

**CITY OF TURLOCK
STANISLAUS COUNTY, CALIFORNIA**



**ADDENDUM NO. 3
TO
CONTRACT DOCUMENTS FOR THE CONSTRUCTION OF THE
TURLOCK REGIONAL WATER QUALITY CONTROL FACILITY
CHEMICAL SYSTEM UPGRADES PROJECT AT RWQCF
CITY PROJECT NO. 20-032**

May 07, 2021



ADDENDUM NO. 3

Turlock Regional Water Quality Control Facility CHEMICAL SYSTEM UPGRADES PROJECT AT RWQCF

Project No. 20-032

City of Turlock, California

THIS ADDENDUM IS NOW INCORPORATED AS A PART OF THE CONTRACT DOCUMENTS AND MODIFIES THE ORIGINAL PLANS AND SPECIFICATIONS AS NOTED HEREIN. BY SUBMISSION OF A BID FOR THIS PROJECT, THE BIDDER IS ACKNOWLEDGING THAT THE BIDDER HAS CONFIRMED THAT HE OR SHE HAS RECEIVED ALL ADDENDA ISSUED FOR THAT PROJECT AND HAS INCLUDED COSTS FOR SUCH IN THE BID SUBMITTED.

While we believe the plans and specifications to be accurate, they are disseminated in accordance with law and are to be relied upon only at user's risk. The user should be advised to contact the City for updates on any material they receive to ensure that they have the latest/most current information.

It shall be the responsibility of the prime bidder to inform any affected sub bidder of the content of this Addendum.

ADDENDUM NO. 1 - CLARIFICATION

1. DRAWINGS VOL. 3, Items No. 2 & 3

A. The drawing numbers were incorrectly listed, Sheet Numbers were correct. Swap DFM01 and SHSM01 so that it now reads:

"2. Sheet Number 34 of 97, Drawing No. SHSM01

A. Add to Keynote 15 on this drawing. "Add 14 gauge sheet metal that is coated with high solids epoxy/polyurethane per Section 09960 to close hole that is located at the top center of the doors where the existing monorail beam was located. Attach to both sides of the doors, and attach with screws @4-inches on center.

3. Sheet Number 48 of 97, Drawing No. DFM01

A. Delete Key Note 6 from this drawing."

SPECIFICATIONS (VOLUME 1 OF 3 – DIVISIONS 0 THROUGH 9)

2. DOCUMENT 00200 – INSTRUCTIONS TO BIDDERS

A. Replace Document 00200 in its entirety with the attached.

3. DOCUMENT 00410 – BID FORM

A. Replace Document 00410 in its entirety with the attached.

4. DOCUMENT 00800 – SUPPLEMENTARY CONDITIONS

A. Replace Document 00800 in its entirety with the attached.

5. DOCUMENT 01460 – CONTRACTOR QUALITY CONTROL PLAN

A. Replace Document 01460 in its entirety with the attached.

6. DOCUMENT 01756 – COMMISSIONING

A. Replace Document 01756 in its entirety with the attached.

SPECIFICATIONS (VOLUME 2 OF 3 – DIVISIONS 09 THROUGH 17)

1. DOCUMENT 13206A – FIBERGLASS REINFORCED PLASTIC ABOVEGROUND STORAGE TANKS

A. Replace Document 13206A in its entirety with the attached.

2. DOCUMENT 17950 – COMMISSIONING FOR INSTRUMENTATION AND CONTROLS

A. Replace Document 17950 in its entirety with the attached.

DRAWINGS (VOLUME 3 OF 3)

1. Sheet Number 22 of 97, Drawing No. 00YP02

A. Replace the drawing with the attached drawing.

2. Sheet Number 34 of 97, Drawing No. SHSM01

A. Replace the drawing with the attached drawing.

ATTACHMENTS:

1. DOCUMENT 00200 – INSTRUCTIONS TO BIDDERS
 2. DOCUMENT 00410 – BID FORM
 3. DOCUMENT 00800 – SUPPLEMENTARY CONDITIONS
 4. DOCUMENT 01460 – CONTRACTOR QUALITY CONTROL PLAN
 5. DOCUMENT 01756 – COMMISSIONING
 6. DOCUMENT 13206A – FIBERGLASS REINFORCED PLASTIC ABOVEGROUND STORAGE TANKS
 7. DOCUMENT 17950 – COMMISSIONING FOR INSTRUMENTATION AND CONTROLS
 8. Sheet Number 22 of 97, Drawing No. 00YP02
 9. Sheet Number 34 of 97, Drawing No. SHSM01
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This Addendum No. 3 shall become part of the Contract and all provisions of the Contract shall apply thereto. This addendum has been prepared by or under, the direction of the following Registered Engineers:



05/07/2021

Ryan Sellman, P.E. California Civil C-76650

CIVIL ENGINEERING

Carollo Engineers, Inc., 2795 Mitchell Drive

Walnut Creek, CA 94598, Telephone: 925-932-1710

DOCUMENT 00200

INSTRUCTIONS TO BIDDERS

ARTICLE 1 - DEFINED TERMS

- 1.01 Terms used in this Document will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in this Document have the meanings indicated below:
- A. Issuing Office - The office from which the Bidding Documents are to be issued.
 - B. Successful Bidder - The lowest responsible Bidder submitting a responsive Bid to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.
 - C. Responsive Bidder - Means a Bidder who has submitted a Bid which conforms in all material respects to the Bidding Documents.
 - D. Responsible Bidder - Means a Bidder who has the capacity and capability in all respects to perform fully the contract requirements and who has the integrity and reliability to assure good faith performance.

ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

- 2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office in the number and format stated in the advertisement or invitation to bid.
- 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 authorize or confer a license for any other use.

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

- 3.01 More than 1 Bid from an individual, firm, partnership, corporation, or association under the same or different names will not be considered. If the Owner believes that any Bidder submits more than 1 Bid for the Work contemplated, all Bids in which such Bidder is interested will be rejected. If the Owner believes that collusion exists among the Bidders, all Bids will be rejected.
- 3.02 Provide proof of registration with the California Department of Industrial Relations (DIR) in the form of a PDF extract from DIR Public Works Registration website.

