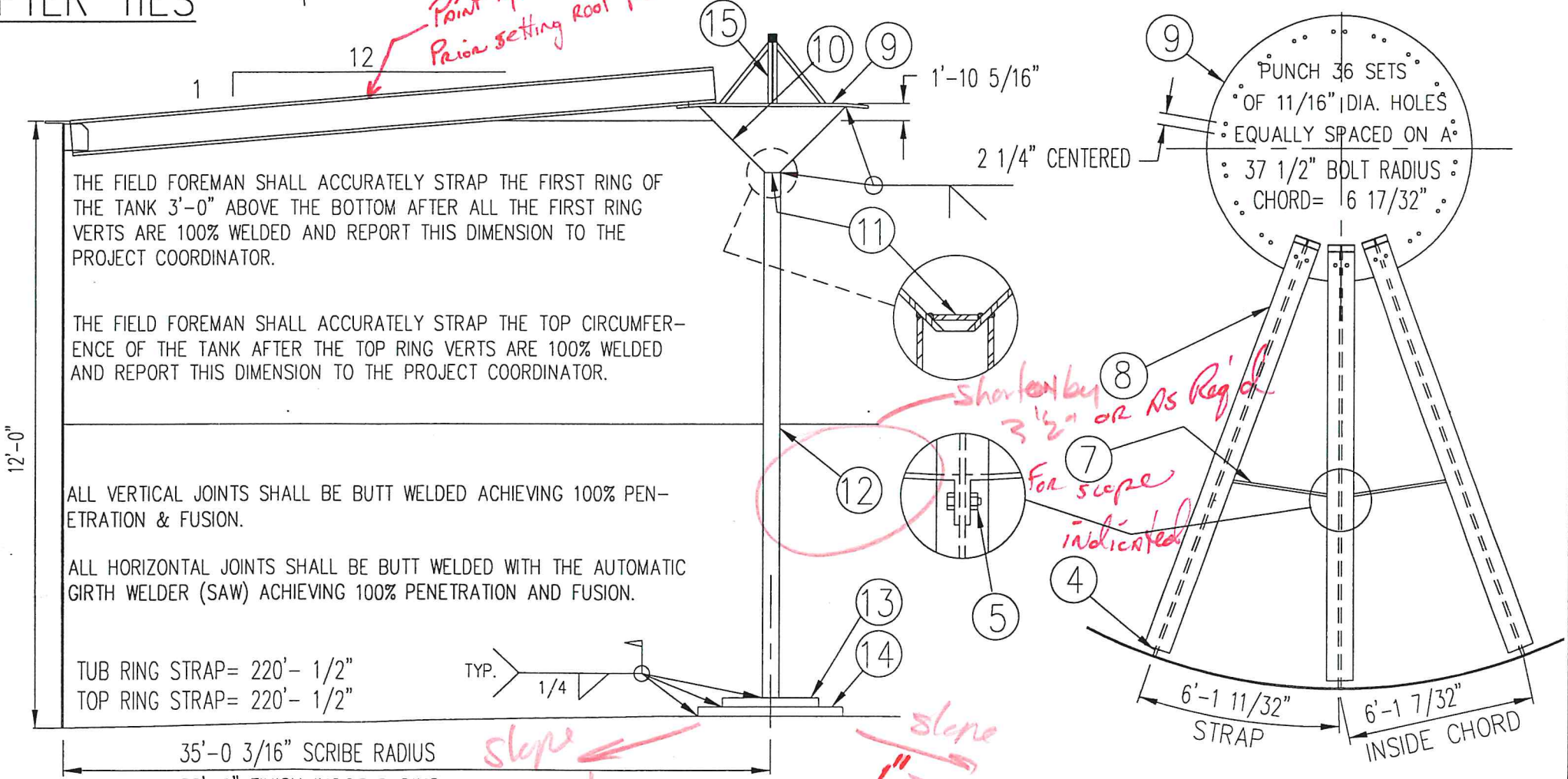
ALL HORIZONTAL JOINTS SHALL BE BUTT WELDED WITH THE AUTOMATIC GIRTH WELDER (SAW) ACHIEVING 100% PENETRATION AND FUSION.

TUB RING STRAP= 220'- 1/2"
TOP RING STRAP= 220'- 1/2"

35'-0 3/16" SCRIBE RADIUS
35'-0" FINISH INSIDE RADIUS

SHELL PLATE CHORD=37'-10 5/16"

MATERIAL LIST					
PcWt	ITEM	DESCRIPTION	Matl	Reqd	PO#
3233#	1	PLATE, 1/4" X 96" (TRIM TO 95") X 5 @ 480" & 1 @ 252"	A36	6	
1668#	2	PLATE, 1/4" X 72" (TRIM TO 49") X 5 @ 480" & 1 @ 252"	A36	6	
76#	3	FLAT BAR, 3/8" X 3" X 20' LG (BUMP TO A 35'-0" INSIDE RAD)	A36	12	
2#	4	FLAT BAR, 1/4" X 4" X 6 1/2" LG. (PER TEMPLATE R5-10-100)	A36	36	
---	5	BOLT & NUT, 5/8" X 1 1/2" LG. GALVANIZED	A325	180	
---	6	FLAT WASHER 5/8" GALVANIZED	USS	72	
8#	7	FLAT BAR, 1/4" X 2" X 46 3/16" W/ 11/16" HOLES AS SHOWN	A36	36	
388#	8	10WF12# X 35'-0" LG. CUT TO 32'-4" LG.	A36	36	
339#	9	PLATE, 1/4" X 78" DIA W/36 SETS OF 11/16" HOLES	A36	1	
406#	10	CONE, 1/4" X 72" O.D. X 45'	A36	1	
6#	11	PLATE, 1/4" X 3 27/32" DIA.	A36	1	
175#	12	PIPE, 5" X 1/4" WALL X 12'-0"	A53B	1	
113#	13	PLATE, 1" X 20" X 20"	A36	1	
842#	14	PLATE, 7/8" X 58 1/4" X 58 1/4"	A36	1	
49#	15	PAINTERS BUGGY POST	A36	1	



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Tank
Inc

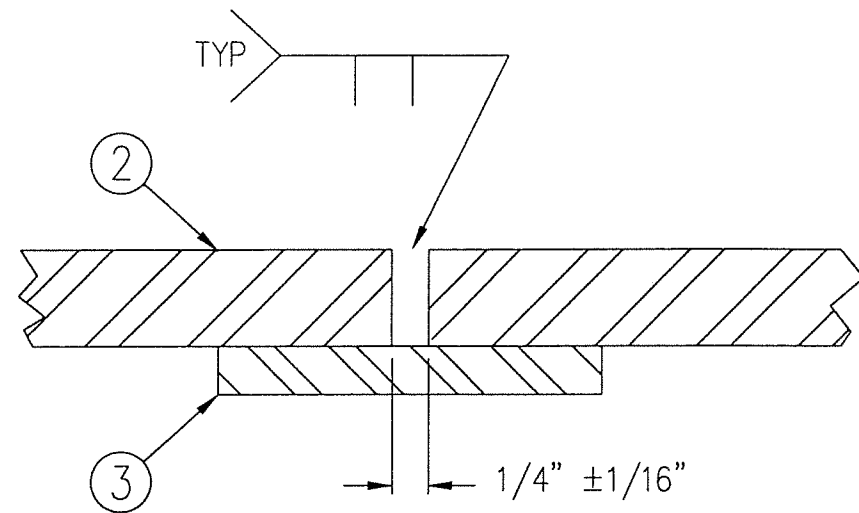
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B
C

TANK SECTION

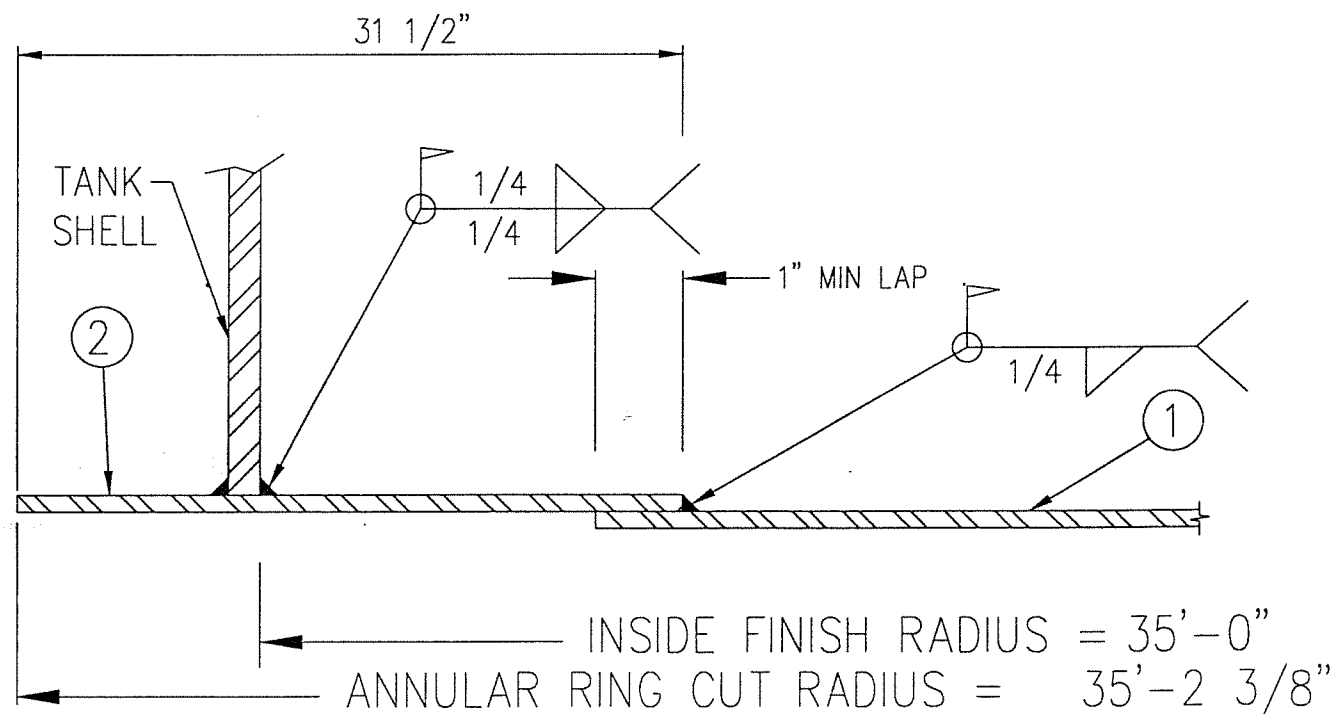
COPPER COVE 0.345 MG
LAKE TULLOCH, CA

Drawn: JMG 2-12-98 Job No.: 622880010
File Name: 001/T 5 OF 13



ANNULAR RING BUTT JOINT

(ALL WELDED JOINTS)
 SHOP FAB 5 SECTIONS OF 3 PIECES EACH
 AND 1 SECTION WITH A CHORD OF 255"



SHELL TO ANNULAR RING & ANNULAR RING TO BOTTOM WELD DETAILS

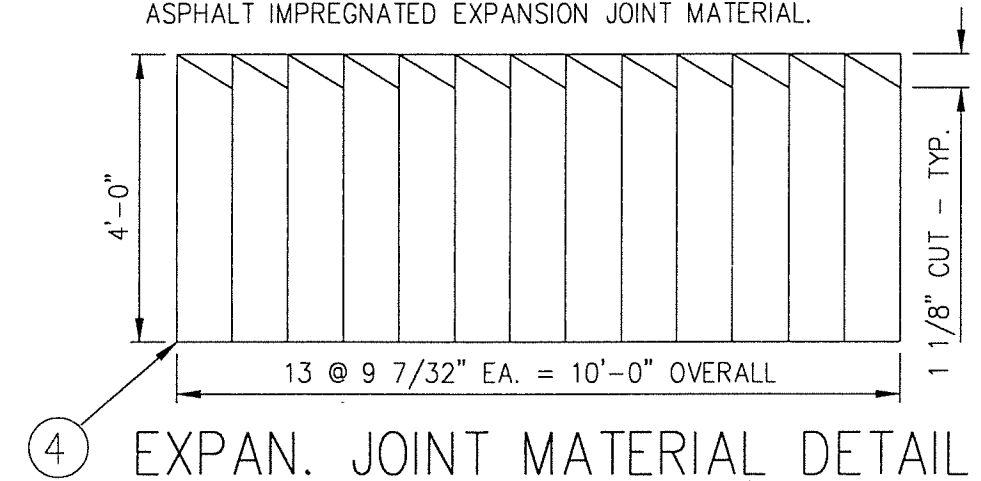
NOTES:

1. BOTTOM PLATE MAY LAP OVER OR UNDER ANNULAR PLATES BUT THIS MUST BE CONSISTANT THRUOUT ENTIRE BOTTOM. IF THE FLOOR PLATE LAPS OVER THE ANNULAR RING THE FLOOR CUT RADIUS WILL BE 32'-8 3/8"

MATERIAL LIST

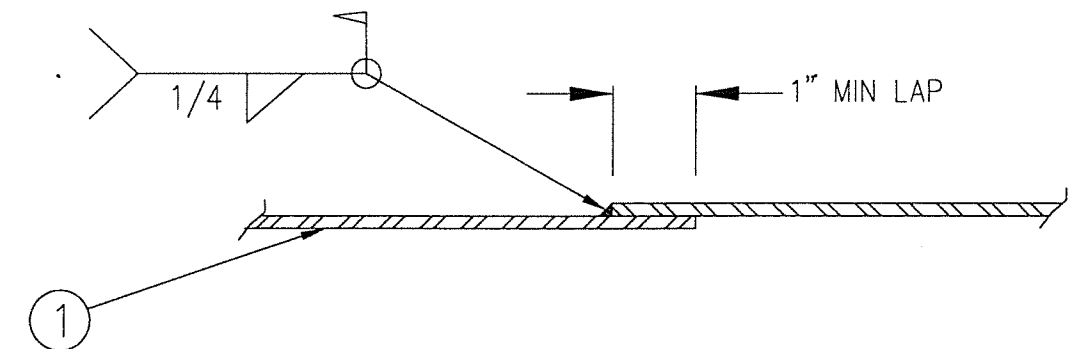
PcWt	Item	Description	Matl	Reqd
2450#	1	PLATE, 1/4" X 72" X 480"	A-36	
357#	2	PLATE, 1/4" X 31 1/2" X 160"	A-36	17
3#	3	FLAT BAR, 3/16" X 1 1/2" X 35" LG.	A-36	17
---	4	1/2" ASPHALT IMPREGNATED EXPANSION JOINT MATERIAL 4'-0" X 10'-0" STD. SHEET (CUT 56 PIECES)	ASTM D1751-78	5

A MASTIC ADHESIVE SHALL BE APPLIED BETWEEN THE CONCRETE RINGWALL SURFACE AND THE ASPHALT IMPREGNATED EXPANSION JOINT MATERIAL.