- 3.03 Pursuant to Section 4105, California Public Contract Code, Bidder may not circumvent the requirement to list subcontractors by the device of listing 1 subcontractor, who in turn sublets portions constituting the majority of the work covered by the contract.
- 3.04 No Contractor or Subcontractor may submit a Bid or perform Work on this Project who is found in violation of California Labor Code Division 2, Part 7, Chapter 1 by the Labor Commissioner. Subcontractors who have been disbarred may not receive public funds pursuant to California Public Contract Code §6109.
- 3.05 To demonstrate Bidder's qualifications to perform the Work, Bidder shall submit written evidence establishing its qualifications such as financial data, previous experience, present commitments by submitting Document 00451C - Construction Contractor's Qualification Statement For Engineered Construction.
- 3.06 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.07 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.08 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 - SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

4.01 Site and Other Areas:

- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

4.02 Existing Site Conditions:

- A. Subsurface and Physical Conditions; Hazardous Environmental Conditions:
 - 1. The Supplementary Conditions identify:
 - a. Those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site.
 - b. Those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
 - c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
 - d. Technical Data contained in such reports and drawings.
 - 2. Owner will make copies of reports and drawings referenced above available at the cost of reproduction to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any

Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

- B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.
- C. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 5.06 of the General Conditions.

4.03 Site Visit and Testing by Bidders:

- A. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- B. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.
- C. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- D. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

4.04 Owner's Safety Program:

- A. Site visits and work at the Site may be governed by an Owner safety program. As the General Conditions indicate, if an Owner safety program exists, it will be noted in the Supplementary Conditions.

4.05 Other Work at the Site:

- A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 5 - BIDDER'S REPRESENTATIONS

5.01 It is the responsibility of each Bidder before submitting a Bid to:

- A. Examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents.
- B. Visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Carefully study all:
 - 1. Reports of explorations and tests of subsurface conditions at or 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.
 - 2. Reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawing.
- E. Consider the information known to Bidder itself; 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.
 - 3. Bidder's safety precautions and programs.
- F. Agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid 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 bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

- G. Become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. 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.
- I. Determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. Agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 6 - PRE-BID CONFERENCE

- 6.01 A mandatory virtual pre-Bid conference and site walk will be held at the times and locations stated in the invitation or advertisement to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are required to attend and participate in the conference and site walk. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 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 delivered to all parties recorded as having received the Bidding Documents. Questions received less than 5 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, supplement, or change the Bidding Documents.

ARTICLE 8 - BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 10 percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check, bank money order, or Document 00432 - Bid Bond issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and 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 released:

- A. 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 consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults.

8.03 The Bid security of other Bidders that 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 Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released 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 - DELAY DAMAGES

10.01 Provisions for delay damages for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in Document 00520 - Agreement.

ARTICLE 11 - SUBSTITUTE AND "OR-EQUAL" ITEMS

11.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or-equal" items:

- A. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.

11.02 In accordance with Section 3400 of the California Public Contract Code, the successful Bidder is permitted a period of 30 days after the award of contract for submission of data substantiating a request for a substitution of an "or equal" item.

11.03 Prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as amended by Addenda:

- A. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

ARTICLE 12 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 12.01 A Bidder shall be prepared to retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of the Work if required by the Bidding Documents (most commonly in the Specifications) to do so. If a prospective Bidder objects to retaining any such Subcontractor, Supplier, or other individual or entity, and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.
- 12.02 Subsequent to the submittal of the Bid, Owner may not require the Successful Bidder or Contractor to retain any Subcontractor, Supplier, or other individual or entity against which Contractor has reasonable objection.
- 12.03 Pursuant to California Public Contract Code §4106, Document 00434 - Proposed Subcontractors List shall list the Subcontractors or Suppliers proposed who will perform work or labor or render services in an amount in excess of 1/2 of 1 percent of Contractor's total bid. The apparent Successful Bidder, and any other Bidder pursuant to California Public Contract Code §4104 so requested, shall within twenty-four hours after Bid opening, submit to Owner any additional information requested by Owner in Document 00434 - Proposed Subcontractors Form, other than: 1) the name, 2) the location of the business, 3) the California contractor license number, and 4) the Department of Industrial Relations registration number of each proposed subcontractor. The information in items 1) through 4) above must be set forth on Document 00434 - Proposed Subcontractors List, and attached to Document 00410 - Bid Form.
- A. If requested by Owner, such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, or other individual or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 12.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.06 of the General Conditions.

ARTICLE 13 - PREPARATION OF BID

- 13.01 Document 00410 - Bid Form is included with the Bidding Documents.
- A. Complete each blank on Document 00410 - Bid Form in ink and the Bid Form signed in ink.

- B. The person signing the Bid Form must initial in ink erasures or alterations.
 - C. Indicate Bid Price for each section, Bid item, alternative, adjustment unit price item, and unit price item listed therein.
 - D. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."
- 13.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.
- 13.03 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.
- 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 shown.
- 13.05 A Bid by an individual shall show the Bidder's name and official address.
- 13.06 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on Document 00410 - Bid Form. The official address of the joint venture shall be shown.
- 13.07 All names shall be printed in ink below the signatures.
- 13.08 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on Document 00410 - Bid Form.
- 13.09 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.10 The Bid shall contain evidence of Bidder's authority and qualification to do business in California, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on Document 00410 - Bid Form. Questions concerning a contractor may be referred to the Registrar, Contractors' State License Board, P.O. Box 26000, Sacramento, CA 95826.
- 13.11 Pursuant to the provisions of Section 6707, California Labor Code, Bids shall contain, as a Bid item, the cost for adequate sheeting, shoring and bracing, or equivalent method, for the protection of life and limb in trenches and open excavation, which shall conform to applicable safety orders.
- 13.12 Pursuant to the provisions of Section 7106 of the California Public Contract Code, Bidders shall submit with their Bids, a Non-Collusion Affidavit, Document 00456 - Non-Collusion Affidavit.

~~13.13 Pursuant to Section 7105, California Public Contract Code, Bidder shall indicate, in the appropriate space provided in Document 00410 - Bid Forms, the cost of insurance~~

~~premiums for earthquake and tidal wave to indemnify Owner for damage to the Work caused by earthquake or tidal wave in an amount of at least 50 percent of the contract price. The determination of whether to require earthquake and tidal wave insurance will be made by Owner prior to award of contract.~~^{AD3}

ARTICLE 14 - BASIS OF BID

14.01 Base Bid with Alternates:

- A. Bidders shall submit a Bid on a lump sum basis for the base Bid and include a separate price for each alternate described in the Bidding Documents and as provided for in Document 00410 - Bid Form. The price for each alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate.

14.02 Unit Price:

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the unit price section of Document 00410 - Bid Form.
- B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity" (which Owner or its representative has set forth in the Bid Form) for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. The quantities of work or material stated in unit price items of the Bid are supplied only to give an indication of the general scope of the Work; the Owner does not expressly or by implication agree that the actual amount of work or material will correspond therewith. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

14.03 Allowances:

- A. For cash allowances the Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 13.02.B of the General Conditions.

14.04 Evaluation of bids containing alternates:

- A. In the evaluation of Bids, the lowest Bid shall be the lowest Bid price on the Base Bid without consideration of the Bid Alternates additive or deductive items.

ARTICLE 15 - SUBMITTAL OF BID

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid

Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 7 of the Bid Form.

15.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the Document 00111 - Advertisement for Bids and shall be enclosed in a plainly marked package 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.

A. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to City of Turlock Engineering Division, 156 S. Broadway, Suite 150, Turlock, CA 95380.

15.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 16 - MODIFICATION AND WITHDRAWAL OF BID

16.01 A Bid may be withdrawn by an appropriate document duly executed in the same 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. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.

16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.

16.03 Unauthorized conditions, limitations, or modifications attached to the Bid will render it informal and may cause its rejection as being non-responsive. The completed Document 00410 - Bid Forms shall be without interlineations, alterations, or erasures. Any changes or corrections shall be initialed by the Bidder. Alternative Bids will not be considered unless expressly called for in Document 00111 - Invitation to Bid. Oral, telegraphic, faxed or telephone Bids or modifications will not be considered.

16.04 In accordance with Sections 5101 and 5103, California Public Contract Code, withdrawal of Bids may be permitted for mistakes made in filling out the Bid but will not be permitted for mistakes resulting from errors in judgment or carelessness in inspecting the site of the work or in reading the drawings, specifications, and other Contracts Documents.

16.05 In the event Bidder alleges that a clerical error has been made in the list of subcontractors, the procedures for substitution shall be provided in accordance with Section 4107.5, California Public Contract Code.

ARTICLE 17 - OPENING OF BIDS

17.01 Bids will be opened at the time and place indicated in Document 00111 - Advertisement for Bids and, unless obviously non-responsive, read aloud publicly. An abstract of the

amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

- 17.02 The 3 lowest Bidders shall submit within 72 hours of the Bid opening, 1 copy of all documentary information generated in preparation of Bid prices for this Project, pursuant to Document 00823 - Escrow Bid Documents.

ARTICLE 18 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 All Bids will remain subject to acceptance for the period of time stated in Document 00410 - Bid Form, but Owner may, in 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 will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, then the Owner will reject the Bid as nonresponsive; provided that Owner also reserves the right to waive all minor informalities not involving price, time, or changes in the Work. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder.
- 19.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the lowest responsive Bid.
- 19.03 More than 1 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 1 Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.
- 19.04 Evaluation of Bids:
- A. 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 Document 00410 - Bid Form or prior to Document 00510 - Notice of Award.
 - B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
- 19.05 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

- 19.06 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.
- 19.07 If the Contract is to be awarded, Owner will award the Contract to the Bidder whose Bid is in the best interests of the Project.

ARTICLE 20 - BONDS 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 Agreement (executed by Successful Bidder) to Owner, it shall be accompanied by required bonds and insurance documentation.

ARTICLE 21 - SIGNING OF AGREEMENT

- 21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement (and any bonds and insurance documentation required to be delivered by the Contract Documents) to Owner. Within ten days thereafter, Owner shall deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 22 - SALES AND USE TAXES

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

ARTICLE 23 - CONTRACTS TO BE ASSIGNED

Not Used.

ARTICLE 24 - RETAINAGE

- 24.01 Provisions concerning Contractor's rights to deposit securities in lieu of retainage are set forth in Document 00520 - Agreement.

ARTICLE 25 - PARTNERING

Not Used.

ARTICLE 26 - LAWS AND REGULATIONS

- 26.01 Prevailing Wage Rates: Pursuant to Section 1770 et seq., California Labor Code, the successful Bidder shall pay not less than the prevailing rate of per diem wages as determined by the Director of California Department of Industrial Relations. A copy of such prevailing rate is on file at the offices of the City Clerk, Turlock, California where copy will be made available for examination during business hours to any party on request:
- A. Pursuant to California SB854, Contractor and subcontractor must submit certified payroll records (CPRs) to the Labor Commissioner.
- 26.02 Contractor's License Classification: In accordance with the provisions of California Business and Professions Code, Section 7028, Owner has determined that Contractor shall possess a valid Class A Contractor License at the time of Bid and for the duration of the contract. Failure to possess the specified license shall render the Bid as non-responsive and shall act as a bar to award of the contract to any Bidder not possessing said license at the time of Bid opening.
- 26.03 The Contractors' State License Board may be contacted at 9821 Business Park Drive, Sacramento, CA 95827; P.O. Box 26000, Sacramento, CA 95826; (800) 321-2752.
- 26.04 In accordance with California Civil Code, Section 3247, a payment bond is required.
- 26.05 In accordance with California Public Contract Code, Section 22300, Contractor may substitute securities in place of retained funds, as provided in Document 0062B - Escrow Agreement for Security Deposits in Lieu of Retention.

ARTICLE 27 - PREVAILING WAGE RATES

- 27.01 Pursuant to Section 1770 et. seq., California Labor Code, the successful Bidder shall pay not less than the prevailing rate of per diem wages as determined by the Director of California Department of Industrial Relations.
- 27.02 A copy of such prevailing rate is on file at the Owner's offices:
- A. A copy will be made available for examination during business hours to any party on request.
- 27.03 The project is subject to compliance monitoring and enforcement by the California Department of Industrial Relations.