EXPAN. JOINT MATERIAL DETAIL

CUT 56 PIECES TOTAL



BOTTOM PLATE LAP JOINT

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BOTTOM DETAILS

COPPER COVE 0.345 MG
 LAKE TULLOCH, CA

Drawn: JMG Date: 2-12-98 Job No.: 622880010

File Name: 001\BTMDTLS 6 OF 13

INSIDE LADDER LEG LOCATIONS

1ST SET #1 RUNG
2ND SET #6 RUNG

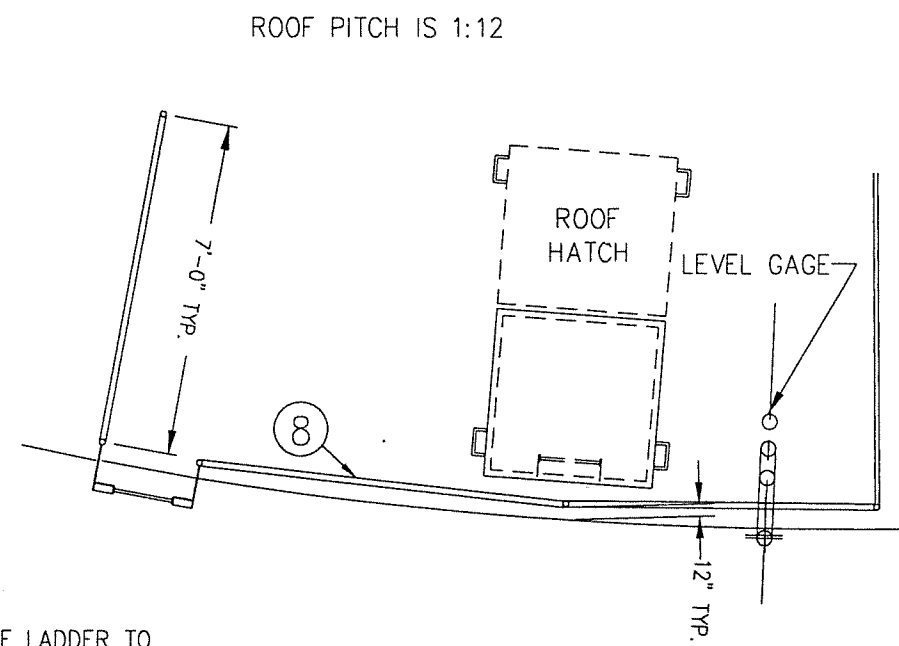
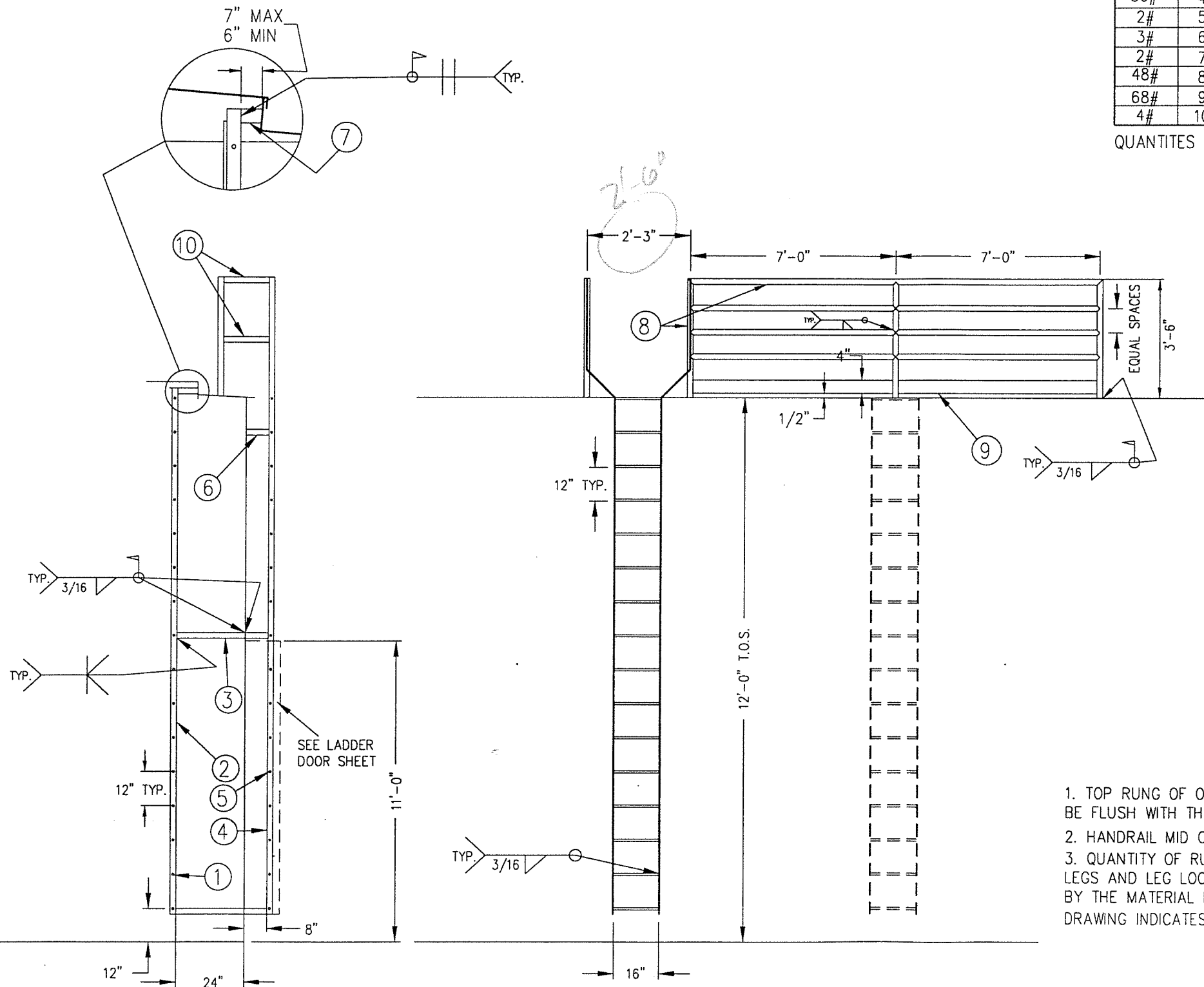
OUTSIDE LADDER LEG LOCATIONS

1ST SET #1 RUNG
2ND SET #6 RUNG
3RD SET #11 RUNG

MATERIAL LIST

PcWt	Item	Description	Matl	Reqd	PO#
2#	1	3/4" DIA. ROUND BAR x 16" LG.	SS304	12	
37#	2	FLAT BAR, 3/8" X 2 1/2" X 11'-7 1/8" LG.	SS304	2	
4#	3	FLAT BAR, 3/8" X 2 1/2" X 24" LG.	SS304	4	
50#	4	FLAT BAR, 3/8" X 2 1/2" X 15'-9 5/16" LG.	A36	2	
2#	5	3/4" DIA. ROUND BAR x 16" LG.	A36	12	
3#	6	FLAT BAR, 3/8" X 2 1/2" X 8" LG.	A36	6	
2#	7	FLAT BAR, 3/8" X 2" X 7" LG.	SS304	2	
48#	8	PIPE, 1 1/2" x STD WT. x 21' STD. LG.	A120	7	
68#	9	1/4" x 4" FB x 20' STD. LG.	A36	2	
4#	10	FLAT BAR, 3/8" X 2" X 20" LG.	A36	4	

QUANTITIES LISTED IN MATERIAL LIST ARE FOR ALL PARTS



1. TOP RUNG OF OUTSIDE LADDER TO BE FLUSH WITH THE TOP OF THE TANK
2. HANDRAIL MID ORDINATE IS 8 21/32"
3. QUANTITY OF RUNGS, QUANTITY OF LADDER LEGS AND LEG LOCATIONS SHALL BE DETERMINED BY THE MATERIAL LIST AND LEG LOCATION CHARTS. DRAWING INDICATES STANDARD OREINTATION ONLY

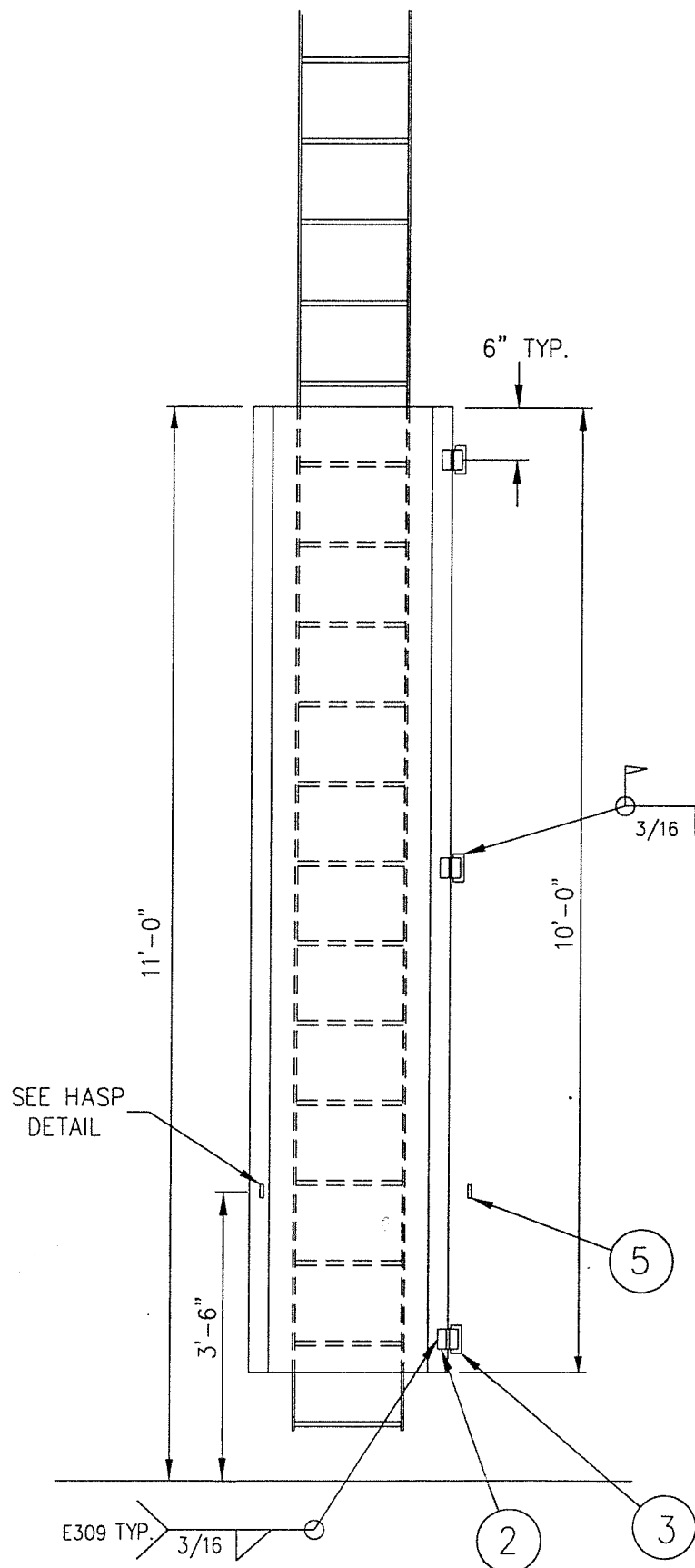
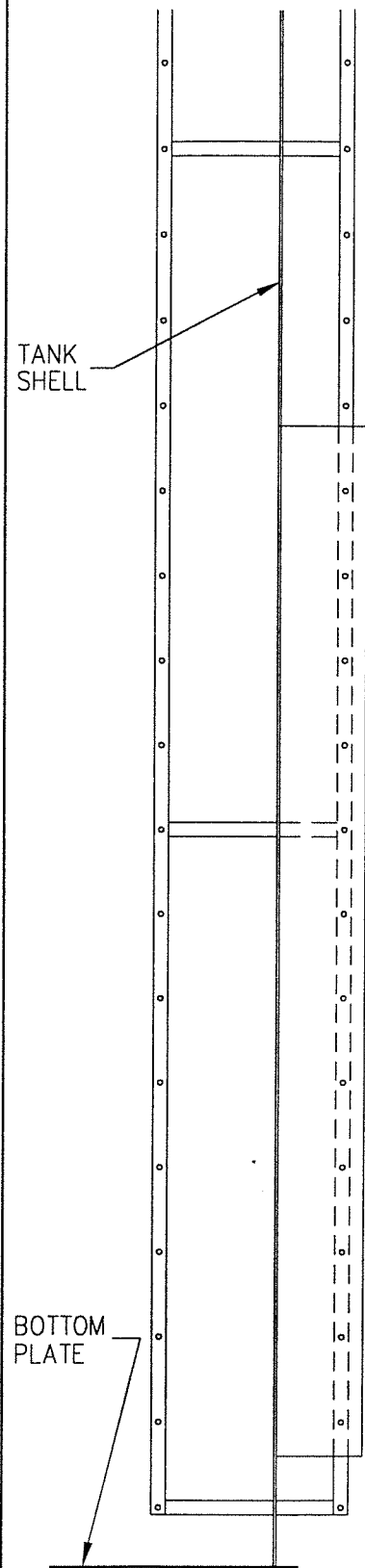
LADDER PLAN VIEW

<p>Trusco Tank Inc 4388 Santa Fe Road San Luis Obispo, CA 93401 (805) 544-9155</p>	GU	IL	OL	LADDER DETAIL		
	Revisions : A B C			COPPER COVE 0.345 MG LAKE TULLOCH, CA Drawn: JMG Date: 2-11-98 Job No.: 622880010 File Name: 001\L 8 OF 13		

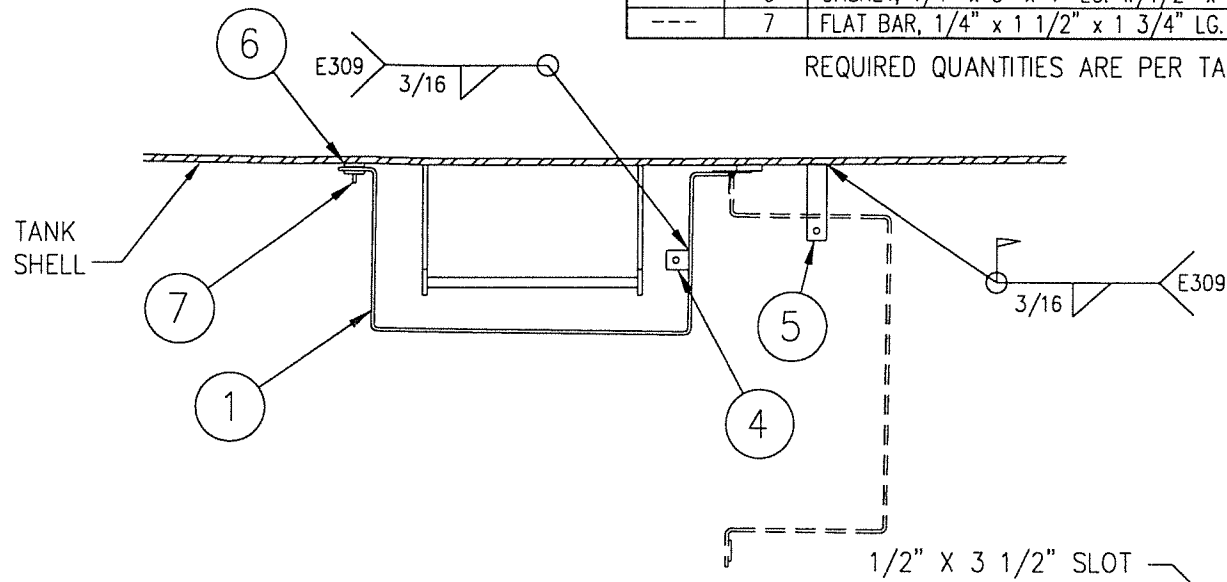
MATERIAL LIST

PcWt	Item	Description	Matl	Reqd
414#	1	PLATE, 3/16" x 4'-6" x 10'-0" LG. FORM AS REQUIRED	A36	1
1#	2	HEAVY DUTY HINGE, 3" x 3"	18-8SS	3
2#	3	FLAT BAR, 1/2" x 2" x 5" LG.	A36	3
---	4	FLAT BAR, 1/4" x 1 1/2" x 1 3/4" LG.	18-8SS	1
1#	5	FLAT BAR, 1/4" x 1 1/2" x 5 7/8" LG.	18-8SS	1
---	6	GASKET, 1/4" x 3" x 4" LG. w/1/2" x 1 3/4" SLOT	NEOP.	2
---	7	FLAT BAR, 1/4" x 1 1/2" x 1 3/4" LG.	18-8SS	1

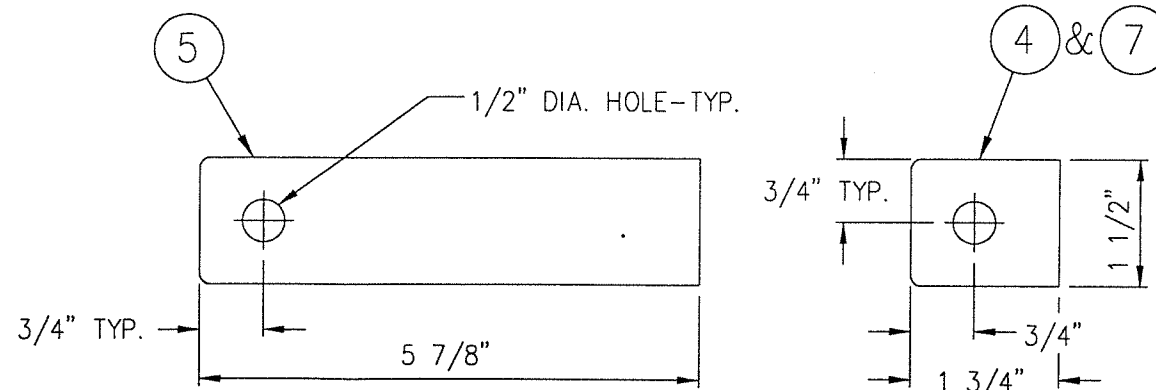
REQUIRED QUANTITIES ARE PER TANK



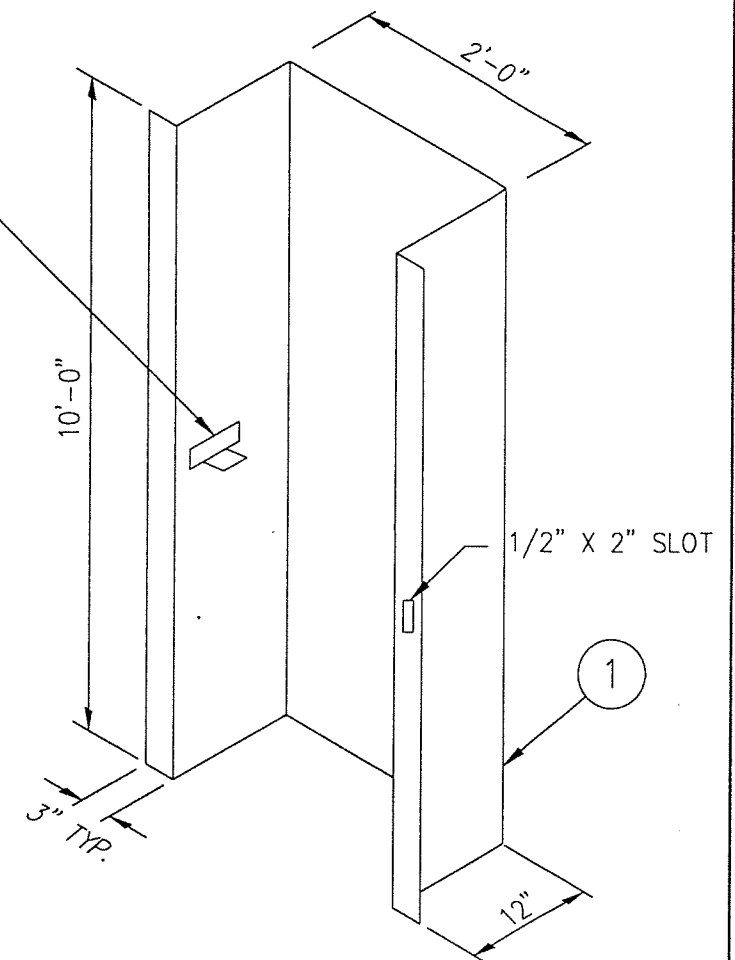
TYPICAL INSTALLATION DETAILS



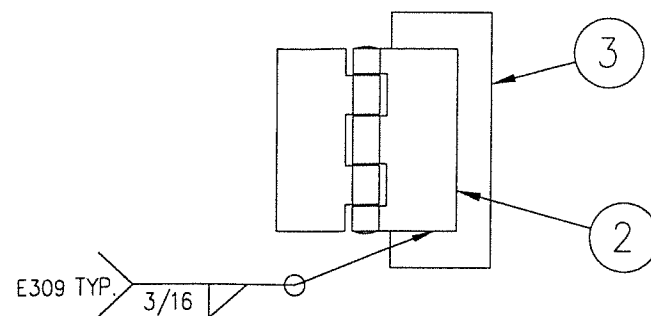
PLAN VIEW WITH PHANTOM VIEW



HASP ASSEMBLY DETAILS



ISOMETRIC FORMING DETAIL



HINGE DETAIL

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LADDER DOOR
COPPER COVE 0.345 MG
LAKE TULLOCH, CA