ARTICLE 28 - NOVEL CORONAVIRUS (COVID-19) SAFETY REQUIREMENTS

- 28.01 Given the coronavirus impacts to society in 2020 preceding the bidding of this Project, as well as the prospective performance of the Work, it is paramount that each Bidder recognize that the means and methods of construction preceding the onset of the COVID-19 pandemic, and the ways of doing business, have been, at least for the foreseeable future, materially impacted and changed. These impacts and changes concern and relate to social distancing, ability to have commerce perform at the pace it previously performed, how labor can interact, the implementation of increased safety

measures, and a myriad of other impacts to construction operations. Heightened and increased measures to protect persons from illness, and the adoption and implementation of many new and increased practices, will make the performance of construction work different and more challenging.

- 28.02 It is the intent of the City, by including the previous paragraph, as well as Novel Coronavirus (COVID-19) Safety Requirements, to alert all Bidders for all aspects of this Project, that they are to include in their Bids all known and reasonably estimated costs and impacts to the ability to obtain goods and materials required, as well as labor to perform the Work. Further, all costs for all of these and other aspects of the project, including supervision, temporary facilities, incidentals, testing, QA/QC, etc. (this listing is intended to be illustrative and not comprehensive) shall be evaluated by each Bidder so their Bid submitted to the City includes all such perceived impacts in recognition of the foregoing and subsequent notices in this and other sections of the Contract Documents.
- 28.03 Each Bidder is to critically appraise and evaluate the reasonably anticipated costs and time impacts, if any, which may need to be accounted for in light of the COVID-19 pandemic and all governmental directives and requirements, and commercial impacts, arising therefrom.
- 28.04 It is the responsibility of each Bidder to alert all Sub-Bidders (potential subcontractors and suppliers of every tier and trade) to also factor in the above-referenced COVID-19 cost and time impacts, if any, into their sub-bids to Bidders for any and all aspects of the Project.
- 28.05 By submitting a Bid for this Project, each Bidder represents to the City they included in their Total Bid Price all cost impacts, whether affecting labor (including, but not limited to obtaining qualified workers, quantity of workers, as well as their productivity), deliveries, supervision, testing and/or procurement of materials and/or equipment and time caused by COVID-19 safety requirements found in Section 01170 and also all public health and/or governmental directives in place at the time Bids are received by the City for this Project. Furthermore, each Bidder recognizes they will not be entitled to a change order granting a COVID-19 related time extension and/or for any COVID-19 related increased costs, which arise from Section 01170, Novel Coronavirus (COVID-19) Safety Requirements and/or from all public health and/or governmental directives in place at the time Bids are received by the City for this Project.

END OF DOCUMENT

AD³ Addendum No. 3

DOCUMENT 00410

BID FORM

ARTICLE 1 - BID RECIPIENT

1.01 Project Identification:

City of Turlock

Development Services Department/Engineering Division

Turlock Regional Water Quality Control Facility

Chemical System Upgrades Project at RWQCF

City of Turlock Project No. 20-032

1.02 This Bid is submitted to:

City of Turlock

Development Services Department/Engineering Division

156 South Broadway, Suite 150

Turlock, CA 95380 - 5454

1.03 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 within the specified time and for the price indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 - BIDDER'S ACKNOWLEDGMENT

2.01 Bidder accepts all of the terms and conditions of Document 00200 - Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. The Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

- A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

- B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and has satisfied itself as to all Federal, state, and local Laws and Regulations and Permits that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all:
 - 1. reports of explorations and tests of subsurface conditions at or 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.
 - 2. reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
- E. Bidder has considered the information known to Bidder itself; 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 any 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.
 - 3. Bidder's safety precautions and programs.
- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder 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 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 confirms that 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 and furnishing the Work required by the Bidding Documents.
- J. In accordance with Section 1861, California Labor Code, the Bidder states the following as its certification.
- K. "I am aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the Work."

ARTICLE 4 - BIDDER'S CERTIFICATION

4.01 Bidder further represents:

- 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.
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this paragraph:
 - 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:
 - a. to influence the bidding process to the Owner's detriment,
 - b. to establish bid prices at artificial non-competitive levels, or
 - c. to deprive Owner of the benefits of free and competitive bidding process.
 - 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.
 - 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.
 - 5. Pursuant to California Public Contract Code Section 7103.5(b), Contractor or Subcontractor shall offer and agree 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. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code).

ARTICLE 5 - ASSIGNMENTS AND ALLOWANCES

5.01 No assignments are used on this project.

- 5.02** Bidder shall provide the Owner with an allowance for work associated with repairing damaged coating in the chemical containment areas of \$25,000. The Owner, at Owner's option, will use this allowance for repairing damaged coating that is NOT caused by the contractor, but was pre-existing damage. The Contractor will submit the appropriate invoices to the Owner with pay requests. The \$25,000 allowance shall be included in the Lump Sum Bid in addition to the cost of the Work in accordance with Section 01210 - Allowances of the General Requirements.

- 5.03 Bidder shall provide the Owner with an allowance for work associated with providing the temporary sodium hypochlorite tanks and chemical of \$300,000. The contractor shall contract and coordinate with a sodium hypochlorite vendor to provide and set-up temporary hypochlorite tanks (minimum 8,000 gallons of tanks) and pay for chemical used while the tanks are installed. City will connect temporary pumps and piping to the tanks to dose the chemical, and will request from the vendor when the tanks need to be filled. The Contractor will submit the appropriate invoices to the Owner with pay requests. The \$300,000 allowance shall be included in the Lump Sum Bid in addition to the cost of the Work in accordance with Section 01210 - Allowances of the General Requirements. Quote and Contract information provided in Appendix A.