Drawn: JMG Date: 2-12-98 Job No.: 622880010

File Name: 001\LD 9 OF 13

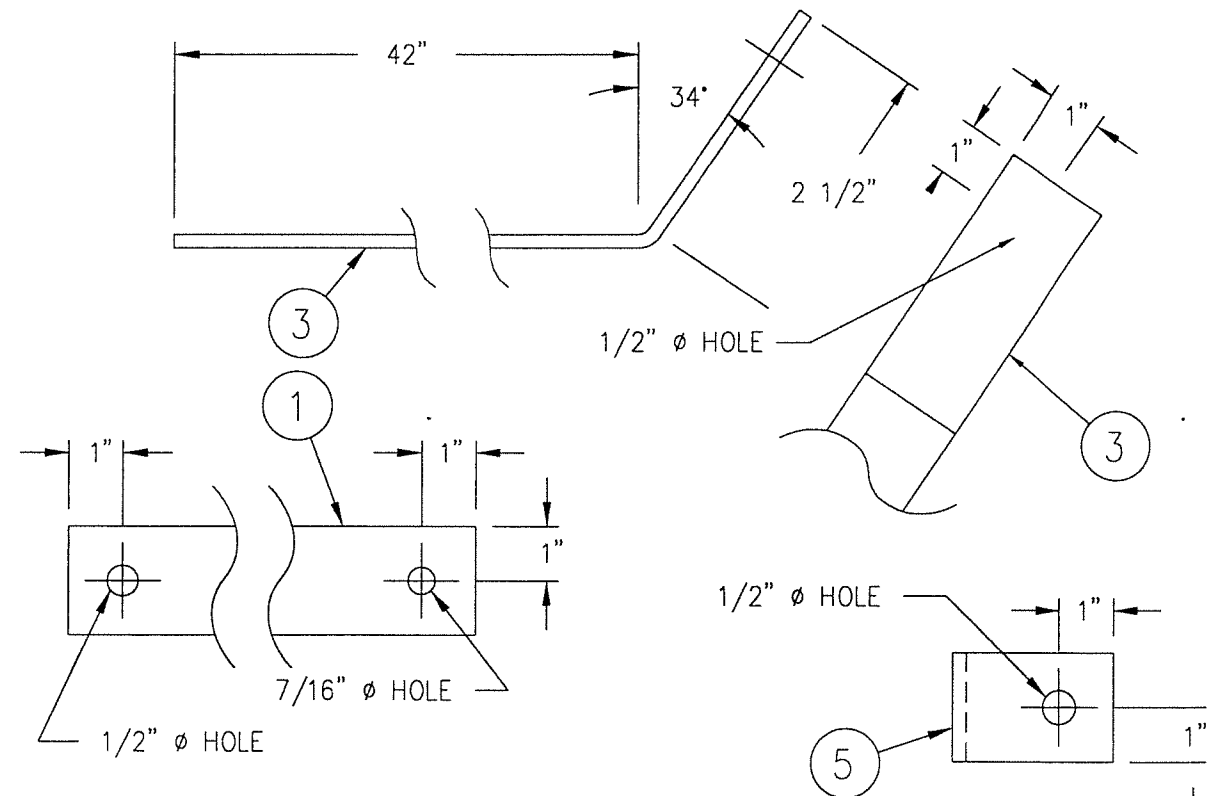
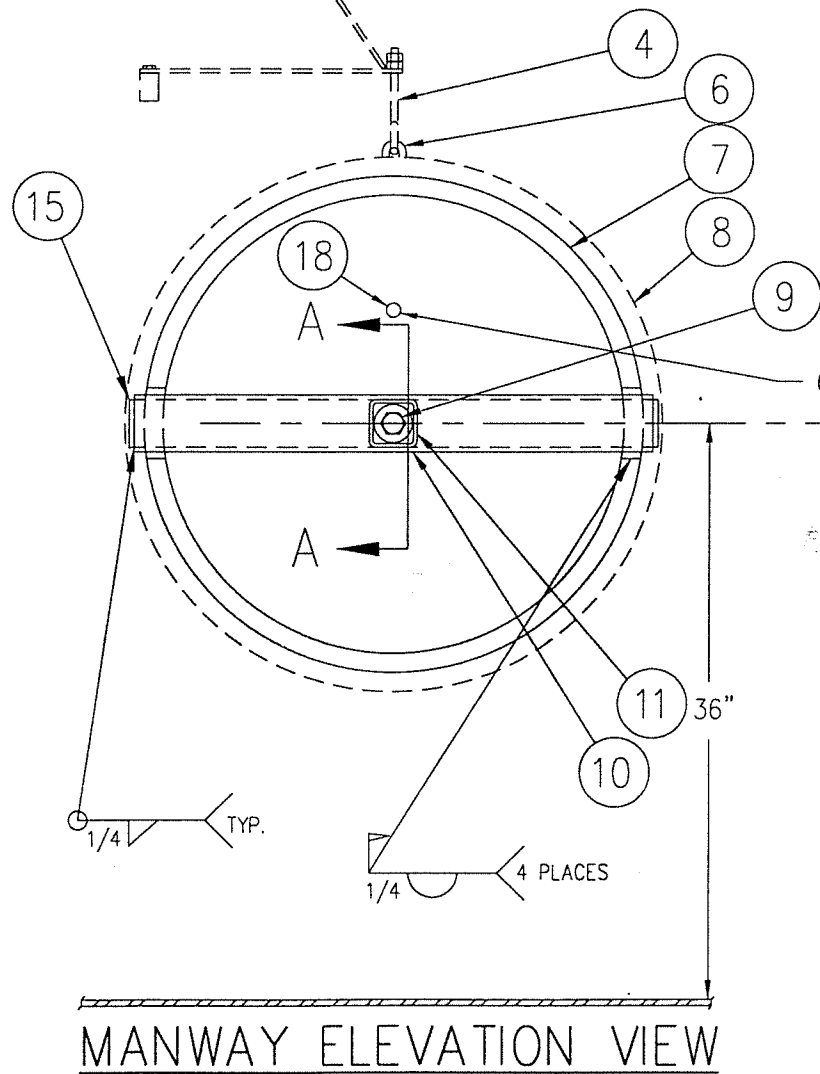
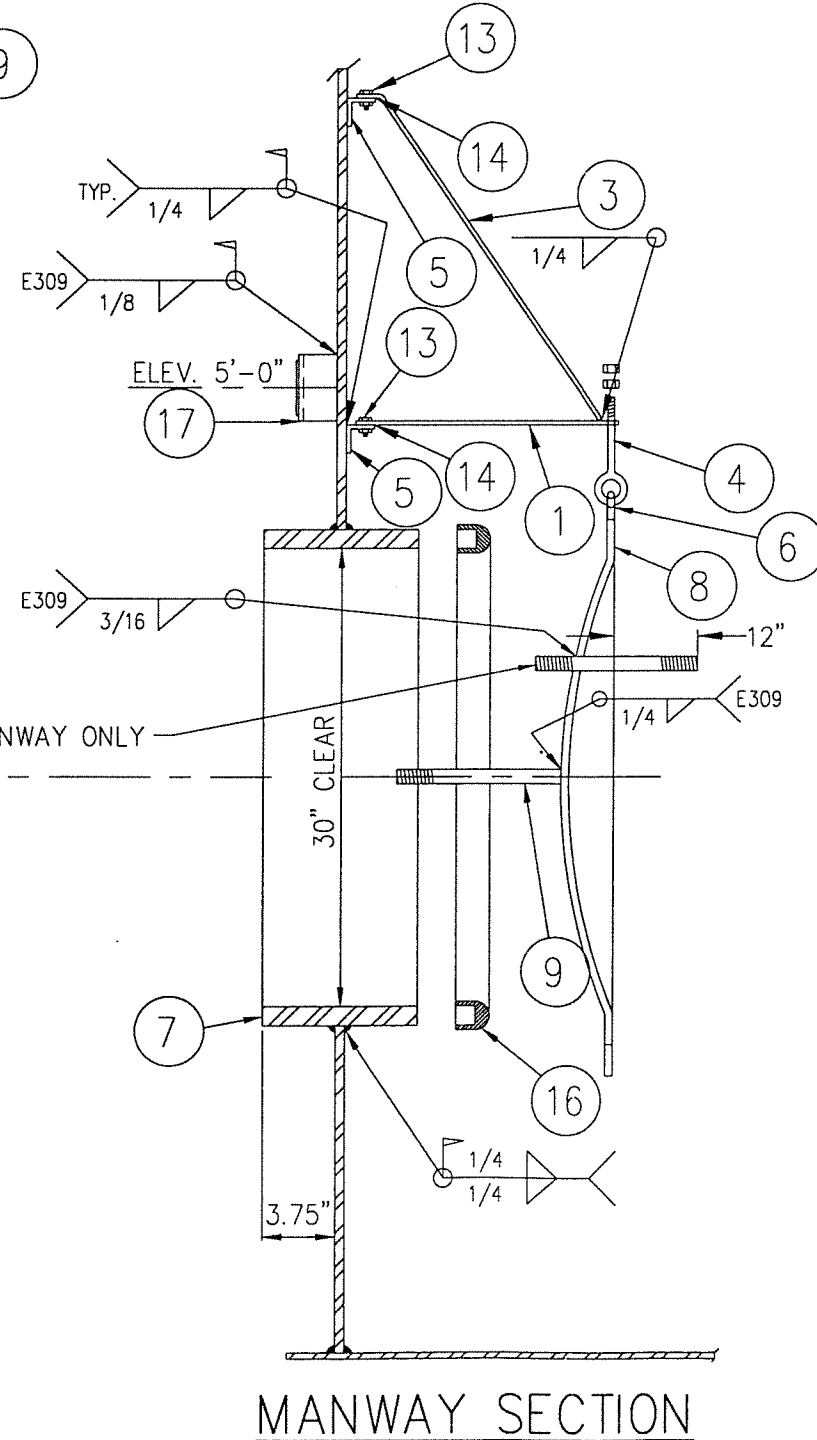
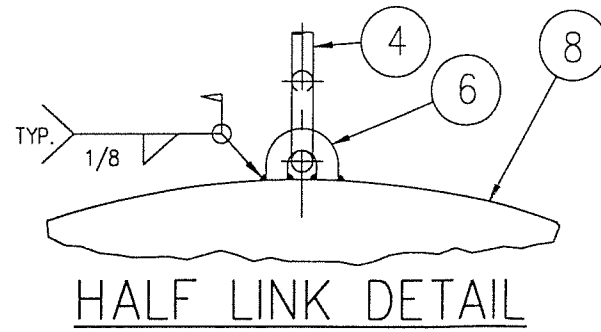
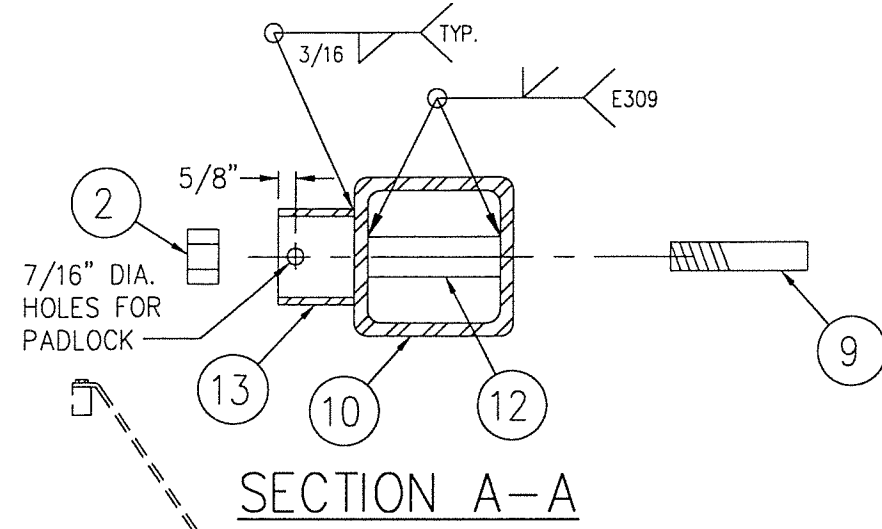
MATERIAL LIST

PcWt	Item	Description	Matl	Reqd
6#	1	FLAT BAR, 3/8" x 2" x 28" LG.	SS304	1
---	2	NUT, 3/4" HEAVY HEX & WASHER	BRNZ	1
7#	3	FLAT BAR, 1/4" x 2" x 44 1/2" LG.	SS304	1
---	4	EYE BOLT, 3/8" x 3" w\ (2) NUTS	SS18-8	1
1#	5	ANGLE, 3" x 3" x 3/8" x 2" LG.	SS304	2
---	6	HALF RING, 5/16" x 2 1/4"	SS18-8	1
237#	7	PLATE, 1" x 8 1/2" x 8'-2 7/16" LG. Rolled to 30" I.D.	A516-70	1
136#	8	HAT HEAD 3/8" X 28" ID X 34" OD. X 28" RAD.	A285	1
2#	9	ROUND BAR, 3/4" DIA. x 10 1/2" LG. w\ 2" NC T.O.E.	SS18-8	1
24#	10	TUBE STUCT., 3" x 3" x 1/4" x 33" LG.	A500	1
---	11	TUBE SQR., 2 1/2" x 2 1/2" x 3/16" x 3" LG. w\ 7/16" Ø HOLES	A36	1
---	12	PIPE, 3/4" x STD. WT. x 3" LG.	SS304	1
---	13	BOLT, 1/2"-13 NC x 1" LG. w\ NYLOCK NUT & WASHER	SS304	2
---	14	NYLON WASHER	NYLON	2
1#	15	FLAT BAR, 2 1/2" x 1/4" x 2 1/2" LG.	A36	2
---	16	C RING GASKET x 1/4" x 29" I.D. 50 Duro-Hard	NEOPR.	1
---	17	STD. AWWA TANK NAMEPLATE (One per tank)	SS304	1
---	18	NIPPLE, 1" X STD. WT. X 18" LG., TBE	SS304	1

NUMBER REQUIRED IS PER MANWAY

NUMBER OF MANWAYS REQUIRED: 2

NOTE: SAMPLE TAP (18) IS REQUIRED ON WESTERN MANWAY ONLY

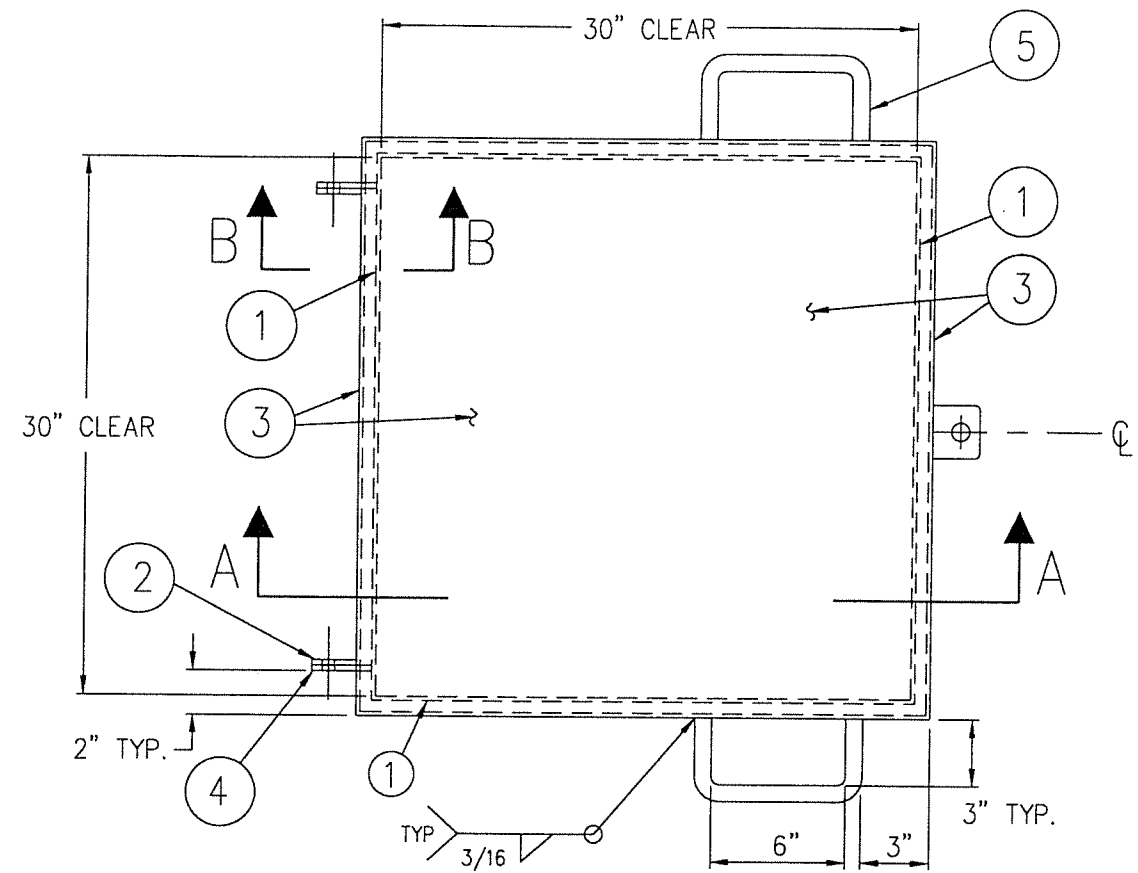


DAVIT SUPPORT & DAVIT ARM DETAILS

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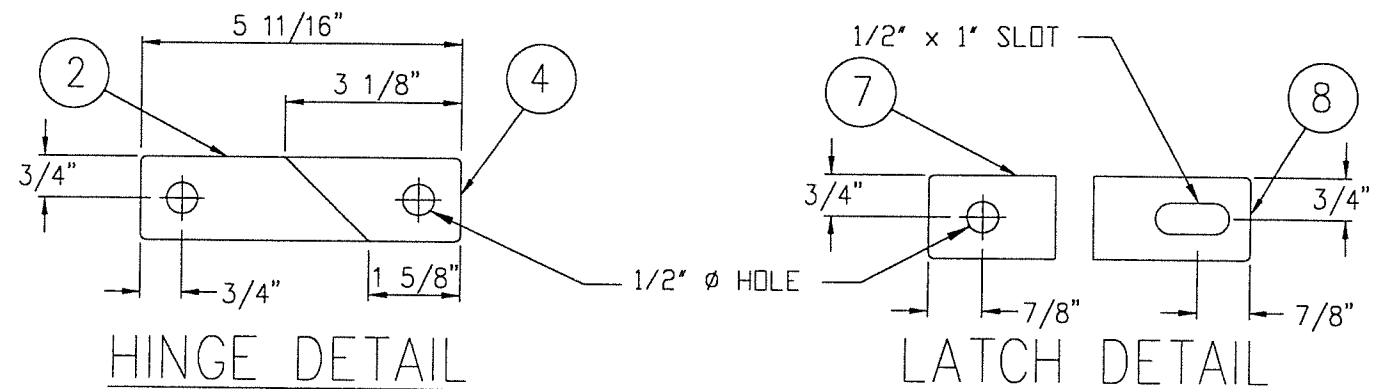
30" MONOBOLT MANWAY
 COPPER COVE 0.345 MG
 LAKE TULLOCH, CA
 Drawn: JMG Date: 2-11-98 Job No.: 622880010
 File Name: 001\MW30 10 OF 13



HATCH PLAN VIEW

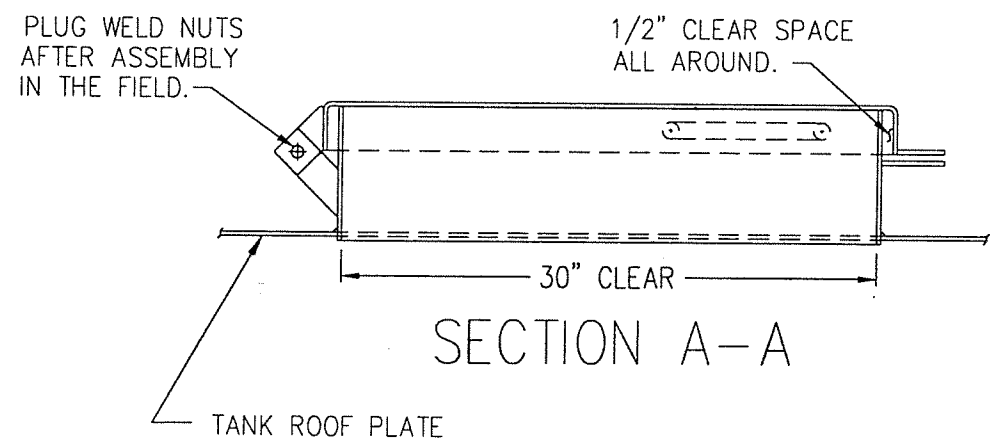
MATERIAL LIST				
PcWt	ITEM	DESCRIPTION	Matl	Reqd
12.4#	1	FLAT BAR, 6" x 3/16" x 30" LG.	A36	4
.25#	2	FLAT BAR, 1 1/2" x 3/16" x 4 3/32" LG. Cut @ 45°	304SS	2
106#	3	PLATE, 3/16" x 35 1/4" Cut x 35 1/4" Cut Form as indicated	A36	1
.175#	4	FLAT BAR, 1 1/2" x 3/16" x 3 1/8" LG. Cut @ 45°	304SS	2
1.65#	5	ROUND BAR, 3/4" DIA. x 13" LG.	A36	2
---	6	BOLT, 1/2"-13 UNC x 1" LG. w\NUT	304SS	2
.25#	7	FLAT BAR, 1 1/2" x 1/4" x 2" LG.	304SS	1
.175#	8	FLAT BAR, 1 1/2" x 1/4" x 2 7/8" LG.	304SS	1