ARTICLE 6 - BASIS OF BID

- 6.01 Bidder will complete the Work in accordance with the Contract Documents for the Lump Sum Bid Price of:

BASE BID					
Item Number	Description	Unit	Unit Price	Estimated Quantity	Total Amount
1	Sheeting, shoring, and bracing, or equivalent method for protection of life and limb in trenches and open excavations.	Lump Sum	---	1	\$ (In figures)
2	RTU and SCADA work performed by HSQ Technology described by HSQ Quote No. 2103-022-GJ_R.1 date March 30, 2021 attached to Section 17050.	Lump Sum	---	1	\$ 277,710 (In figures)
3	Bid allowances for repairing damaged coatings not caused by contractor in chemical containment areas	Lump Sum	---	1	\$ 25,000
4	Bid allowances for providing temporary sodium hypochlorite storage tanks and chemical for 6 months. Quote and Contract provided in Appendix A.	Lump Sum	---	1	\$ 300,000
5	Completion of all Work associated with the Contract Documents excluding all work listed on other bid items in this table.	Lump Sum	---	1	\$ (In figures)
	TOTAL LUMP SUM BID PRICE (BID ITEMS 1 - 5) (In words)				\$ (In figures)

~~6.02 Bid Alternatives~~

- ~~A. Bidder offers to make, at the bid alternate prices following, the changes in the Work covered by the Lump Sum Bid Price that are specified in the bid alternates priced below.~~
- ~~B. It is understood that:~~
- ~~1. All bid alternate prices must be filled in.~~
 - ~~2. The acceptance or rejection of any or all of these bid alternates is at the option of Owner.~~
 - ~~3. Acceptance or rejection of bid alternates will not necessarily be made on the basis of price alone.~~
 - ~~4. The acceptance or rejection of one or more bid alternates will not affect the Lump Sum Bid Price, nor other conditions of this Bid, nor the price of other accepted bid alternates.~~
 - ~~5. The addition or deduction shown herein for each bid alternate is the net addition or net deduction that is to be applied to the Lump Sum Bid Price of the undersigned if the bid alternate is accepted by Owner.~~
 - ~~6. The Contract Price shall be the net amount determined by applying the bid alternate prices of all accepted bid alternates to the Lump Sum Bid Price.~~
- ~~C. Bid Alternate A (add): Bidder agrees to add to the total Lump Sum Bid Price the amount shown below for insurance coverage in the amount of fifty (50) percent of the Lump Sum Bid Price against the risk of tidal wave and earthquake in excess of 3.5 on the Richter scale, deemed an act of God pursuant to Section 7105 of California Public Contract Code. Owner may, at its sole option, elect to provide its own insurance:~~

~~\$ _____ (in figures)~~

~~_____ dollars (in words)^{AD3}~~

ARTICLE 7 - TIME OF COMPLETION

- 7.01 Bidder agrees that the Work will be substantially completed, and, 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 as specified in Document 00520 - Agreement.
- 7.02 Bidder accepts the provisions of the Agreement as to delay damages in the event of failure to complete the Work within the times specified above, which shall be as specified in Document 00520 - Agreement.

ARTICLE 8 - ATTACHMENTS TO THIS BID

- 8.01 The following documents are attached to and made a condition of this Bid:
- A. Document 00432 - Bid Bond. Provide required Bid security in the form of cash, a certified or bank check, or a Bid Bond as specified in this document.
 - B. Document 00434 - Proposed Subcontractors Form.

- C. Document 00436 - List of Equipment Manufacturers.
- D. Document 00451C - Construction Contractor's Qualification Statement with supporting data.
- E. Document 00452 - Affirmative Action Program Certificate.
- F. Document 00456 - Non-Collusion Affidavit.
- G. Document 00458 - Certification of Drug-Free Workplace Requirements.

ARTICLE 9 - DEFINED TERMS

9.01 The terms used in this Bid with initial capital letters or all capital letters have the meanings as specified in Document 00200 - Instructions to Bidders, General Conditions, and Supplementary Conditions.

ARTICLE 10 - BID SUBMITTAL

SUBMITTED on _____, 2021.

State Contractor License Number _____. (If applicable)

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____
(Individual's signature)

Doing business as: _____

Business address: _____

Phone Number: () _____ FAX Number: () _____

A Partnership

Partnership Name: _____

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

Name (typed or printed): _____

Business address: _____

Phone Number: () _____ FAX Number: () _____

A Corporation

Corporation Name: _____

State of Incorporation: _____

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

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

Name (typed or printed): _____

Title: _____

Attest: _____
(Signature of Corporate Secretary, Acting Secretary or other officer)

Business address: _____

Phone Number: () _____ FAX Number: () _____

Date of Qualification to do business is _____

A Joint Venture

Joint Venturer Name: _____

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

Name (typed or printed): _____

Title: _____

Business address: _____

Phone Number: () _____ FAX Number: () _____

Joint Venturer Name: _____

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

Name (typed or printed): _____

Title: _____

Business address: _____

Phone Number: () _____ FAX Number: () _____

Phone and FAX Number, and Address for receipt of official communications:

(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.)

END OF DOCUMENT

AD3 Addendum No. 3

DOCUMENT 00800

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement Document 00700 - General Conditions. All provisions, which are not so amended or supplemented, remain in full force and effect.

The terms used in these Supplementary Conditions will have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof.

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.

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

SC-1.01 Defined Terms

SC-1.01 Add to the list of definitions in Paragraph 1.01.A by inserting the following as numbered items in their proper alphabetical positions:

Construction Manager - Carollo Engineers, Inc.

Design Engineer - Carollo Engineers, Inc.

Final Completion - The Work is complete when it is ready for final payment as established by the Engineer's written recommendation of final payment as set forth in Paragraph 15.06.

ARTICLE 2 - PRELIMINARY MATTERS

SC-2.01 Delivery of Bonds and Evidence of Insurance

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

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

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

SC-2.02 Copies of Documents

SC-2.02 Delete Paragraph 2.02.A. in its entirety and insert the following in its place:

- A. Owner shall furnish Contractor up to 5 printed copies of the Contract Conformed Documents (including 1 fully executed counterpart of the Agreement), and 1 copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

SC-2.04 Preconstruction Conference; Designation of Authorized Representative

SC-2.04 Delete Paragraph 2.04.B. in its entirety.

ARTICLE 4 - COMMENCEMENT AND PROGRESS OF THE WORK

SC-4.01 Commencement of Contract Times; Notice to Proceed

SC-4.01 Delete Paragraph 4.01.A. in its entirety and insert the following in its place:

- A. The time fixed for the commencement of such work is within 10 working days after the "Notice to Proceed" has been issued.