NUMBER REQUIRED IS PER HATCH
 NUMBER OF HATCHES REQUIRED: 1

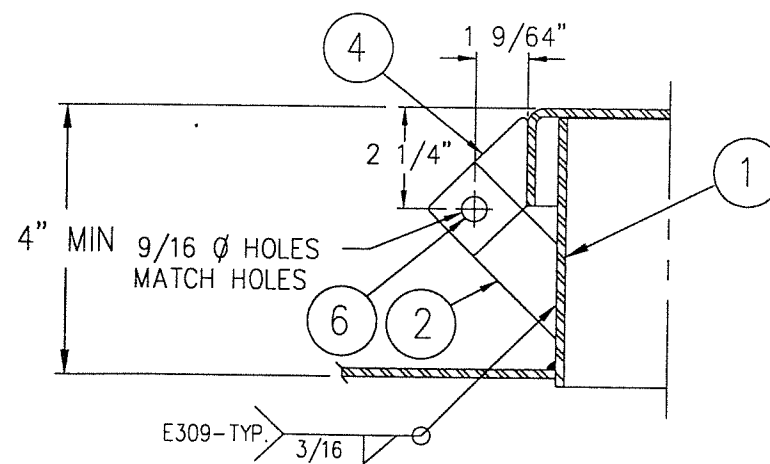


HINGE DETAIL

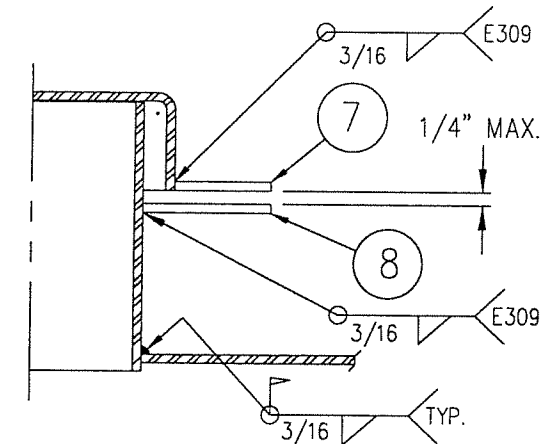
LATCH DETAIL



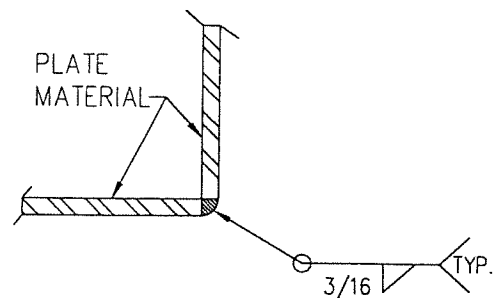
SECTION A-A



SECTION B-B



LATCH DETAIL



TYPICAL JOINT DETAIL



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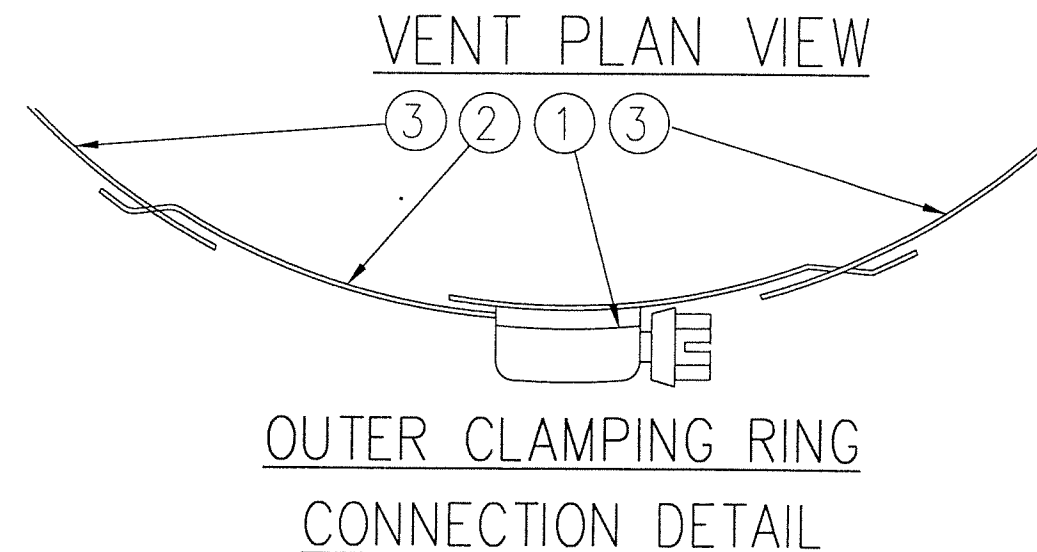
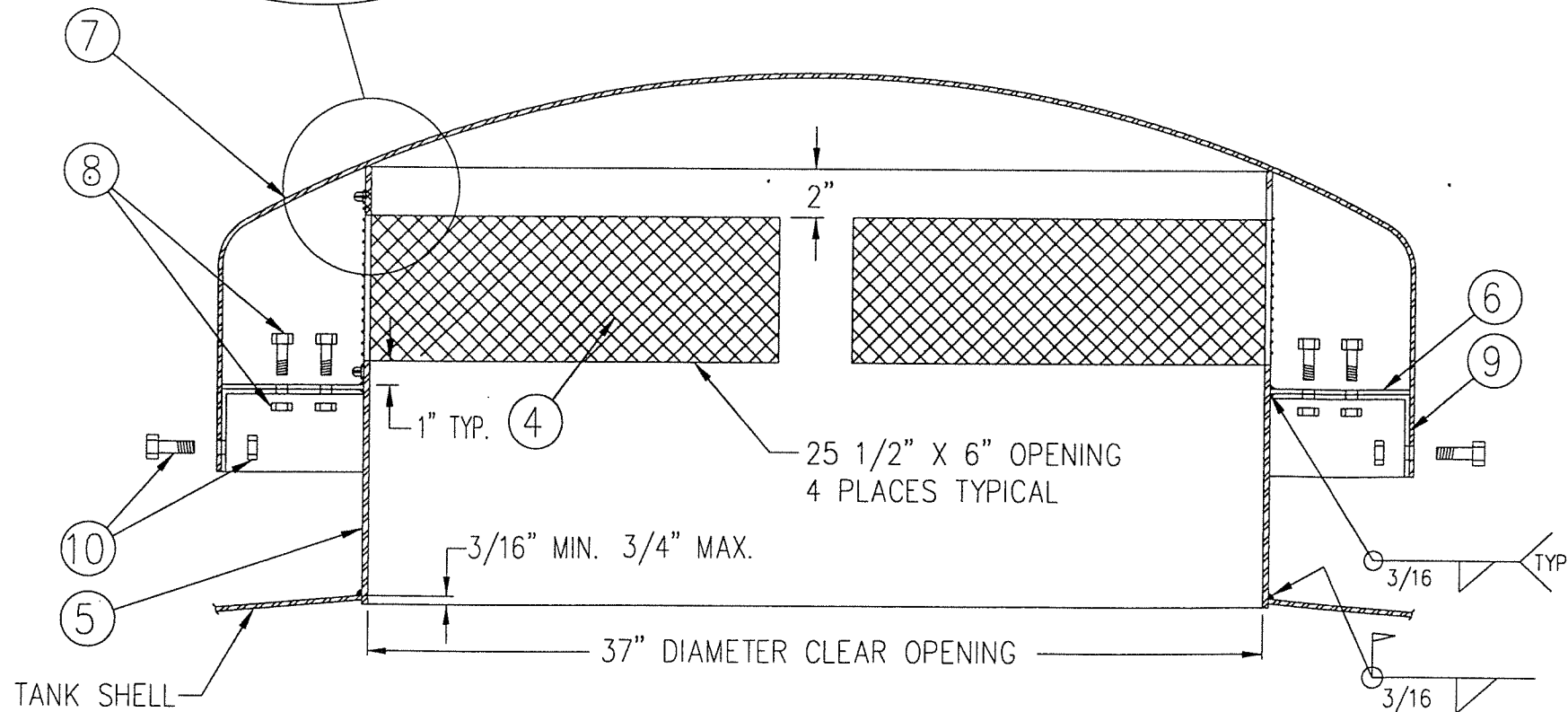
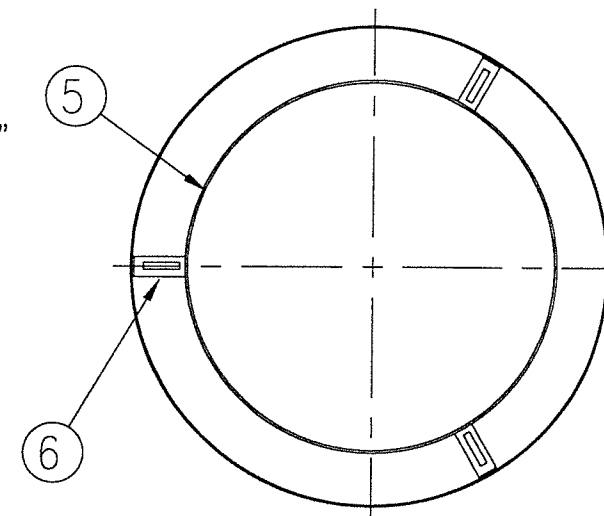
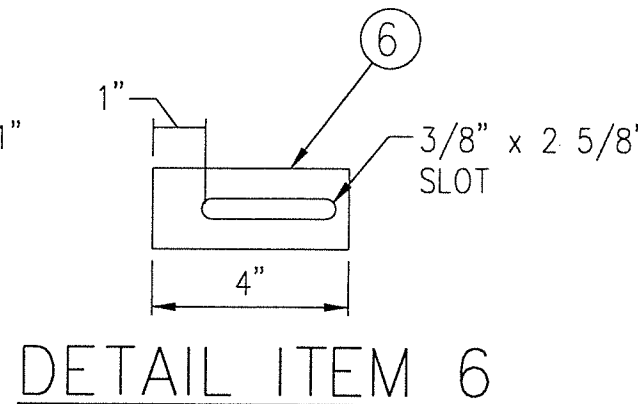
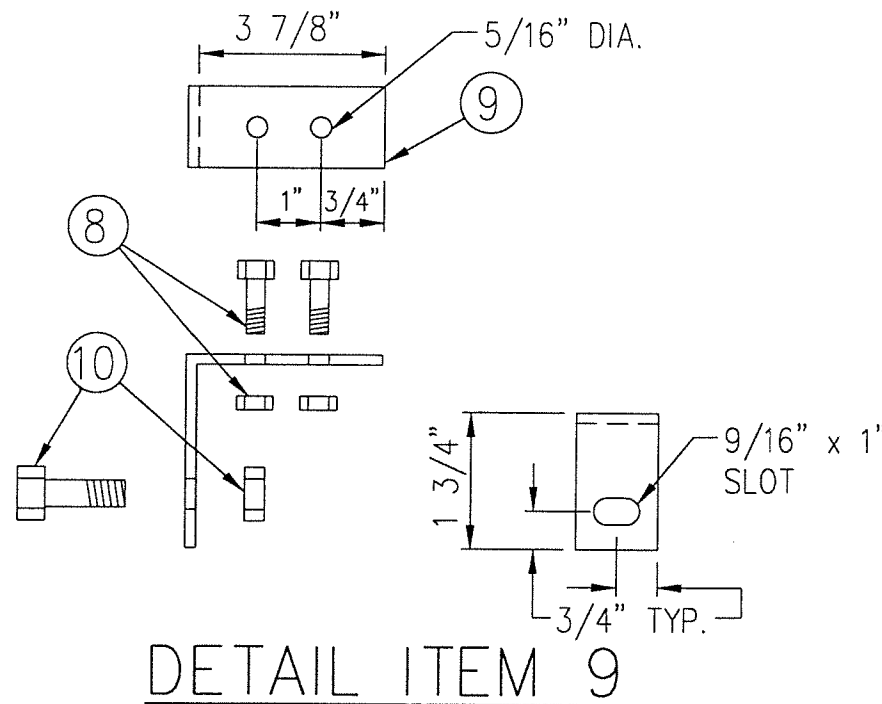
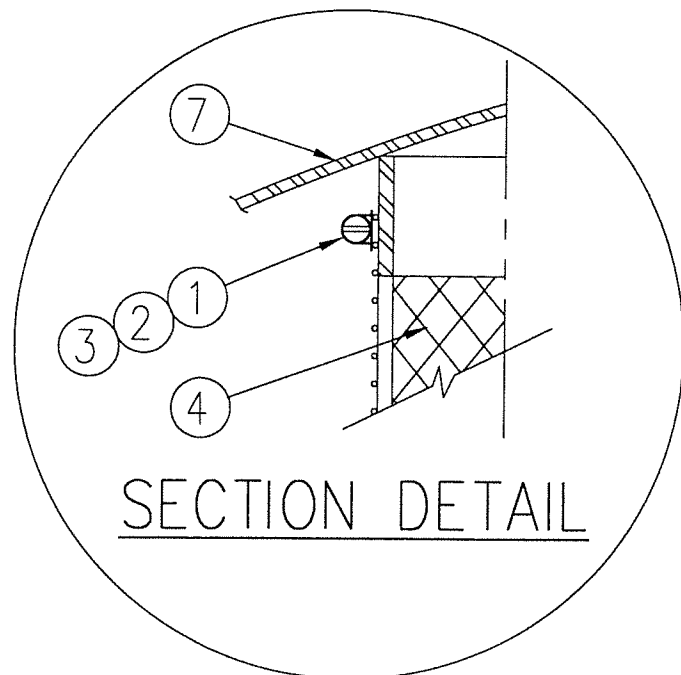
30" ROOF HATCH		
COPPER COVE 0.345 MG LAKE TULLOCH, CA		
Drawn: JMG	Date: 2-11-98	Job No.: 622880010
File Name: 001/RH30		11 OF 13

ROOF VENT IS DESIGNED WITH A REMOVABLE HOOD
IN ORDER TO ACCEPT A HIGH VOLUME AIR VENTILATOR
WHICH RESTS ON THE OPEN TOP OF THE VENT.

MATERIAL LIST

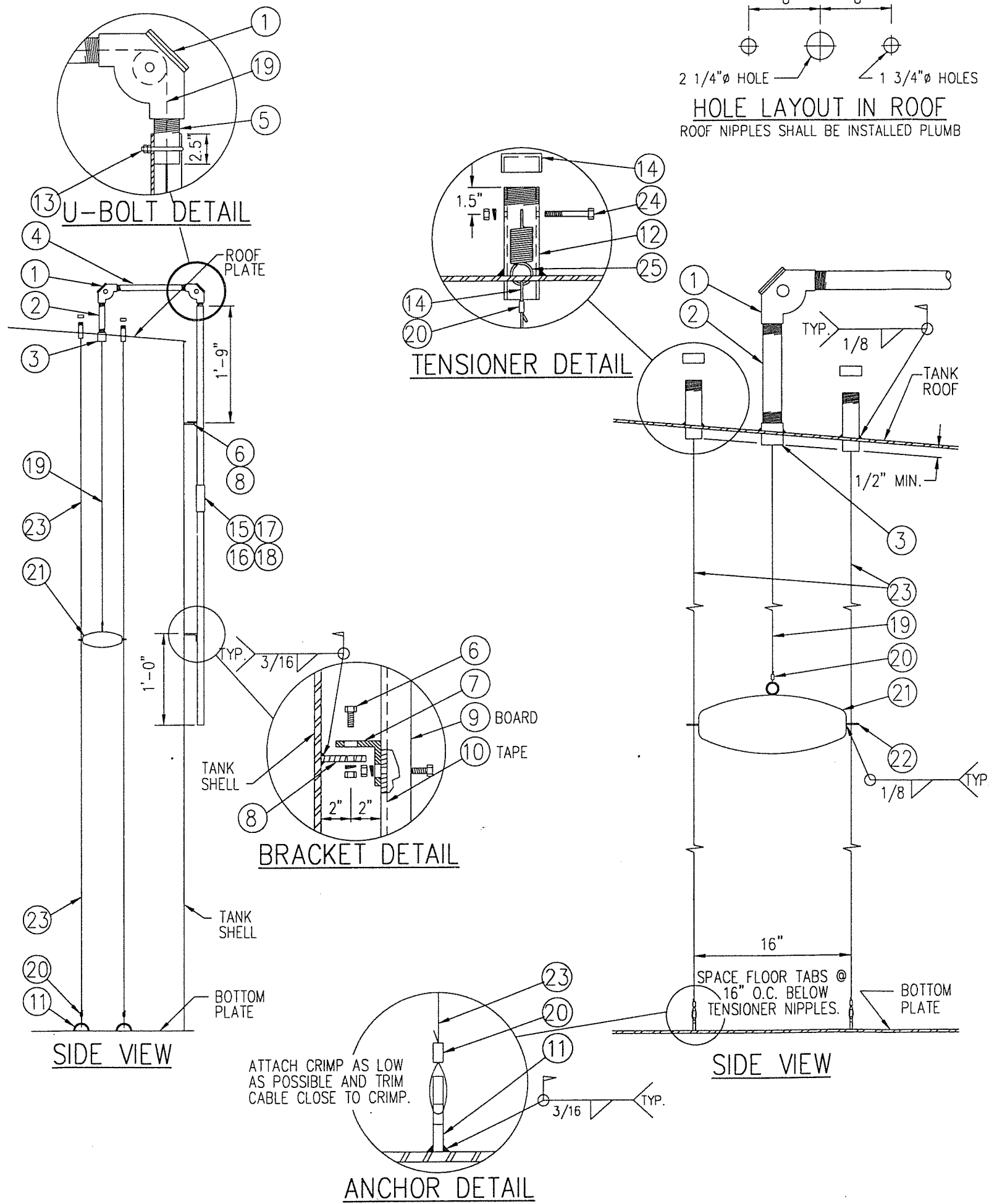
PcWt	ITEM	DESCRIPTION	Matl	Reqd	PO#
---	1	DRIVER FOR AERO SEAL "BREEZE" ADJUSTABLE WORM DRIVE CLAMP	STAINLESS	2	
---	2	GRIPPING STRAP FOR AERO SEAL "BREEZE" WORM DRIVE CLAMP	STAINLESS	2	
---	3	PERFORATED BAND, 1/2" X 0.025" x 9'-8" LG.	STAINLESS	2	
---	4	MESH INSECT SCREEN, .028" x 8 x 8 WIRE x 8" x 9'-11" LG.	BRONZE	1	
75#	5	PLATE, 3/16" X 18" x 9'-8 27/32" LG. Roll to 37" I.D.	A36		
.96#	6	FLAT BAT, 3/16" x 1 1/2" x 4" LG. Punch as detailed	A36	3	
43#	7	FIBERGLASS REINFORCED PLASTIC VENT HOOD x 7/32" x 48" Crown Radius x 48" I.D. x 16 1/2" HT.	FRP	1	
---	8	BOLT, 3/8" X UNC X 1" LG W\NYLOCK NUT & WASHER	304SS	6	
.28#	9	FB, 3/16" x 1 1/2" x 5 5/8" LG. Bend & Punch per template	A36	3	
---	10	BOLT, 1/2" X UNC X 1 1/2" LG W\NYLOCK NUT & (2) WASHERS	304SS	3	

QUANTITIES REQUIRED ARE FOR ALL PARTS



INSTALL CLAMPING RINGS AFTER SCREEN IS IN PLACE.
RINGS & SCREEN ARE TO BE INSTALLED AFTER ALL PAINT IS DRY.