ARTICLE 5 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

SC-5.01 Availability of Lands

SC-5.01 Add the following new paragraph immediately after Paragraph 5.01.C:

- D. Any Work performed in public rights-of-way, in addition to conforming to the Contract Documents, shall be done in accordance with the requirements of the permit issued by the public agency in whose right-of-way the Work is located.

SC-5.03 Subsurface and Physical Conditions

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

- C. The following reports of explorations and tests of subsurface conditions at or adjacent to the Site are known to Owner:
 - 1. Report dated January 25, 2017, by Kleinfelder, Inc., entitled "Addendum to Geotechnical Services Reports, Secondary Clarifier No. 5 and Denitrification Improvement Projects, Turlock Water Quality Control Plant, Turlock, California."
 - 2. Report dated July 24, 2014, by Kleinfelder, Inc., entitled "Report Update Geotechnical Services Report and Geologic/Seismic Hazards Assessment for the Proposed Secondary Clarifier, Turlock Water Quality Control Facility, Turlock, California."
 - 3. Report dated August 10, 2011, by Kleinfelder, Inc., entitled "Report Update Geotechnical Services Report and Geologic/Seismic Hazards

Assessment for the Proposed Headworks and Secondary Expansion, Turlock Water Quality Control Facility, Turlock, California.”

4. Report dated December 21, 2007, by Kleinfelder, Inc., entitled “Geotechnical Services Report”, Proposed Headworks and Secondary Expansion, Turlock Water Quality Control Facility, Turlock, California.
5. Report dated November 26, 2002, by Kleinfelder, Inc., entitled “Supplementary Geotechnical Investigation Report”, Proposed Wastewater Treatment Plant Turlock Water Quality Control Facility”, Turlock Water Quality Control Facility, Turlock, California.
6. Report dated July 24, 2002, by Kleinfelder, Inc., entitled “Geotechnical Investigation Report”, Proposed Wastewater Treatment Plant Turlock Water Quality Control Facility”, Turlock Water Quality Control Facility, Turlock, California.

D. The following drawings of physical conditions relating to existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities) are known to Owner:

1. Drawings dated January 1971, prepared by Jenks & Adamson entitled, “City of Turlock, CA Sewerage Works Improvements, Plans for the Construction of Wastewater Treatment Plan Enlargement” consisting of Sheets 1 through 66, inclusive.
2. Drawings dated March 1977, prepared by CH2M Hill entitled, “City of Turlock Wastewater Treatment Plant” consisting of Sheets 1 through 76, inclusive.
3. Drawings dated October 1994, prepared by John Carollo Engineers, entitled: “Water Quality Control Facility Expansion Program Stage 1,” consisting of Sheets 1 through 31, inclusive.
4. Drawings dated July 1995, prepared by HDR Engineering, Inc., entitled: “Water Quality Control Facility Expansion Phase II,” consisting of Sheets 1 through 50, inclusive.
5. Drawings dated June 2000, prepared by Carollo Engineers, entitled: “Water Quality Control Facility Expansion Program – Nitrification Facilities Project,” consisting of Sheets 1 through 68, inclusive.
6. Drawings dated September 2003, prepared by Carollo Engineers, entitled: “Water Quality Control Facility Treatment Facilities Improvement Project,” consisting of Sheets 1 through 397, inclusive.
7. Drawings dated March 2012, prepared by Carollo Engineers, entitled “Headworks And Secondary Treatment Capacity Expansion Project - Phase I,” consisting of Sheets 1 through 259, inclusive.

E. Contractor may examine copies of reports and drawings identified in Document 00800 - Supplementary Conditions that were not included with the Bidding Documents at 156 S. Broadway, Suite 150, Turlock, CA during regular business hours, or may request copies of PDF documents by requesting them from Stephen Fremming, phone 209-668-5417, sfremming@turlock.ca.us.

SC-5.06 Hazardous Environmental Conditions at Site

SC-5.06 Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

- A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.
- B. Not Used.

ARTICLE 6 - BONDS AND INSURANCE

SC-6.03 Contractor's Insurance

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

- K. The limits of liability for the 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:

State: Statutory

Federal, if applicable (e.g.,
Longshoreman's): Statutory

Employer's Liability:

Bodily injury, each accident \$ 1,000,000

Bodily injury aggregate \$ 1,000,000

Foreign voluntary worker compensation Statutory

2. Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:

General Aggregate \$ 2,000,000

Products - Completed Operations Aggregate \$ 2,000,000

Personal and Advertising Injury \$ 1,000,000

Each Occurrence (Bodily Injury and Property Damage) \$ 1,000,000

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Bodily Injury:

Each person \$ 1,000,000

Each accident \$ 1,000,000

Property Damage:

Combined Single Limit of \$ 1,000,000

4. Excess or Umbrella Liability:

Per Occurrence \$ 5,000,000

General Aggregate \$ 5,000,000

5. Contractor's Pollution Liability:

Each Occurrence \$ 1,000,000

General Aggregate \$ 2,000,000

☐

If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

6. Contractor's Professional Liability:

Each Claim \$ 1,000,000

Annual Aggregate \$ 1,000,000

7. Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following: Design Engineer and Construction Manager.

- L. Each policy shall contain a cross liability or severability of interest clause or endorsement. Insurance covering the specified additional insureds shall be primary insurance, and all other insurance carried by the additional insureds shall be excess insurance; and with respect to workers' compensation and employer's liability, comprehensive automobile liability, commercial general liability, and umbrella liability insurance, Contractor shall require Contractor's insurance carriers to waive all rights of subrogation against Owner, Engineer, Design Engineer and Construction Manager and their respective officers, directors, partners, employees, subconsultants, and agents.

SC-6.05 Property Insurance

SC-6.05 Add the following new subparagraph after subparagraph 6.05.A.1:

- a. In addition to Owner, Contractor, and all Subcontractors, include as insureds the following: Engineer, Design Engineer and Construction Manager.

SC-6.05 Amend the first sentence of Paragraph 6.05.B to read as follows:

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 30 days prior written notice has been given to the purchasing policyholder.

SC-6.06 Add the following sentence to the end of paragraph 6.06.A

None of the above waivers shall extend to the rights of the Builder's Risk insurer for losses and damages arising out of the rendering or the failure to render any professional services against the Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.^{AD3}

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

SC-7.02 Labor; Working Hours

SC-7.02 Add the following new subparagraphs immediately after Paragraph 7.02.B:

1. Regular working hours will be 7:00 a.m. to 5:00 p.m.
2. Owner's legal holidays are New Year's Day, Martin Luther King, Jr. Day, President's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving/Day After Thanksgiving, Christmas Day.

SC-7.06 Concerning Subcontractors, Suppliers, and Others

SC-7.06 Add the following subparagraph immediately after 7.06.B:

1. Subcontracting: Contractor shall perform with Contractor's own organization work amounting to not less than 40 percent of the combined value of all items of the Work covered by the Contract.

SC-7.09 Taxes

SC-7.09 Add the following new sentence and subparagraphs immediately after the last sentence of paragraph 7.09.A:

Contractor shall cooperate with City to the full extent possible to maximize the local allocation of California sales and use tax to the City. Such cooperation shall include but not be limited to:

1. Use Tax Direct Payment Permits. Contractor shall apply for, obtain and utilize, to the maximum extent reasonable, a California Use Tax Direct Payment Permit.
2. Purchases of \$500,000 or More. Contractor shall require vendors and suppliers located outside California from whom Contractor makes purchase of \$500,000 or more to allocate the use tax to the City.

Additional information regarding use tax and the Permit can be found in the State of California Board of Equalization, Sales and Use Tax Regulations, Regulation 1699.6, Use Tax Direct Payment Permits, or on the web site for the Board of Equalization at <http://www.boe.ca.gov/sutax/sutprograms.htm>

SC-7.12 Safety and Protection

SC-7.12 Insert the following new sentence immediately after the second sentence of Paragraph 7.12.C:

The following Owner safety programs are applicable to the Work: Contractor's Safety Program.

SC-7.14 Hazard Communication Programs:

SC-7.14.B Add the following paragraphs immediately after 6.15.A:

- B. Contractor shall promptly, and before the following conditions are disturbed, notify Owner and Engineer, in writing, of any:
 1. Material that Contractor believes may be material that is hazardous waste, as defined in Section 25117, California Health & Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.
 2. Subsurface or latent physical conditions at the site differing from those indicated in the Contract Documents.
 3. Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents.
- C. Owner will promptly investigate the conditions, and where Owner finds the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contract Price, or in the Contract Time, or both, a Change Order will be issued in accordance with Document 00700, General Conditions.
- D. In the event a dispute arises as to whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contract Price, Contract Time, or both, Contractor shall not be excused from any scheduled completion date provided in the Contract Documents, but shall proceed with the Work.

SC-7.16 Shop Drawings, Samples, and Other Submittals

SC-7.16 Delete the Paragraph 7.16.E.2 in its entirety and insert the following in its place:

2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than two submittals. Engineer will record Engineer's time for reviewing a third 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.

SC-7.20 Add the following paragraph immediately after Article 7.19

SC-7.20 City Business License

- E. Contractor shall obtain a City of Turlock business license prior to issuance of the Notice to Proceed. The cost of the business license is fifty cents per thousand dollars in revenue. Business Licenses are obtained through the Finance Division at Turlock City Hall, 156 S. Broadway, Suite 114. Additional information can be found on the City's website at <http://ci.turlock.ca.us/doingbusinessinturlock/businesslicenses/newbusinesslicense.asp>
- F. Full compensation for obtaining a business license as specified above shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefore.

ARTICLE 9 - OWNER'S RESPONSIBILITIES

SC-9.01 Communications to Contractor

SC-9.01 Amend the first sentence of paragraph 9.01.A to read as follows:

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

SC-9.01 Add paragraph 9.01.B to read as follows:

- B. Construction Manager will establish and implement procedures including testing, reviewing and processing requests for clarifications and interpretations of the Contract Documents; Shop Drawings, samples, and other submittals; schedule adjustments; Change Order proposals; written proposals for substitutions; payment applications; and maintenance of logs.

SC-9.02 Replacement of Engineer

SC-9.02 Amend the first sentence of paragraph 9.02.A to read as follows:

Owner may at its discretion appoint an engineer to replace Engineer.

ARTICLE 10 - ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03 Project Representative

SC-10.03 Delete Paragraph 10.03 in its entirety.

ARTICLE 11 - AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

SC-11.01 Amending and Supplementing Contract Documents

SC-11.01 Insert the following subparagraphs immediately following 11.02.A.1.b:

- c. In signing a Change Order, the Owner and Contractor acknowledge and agree that:
 - 1) the stipulated compensation (Contract Price or Contract Times, or both) set forth in the Change Order includes not only all direct costs of Contractor such as labor, material, job overhead, and profit markup, but also includes any costs for modifications or changes in sequence of work to be performed, delays, rescheduling, disruptions, extended direct overhead or general overhead, acceleration, material or other escalation which includes wages and other impact costs. This document will become a supplement to the Contract and all Contract provisions will apply hereto. It is understood that this Change Order shall be effective on the date approved by the Owner's Representative.
 - 2) the Change Order constitutes full mutual accord and satisfaction for the change to the Work;
 - 3) no reservation of rights to pursue subsequent claims on the Change Order will be made by either party; and
 - 4) no subsequent claim or amendment of the Contract Documents will arise out of or as a result of the Change Order.

SC-11.04 Change of Contract Price

SC-11.04 Delete the Paragraph 11.04.B.3 in its entirety and insert the following in its place:

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 markup percentage for overhead and profit as provided below:
 - a. Labor markup: Labor markup applies to the direct performance of the work and equals 5 percent. In addition to the 5 percent markup, Contractor shall receive the labor surcharge percentage published in the current edition of the Caltrans Labor Surcharge and Equipment Rental Rates book.
 - b. Materials markup: Material markup applies to materials furnished and consumed on the extra work and equals 5 percent of the direct cost to the Contractor.