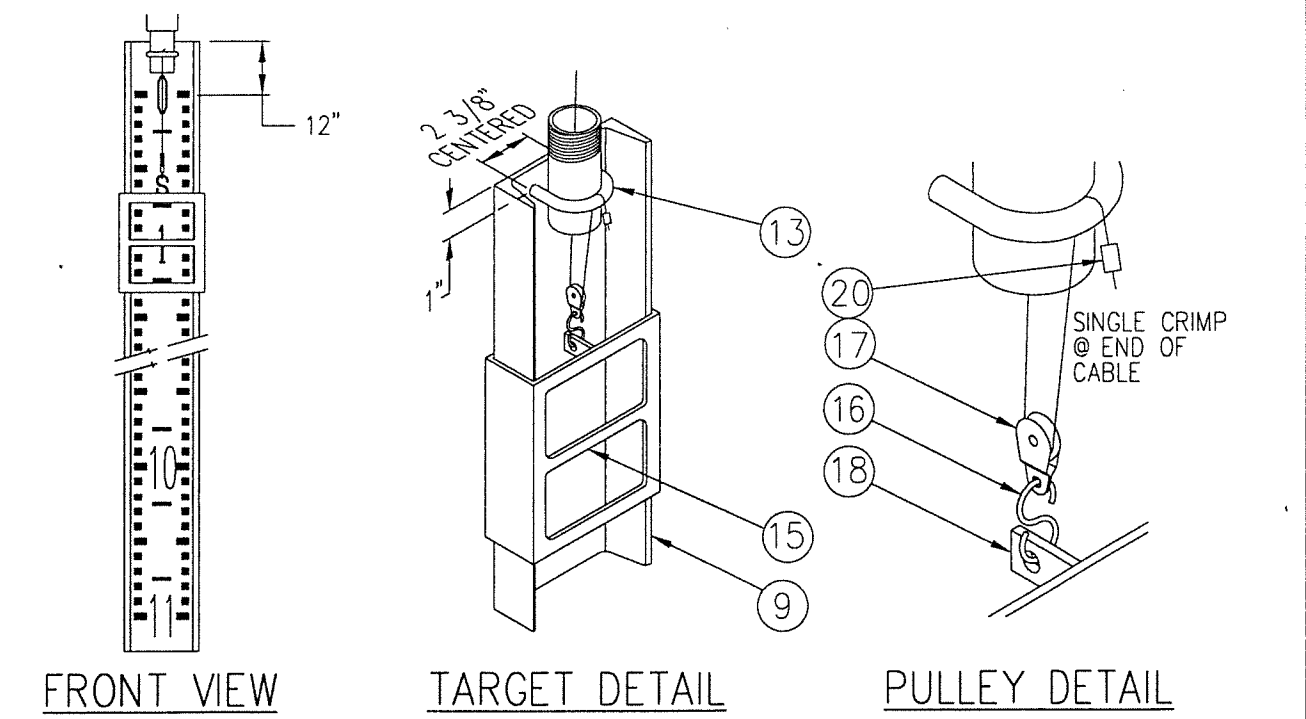
<p>Trusco Tank Inc</p> <p>4388 Santa Fe Road San Luis Obispo, CA 93401 (805) 544-9155</p>	<p>RV</p> <p>Revisions :</p> <p>A</p> <p>B</p> <p>C</p>	<p>37" ROOF VENT</p>		
		<p>COPPER COVE 0.345 MG</p> <p>LAKE TULLOCH, CA</p>		
		<p>Drawn By:</p> <p>JMG</p>	<p>Date:</p> <p>2-11-98</p>	<p>Job No. :</p> <p>622880010</p>
		<p>Dwg. No:</p> <p>001\RV</p>	<p>12 OF 13</p>	



MATERIAL LIST

PcWt	ITEM	DESCRIPTION	Matl	Reqd	PO#
	1	1 1/2" TANK PRODUCTS 90° SHEAVE ELBOW	ALUM.	2	
	2	1 1/2" SCH. 40 PIPE NIPPLE x 9" LG. T.B.E.	ALUM.	1	
	3	1 1/2" x 150# HALF COUPLING	SS	1	
	4	1 1/2" SCH. 40 PIPE NIPPLE x 26" LG. T.B.E.	ALUM.	1	
	5	1 1/2" SCH. 40 PIPE NIPPLE x 4" LG. T.O.E.	ALUM.	1	
	6	3/8" x 1" NC BOLT & NUT & LOCK WASHER	SS	12	
	7	1/4" x 4" FB x 6 1/2" LG. (Per Template C-1-L)	SS	3	
	8	1/4" x 4" FB x 3" LG. w/ (2) holes @ 1/2" Ø @ 2 1/2" centered	SS	3	
	9	6" AMER. STANDARD CHANNEL (2.83# ft.) 7'-0" LG.	ALUM.	1	
	10	5" WIDE ADHESIVE BACKED HALF SCALE TAPE w/ 3" LETTERS Black on White	VINYL	1	
	11	HALF LINK	SS	2	
	12	1 1/4" SCH. 40 PIPE NIPPLE x 6" LG. w/ 9/32" Ø hole	SS	2	
	13	3/8" STD. U-BOLT w/ 4 NUTS FOR 1 1/2" PIPE	SS	1	
	14	1 1/4" x 150# THREADED PIPE CAPT.O.E.	SS	2	
	15	3/16" x 8" FB x 12" LG. break & punch as shown	H.D.G.	1	
	16	1/8" x 1 3/4" S-HOOK	SS	1	
	17	3/4" FIXED EYE WIRE ROPE PULLEY	SS/DELRI	1	
	18	3/16" x 3/4" FB x 1 3/8" LG. w/ 3/8" Ø hole	H.D.G.	1	
	19	3/64" STRANDED FLOAT CABLE LENGTH AS REQ'D	SS	1	
	20	CABLE CRIMP	SS	6	
	21	12 GA. x 15" DIA. x 6 1/2" FLOAT	SS	1	
	22	3/16" x 1" I.D. RING	SS	3	
	23	1/16" STRANDED FLOAT GUIDE WIRE LENGTH AS REQ'D	SS	2	
	24	1/4" x 2" NC BOLT & NUT & LOCK WASHER	SS	2	
	25	1" O.D. x 3 1/2" x .105" EXT'N SPRING E1000-105-3500S	SS	2	

HDG = HOT DIP GALVANIZED ALUM. = ALUMINUM
SS = CORROSION RESISTANT STAINLESS STEEL ALLOY



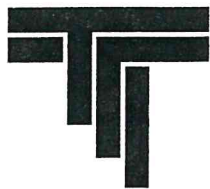
<p>Trusco Tank Inc</p> <p>4388 Santa Fe Road San Luis Obispo, CA 93401 (805) 544-9155</p>	<p>LG</p> <p>Revisions: A B C</p>	<p>HALF SCALE LEVEL GAGE</p>	
		<p>COPPER COVE 0.345 MG LAKE TULLOCH, CA</p>	
		<p>Drawn: JMG</p> <p>File Name: 001\LG</p>	<p>Date: 2-12-98</p>

**CALERVERAS COUNTY WATER DISTRICT
COPPER COVE CLEARWELL RESERVOIR**

70' DIA. x 12' HT.

345,000 GALLONS

CONE ROOF



**TRUSCO
TANK
INC.**

4388 SANTA FE ROAD
SAN LUIS OBISPO, CA 93401
(805) 544-9155 FAX (805) 546-8105



CALCS
Pages 1-10 + APP. A
Date 2-13-98

**Caleveras County Water District
Copper Cove/ Lake Tulloch W.T.P.**

December 5, 1997

Nom. Capacity : 0.345 MG
 Tank Diameter : 70.00'
 Shell Height : 12.00'
 Liquid Height : 11.00'
 Specific Gravity : 1.00
 No. of Rings : 2
 Code Min. Shell T : 0.2500"
 Wind Velocity : 100 mph
 Roof Type : Cone

Design Method : AWWA
 Appendix C Used : no
 Shell Stress Limit : none
 Joint Efficiency : 0.85
 Des. Metal Temp. : n/a
 Roof Live Load : 25 psf
 Seismic Roof Load : 0 psf

AWWA Seismic Zone : 4
 Force Reduction Factor : 3.50
 Soil Profile Type : c
 Site Amplific. Factor : 1.5
 Design Acceleration : D100
 Pressure Stability : Yes
 Vertical Acceleration : n/a

Seismic Acceleration
 Design Values
 Ai = 36.00%g
 Ac = 6.45%g
 Av = 0.00%g

SHELL DESIGN SUMMARY

Ring Number	Ring Height	Material Type	Thickness Used	Specified Minimum Thickness	Corrosion Allow. for Code Min	REQUIRED THICKNESSES FOR DESIGN CRITERIA (excluding C.A.)				Seismic OTM Compress.	Shell Wind Loads	Corrosion Allowance for Design Conditions	Governing Criteria	Ring Weight
						HOOP STRESSES								
						Static Std Method	Horizontal EQ Loads	Vertical EQ Loads	Combined EQ Loads					
2	49.00	A36	0.25000"	0.00000	0.00000	0.04402	0.06753	n/a	n/a	0.03584	0.11042	0.00000	Code Min	9,166
1	95.00	A36	0.25000"	0.00000	0.00000	0.15702	0.16993	n/a	n/a	0.06188	0.12866	0.00000	Code Min	17,772

TOTAL SHELL WEIGHT: 26,938
Height to C.G. of Shell : 6.00'

BILL OF MATERIALS

Description	QTY	t	Width	Length	Material Spec	Piece Weight	Total Weight
BOTTOM PLATES	14.7	1/4"	x 72"	x 480"	A36	2,450	36,015
ANNULAR RING PLATES	16.4	1/4"	x 31.50"	x 160"	A36	358	5,869
ROOF PLATES	17.4	3/16"	x 72"	x 480"	A36	1,838	31,981

TOTAL PLATE REQUIREMENTS	
Bottom, Annular Ring, and Roof	37 tons
Shell Plate	14 tons
TOTAL	51 tons

SHELL PLATES	Ring No.	QTY	t	Width	Length	Material Spec	Piece Weight	Total Weight
	2	6	0.25000	50.00"	442"	A36	1,567	9,402
	1	6	0.25000	96.00"	442"	A36	3,009	18,054

Caleveras County Water District
Copper Cove/ Lake Tulloch W.T.P.
December 5, 1997

HYDROSTATIC DESIGN
Per AWWA Section 3.7

Factored Hoop Stress Force = $214.12 = 2.6 \cdot D \cdot G / JE$
= Hydrostatic Hoop Force in Lbs-per-inch of shell Ht per ft of water Depth

Nom. Capacity : 0.35 MG
Tank Dia : 70.00'
Shell Ht : 12.00'
Liquid Ht : 11.00'
Spec. Grav : 1.00
Appendix C Used : no
Joint Efficiency : 0.85
Des. Metal Temp. : 45 °F
Corrosion Allowance : 0.0000"

HYDROSTATIC DESIGN

Ring No.	Ring HT	Material	Allowable Stress	Design Depth	Design Pt Elevation	Hoop Force at Des. Pt.	Min t Req'd (without C.A.)	Thickness Used	Thickness Status
2	49.00	A36	15,000	3.08	7.92	660.2	0.04402	0.25000"	o.k.
1	95.00	A36	15,000	11.00	0.00	2,355.3	0.15702	0.25000"	o.k.

**Caleveras County Water District
Copper Cove/ Lake Tulloch W.T.P.
December 5, 1997**

Nom. Capacity : 0.35 MG
 Tank Dia : 70.00'
 Shell Ht : 12.00'
 Wind Speed : 100 mph
 Wind Load : 18 psf
 Corrosion Allowance : 0.0000"

WIND DESIGN
 Per AWWA Section 3.5

Wind Load Design Factor = 0.0009922

WIND DESIGN

Ring No.	Ring Ht	Cumulative Ht (top down)		Req'd Ave. t this Ht	Min. t Req'd (without C.A.)	Thickness Used	Corroded Thickness	Ave. t This Ht (corroded)	Thickness Status
		Inches	Feet						
2	49.00	49.00	4.08	0.11042	0.11042	0.25000"	0.25000"	0.25000	o.k.
1	95.00	144.00	12.00	0.16995	0.12866	0.25000"	0.25000"	0.25000	o.k.

**Caleveras County Water District
Copper Cove/ Lake Tulloch W.T.P.**

December 5, 1997

Nom. Capacity : 0.35 MG
 Tank Dia : 70.00' Rad = 35.00'
 Shell Ht : 12.00'
 Liquid Ht : 11.00'
 Spec. Grav : 1.00
 Appendix C Used : no
 Joint Efficiency : 0.85
 Des. Metal Temp. : 45 °F
 Corr. Allowance : 0.0000"

SEISMIC DESIGN - Horizontal Acceleration

Impulsive Horiz. Acceleration : 36.0%g
 Convective Horiz. Acceleration : 6.5%g
 Seismic Load Scaling Factor : 1.00

Design Point Method : AWWA

D / H Ratio = 6.36 0.75 • D = 52.50

AWWA D100-96 - DESIGN FOR SEISMIC HORIZONTAL ACCELERATION

Ring No.	Ring HT	Mat'l	Seismic Allowable	Des. Pt. Depth	Des. Pt. Elev.	P static (psi)	Pi (psi)	Pc (psi)	Phd (psi)	P total (lbs/in)	Min t Req'd (without C.A.)	Thickness Used	Seismic Stress	Thickness Status
2	49.00	A36	20,000	3.08	7.92	1.336	0.716	0.681	1.397	1,147.9	0.06753	0.25000	4,592	o.k.
1	95.00	A36	20,000	11.00	0.00	4.767	1.485	0.626	2.111	2,888.8	0.16993	0.25000	11,555	o.k.

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**Caleveras County Water District
Copper Cove/ Lake Tulloch W.T.P.**

December 5, 1997

SEISMIC OVERTURNING DESIGN

TANK STRUCTURE AND WATER MASS DATA

D	= 70.00'	WT	= (3.14159 / 4) (70.00') (70.00') (11.00') (62.4) (1.00) =	2,641,577	lbs.
R	= 35.00'	W1	= (0.18145) x WT =	479,306	lbs
HL	= 11.00'	X1	= (0.37500) x HL =	4.13	ft
D/HL	= 6.3636	W2	= (0.75388) x WT =	1,991,424	lbs
R/HL	= 3.1818	X2	= (0.51348) x HL =	5.65	ft
HL/R	= 0.3143	Ws	= Total Shell Weight =	26,938	lbs
		Xs	= Center of Gravity =	6.00	ft
kp	= 0.8005	Wr	= Wpl + Wst =	48,517	lbs
Tw	= 6.6971		Wpl = 31,897 lbs	Wst = 16,620	lbs
C1	= 0.01672	Ht	= Top of Shell Height =	12.00	ft

SEISMIC DESIGN COEFFICIENTS - ZONE 4

Z = 0.40	Zone Coefficient
I = 1.25	Importance Factor - Sole supply or fire protection
S = 1.50	Site Amplification Factor - Soil Profile type C or type not specified
Rw = 3.5	Force reduction factor - unanchored tank

$$A_i = (0.14) \cdot \frac{18 \cdot Z \cdot I}{R_w}$$

$$A_c = \frac{18 \cdot Z \cdot I \cdot C_1 \cdot S}{R_w}$$

LATERAL FORCE DESIGN VALUES

From Section 13.3.3.2.3

Ai = Impulsive acceleration =	36.00%g = 0.3600	Ai applies to the tank structure and fixed water mass
Ac = Convective acceleration =	6.45%g = 0.0645	Ac applies to the oscillating water mass

SEISMIC BASE SHEAR

V = Ai • (Ws + Wr + W1) + Ac • (W2) = 328,161 lbs = 13.14%g average design acceleration

SEISMIC OVERTURNING

M = Ai • (WsXs + WrHt + W1 X1) + Ac • (W2 X2) = 1,706,136 ft-lbs

SEISMIC RESISTANCE - HOLDDOWN FORCES

Tank Bottom Plate :	t = 0.2500"	Yield Strength, Fy = 36,000 psi	for A36 Steel	L max = 3.0892'
Annular Ring Plate :	Not Required			

L used = 0.000'	Total Width = 0.00"	wL used = 0.0 lbs/ft	corresponding to L used
t req'd = 0.0000"	L used < 1.28 H D G = 985.6 lbs/ft	O.K. per AWWA 13.3.3.3.1	

wt = $\frac{W'}{3.1415 \cdot D}$ = 239.1 lbs/ft W' = Ws + SSRW = 52,580 lbs
 SSRW = Shell Supported Roof Weight = 25,642 lbs

STABILITY CHECK

Equation (13-13) $\frac{M}{D^2 (w_t + w_L)}$ = 1.46 <= 1.54 therefore the tank is stable
 > 0.785 therefore uplift occurs. Use Equation (13-16) for shell compression.

SHELL COMPRESSION

See sheet titled "Seismic Shell Compression Stresses"

**C. / eras County Water District
Copper Cove/ Lake Tulloch W.T.P.
December 5, 1997**

Nom. Capacity : 0.35 MG
 Tank Dia : 70.00' = 420.00" radius
 Shell Ht : 12.00'
 Liquid Ht : 11.00'
 Spec. Grav : 1.00
 Corr Allowance : 0.0000"

SEISMIC SHELL COMPRESSION STRESSES

Load Cases	Ai	Ac	Av
Case 1	0.3600g	0.0645g	0.0000g
Ws = 26,938		Xs = 6.00	
Wr = 48,517		Ht = 12.00	
W1 = 479,306		X1 = 4.13	
W2 = 1,991,424		X2 = 5.65	

Allowable Seismic Compressive Stress by : AWWA D100-96
 Allowable Shell Stresses Determined for an : Unanchored Tank
 Allowable Increase for Pressure Stability : WILL Be Considered
LOAD CAS # 1

SEISMIC SHELL COMPRESSION STRESSES

Ring No.	Ring t	Ring HT	Wt of Rings Above, Wsi	Btm Elev of Shell Ring, hi	CG of Rings Above, Xsi	Moments due to Loads (ft-lbs)				Total Mom
						Ai·W1·(X1-hi)	Ac·W2·(X2-hi)	Ai·Wsi·(Xsi-hi)	Ai·Wr·(Ht-hi)	
2	0.25000	49.00	9,166	7.92'	9.96'	0	0	6,743	71,320	78,062
1	0.25000	95.00	26,938	0.00'	6.00'	712,632	725,725	58,186	209,593	1,706,136

Ring No.	Ring t	Minimum Req'd T	Ring WT	Shell & Roof WT, W _{ti}	EQN (13-16) σ _c , psi (corroded)	ALLOWABLE STRESSES				Thickness Status	
						FL Case #	t _i / R (corroded)	EQN (13-28) Δσ _{cr}	Table 9 σ _a		EQN (13-27) σ _e
2	0.25000"	0.03584"	9,166	262	94	1	0.0005952	1,726	1,060	2,564	o.k.
1	0.25000"	0.06188"	17,772	343	262	1	0.0005952	2,969	1,060	3,393	o.k.

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Copper Cove / Lake Tulloch W.T.P.
December 5, 1997

RAFTER DESIGN

Tank Diameter 70.00'
Roof Type cone

No. of Rafters 36
Rafter Spacing 6.11'
Roof Plate Weight 7.66 psf
Roof Live Load 25 psf
Center Support 72" dia
Span Length 32.00'

Roof Friction Provides Stability yes

SEISMIC DESIGN

36.00%g Horizontal Acceleration
0.00%g Vertical Acceleration
25 psf Live Load Included

Use Rafter Ties @ 1/2 distance between shell & center support

Try Wide Flange 10WF12 Sx=10.90

Dead + Live Loads (per Appendix B)

Wo	199.5 #/ft	R1 =	2,411 lbs
Wi	17.1 #/ft	R2 =	1,438 lbs
Wr	12.0 #/ft		
a	2.850	L =	32.00'
b	-211.5		
c	2,411.0	Xo =	14.07'
Mmax	15,636	Fb =	21,600 psi
Sreq'd	8.69		

Seismic Loads

Wo =	199.5 #/ft	R1 =	2,411 lbs
Wi =	17.1 #/ft	R2 =	1,438 lbs
Wr =	12.0 #/ft		
a =	2.850		
b =	-211.5		
c =	2,411.0	Xo =	14.07'
Mx =	15,636	Sreq'd =	6.51
My =	138	Sreq'd =	0.05
		fbx/Fbx + fby/Fby =	0.640

Total Center Support Load = 52,703 lbs

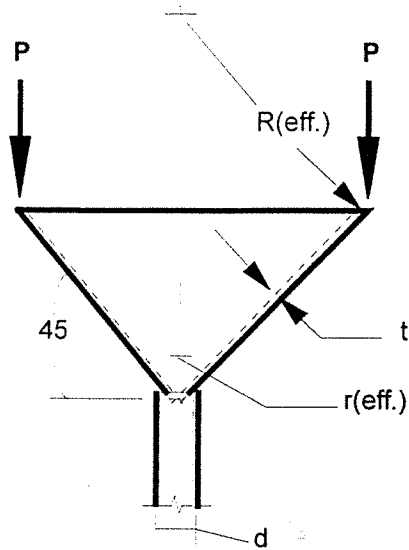
Order (36) 10WF12 x 35'

Dead Loads Only

Wo	46.8 #/ft	R1 =	712 lbs
Wi	4.0 #/ft	R2 =	484 lbs
Wr	12.0 #/ft		
a	0.668		
b	-58.8		
c	712.3	Xo =	14.51'
Mmax	4,829		

Total Center Support Load = 18,355 lbs

Shell Supported Roof Weight = 25,642 lbs (dead weight)
Roof Structure Dead Weight = 16,620 lbs (dead weight, incl. ctr. supt.)

CENTER CONE DESIGN**72 in. DIAMETER** **$P = \text{CENTER SUPPORT LOAD} = 52703$** **$t = \text{CONE THICKNESS} = 0.25$** **$d = \text{INSIDE DIAMETER OF COLUMN} = 20$**

$$R(\text{eff.}) = \frac{\text{TOP CONE DIA.}}{2 \times \cos 45} = 1.9116882$$

$$r(\text{eff.}) = \frac{\text{COLUMN DIA.}}{2 \times \cos 45} = 1.1421356$$

Allowable stresses from AWWA table 8

$$\frac{t}{R(\text{eff.})} = 0.0049 \text{ herefore } F_a = 8213.41723$$

$$f_a = \frac{P}{2(3.1416) R(\text{eff.}) t} = 9.019039 < F_a \text{ therefore OK}$$

$$\frac{t}{r(\text{eff.})} = 0.0177 \text{ 15 therefore } F_a = 15000$$

$$f_a = \frac{P}{2(3.1416) r(\text{eff.}) t} = 72.46854 < F_a \text{ therefore OK}$$

USE 0.25 PLATE CONE x 45TOTAL WEIGHT = 745.304
(including cover plate)

COLUMN LOAD = 53448.3037

Copper Cove / Lake Tulloch W.T.P.

December 5, 1997

COLUMN DESIGN

CENTER COLUMN

$P = 53.448$ kips
 $L = 12.00 + 0.5 [70.00 - 6.00] (1.00/12) - 9.87/12 - (6.00-.5)/2 = 11.09$
 $I = 12 (L) = 133.1''$
 $K = 1.00$ AISC C-C2.1 Case (d)

$$\left[\frac{K I}{F} \right]_{\max} = 175 \quad \text{therefore } r_{\min} = 0.76''$$

TRY 5" STD pipe A53-B Steel $F_y = 35$ ksi $C_c = 127.9$
 $d_c = 5.563$ in $r = 1.878$ in
 $t = 0.258$ in $A = 3.784$ sq in
 $w = 14.63$ #/ft $S = 5.45$ cu in

$$\left[\frac{K I}{F} \right] = 70.87 < C_c, \text{ therefore AISC (E2-1) applies}$$

$$< 175, \text{ therefore OK}$$

$F_a = 15.987$ ksi AISC (E2-1)
 $P_a = F_a (A) = 60.495$ kips $> P$, therefore OK

5" STD Pipe Column is OK for dead and live loads
 Base Plate Load = $53.448 + (11.09) (14.63/1000) = 53.61$ kips

Copper Cove / Lake Tulloch W.T.P.

December 5, 1997

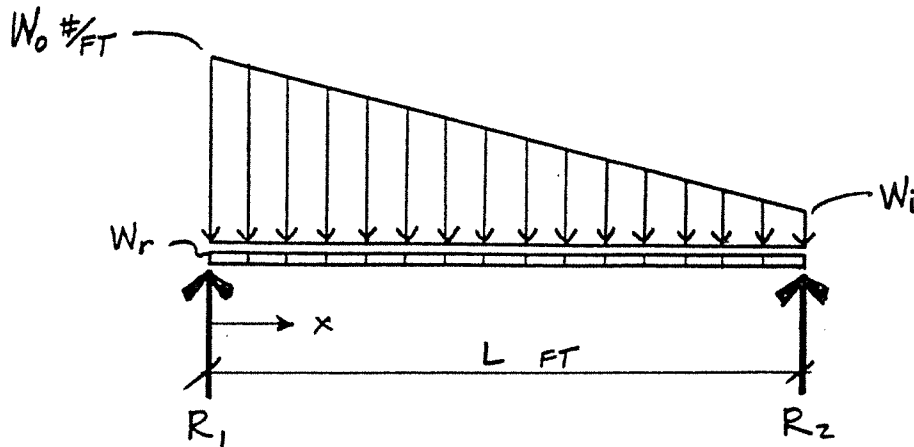
BASE PLATE DESIGN

(Design per AISC 3-106)

CENTER COLUMN BASE PLATE

P = 53,610 lbs Assembly weight = 955 lbs
 Fp = 2,314 psf A req'd = 3336.72 57.77" square
 Fb = 24,000 psi
 Dc = 5.563" Effective Square = 4.4504
 Bottom Plate Used no td = 1 desired design thickness

Plate No.	Area	Width	Length	n	fp	M	T req'd	Actual Dimensions			Weight
								t	Width	Length	
Plate 1	383.0	19.57	19.57	7.56	139.97	4,000.00	1.000"	1.0000"	20.000"	20.000"	113.4
Plate 2	3,337.4	57.77	57.77	18.89	16.06	2,863.85	0.846"	0.8750"	58.250"	58.250"	841.9

RAFTER DESIGN

$$R_1 = (2W_0 + W_i + 3W_r) \frac{L}{6} \quad (\text{LBS})$$

$$R_2 = (W_0 + 2W_i + 3W_r) \frac{L}{6} \quad (\text{LBS})$$

$$V_x = R_1 - (W_0 + W_r)x + \frac{(W_0 - W_i)}{2L} x^2 \quad (\text{LBS})$$

$$M_x = R_1 x - \frac{(W_0 + W_r)}{2} x^2 + \frac{(W_0 - W_i)}{6L} x^3 \quad (\text{FT-LBS})$$

$$V = V_{\max} = R_1 \quad @ \quad x = 0$$

$$M = M_{\max} \quad \text{when} \quad V_x = 0$$

$$V_x = 0 \quad @ \quad x = x_0$$

$$a = \frac{(W_0 - W_i)}{2L}$$

$$b = -(W_0 + W_r)$$

$$c = R_1$$

$$x_0 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

$$M_{\max} = R_1 x_0 - \frac{(W_0 + W_r)}{2} x_0^2 + \frac{(W_0 - W_i)}{6L} x_0^3$$

$$S_{\text{req'd}} = \frac{12 M_{\max}}{1000 F_b} \quad (\text{in}^3)$$