- c. Equipment markup: Equipment markup is applied to all equipment utilized on the extra work and equals 5 percent.
- d. Subcontractor markup: If a subcontractor performs work on the basis of the Cost of the Work, accept an additional 2 percent markup to the total cost of that work paid at the basis of the Cost of the Work, including markups specified above, as reimbursement for additional administrative costs.

SC-11.05 Change of Contract Times

SC-11.05 Add the following new paragraphs immediately after 11.05.B:

C. Use of Float:

- 1. A request for adjustment of Contract Times (or Milestones), otherwise allowable under the Contract Documents, shall be granted only when the time lost or gained exceeds the float for the activity at the time of the event giving rise to the claim. Float, the amount of time between the early start date and the late start date, or the early finish date and the late finish date, is jointly owned by both Owner and Contractor whether expressly disclosed or implied in any manner.
- 2. Contractor shall not use float suppression techniques (including, but not limited to, preferential sequencing caused by late starts of follow-up trades, unreasonably small crews, extended durations, or imposed dates) in information provided to Engineer.

D. Weather Days:

- 1. The Contract Time includes a weather day allowance of 15 working days. No extension in Contract Time will be allowed for the first 15 working days lost due to weather conditions.

SC-11.06 Change Proposals

SC-11.06 Delete Paragraph 11.06.a.1 in its entirety and insert the following in its place:

- 1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 15 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.

ARTICLE 12 - CLAIMS

SC-12.01 Delete Paragraph 12.01 in its entirety and insert the following in its place:

12.01. Claims Process:

Claims between the Owner and Contractor shall be addressed as provided by California Public Contract Code Section 9204, which is set forth in its entirety:

Legislative findings and declarations regarding timely and complete payment of contractors for public works projects; claims process.

(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) Public entity definition

(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 a 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) The Department of Water Resources as to any project under the jurisdiction of that department.

(ii) The Department of Transportation as to any project under the jurisdiction of that department.

(iii) The Department of Parks and Recreation as to any project under the jurisdiction of that department.

(iv) The Department of Corrections and Rehabilitation with respect to any project under its jurisdiction pursuant to Chapter 11 (commencing with Section 7000) of Title 7 of Part 3 of the Penal Code.

(v) The Military Department as to any project under the jurisdiction of that department.

(vi) The Department of General Services as to all other projects.

(vii) The 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) Claims process:

(1) Claims review and response

(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 days, 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 registered 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 issues its written statement. If the public entity fails to issue a written statement, paragraph (3) shall apply.

(2) Claims dispute

(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 in 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 assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the 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 his or her 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 of 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 the 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 provisions 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, 2017.

(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, 2020, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2020, deletes or extends that date.

(j) Claims Process additional requirements:

(1) Claims asserted by the Owner against the Contractor shall be submitted according to the procedures set forth above.

(2) 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. Such a claim shall be submitted 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.

(3) The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer..

(4) Mediation:

(A) 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.

SC-12.01 Add the following subparagraph immediately following Paragraph 12.01.A:

- B. Claims over \$375,000 or less shall be resolved pursuant to California Public Contract Code Section 20104 et seq. unless Owner elects to resolve the dispute pursuant to California Public Contract Code Section 10240 et seq.

ARTICLE 13 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

SC-13.01 Cost of Work

SC-13.01 Delete Paragraph 13.01.B.5.c in its entirety and insert the following in its place:

c. Construction Equipment and Machinery

Equipment rental payment is full compensation for:

1. Rental equipment costs, including moving rental equipment to and from the change order work site using its own power.
2. Transport equipment costs for rental equipment that cannot be transported economically using its own power. No payment is made during transport for the transported equipment.

If the Contractor wants to return the equipment to a location other than its original location, the payment to move the equipment must not exceed the cost of returning the equipment to its original location. If the Contractor uses the equipment for work other than work paid by force account, the transportation cost is included in the other work.

Before moving or loading the equipment, obtain authorization for the equipment rental's original location.

The Engineer determines rental costs:

1. Using rates in the Caltrans Labor Surcharge and Equipment Rental Rates:
 - 1.1. By classifying equipment using manufacturer's ratings and manufacturer-approved changes.
 - 1.2. Current during the work paid by force account.
 - 1.3. Regardless of equipment ownership; but the City uses the rental document rates or minimum rental cost terms if:
 - 1.3.1. Rented from equipment business the Contractor does not own.
 - 1.3.2. The Labor Surcharge and Equipment Rental Rates hourly rate is \$10.00 per hour or less.
2. Using rates established by the Engineer for equipment not listed in Labor Surcharge and Equipment Rental Rates. The Contractor may submit cost information that helps the Engineer establish the rental rate; but the City uses the rental document rates or minimum rental cost terms if:
 - 2.1. Rented from equipment business the Contractor does not own.
 - 2.2. The Engineer establishes a rate of \$10.00 per hour or less.
3. Using rates for transport equipment not exceeding the hourly rates charged by established haulers.

Equipment rental rates include the cost of:

1. Fuel.
2. Oil.

3. Lubrication.
4. Supplies.
5. Small tools that are not consumed by use.
6. Necessary attachments.
7. Repairs and maintenance.
8. Depreciation.
9. Storage.
10. Insurance.
11. Incidentals.

The City pays for small tools consumed by use. The Engineer determines payment for small tools consumed by use based on Contractor-submitted invoices.

The Engineer may authorize rates in excess of those in the Labor Surcharge and Equipment Rental Rates if:

1. The Contractor submits a request to use rented equipment
2. Equipment is not available from the Contractors normal sources or from one of the Contractors subcontractors
3. Rented equipment is from an independent rental company
4. Proposed equipment rental rate is reasonable
5. The Engineer authorizes the equipment source and the rental rate before the Contractor uses the equipment

EQUIPMENT ON THE JOB SITE

For equipment on the job site at the time required to perform work paid by force account, the time paid is the time:

1. To move the equipment to the location of work paid by force account plus an equal amount of time to move the equipment to another location on the job site when the work paid by force account is completed
2. To load and unload equipment
3. Equipment is operated to perform work paid by force account and:
 - 3.1. Hourly rates are paid in 1/2-hour increments
 - 3.2. Daily rates are paid in 1/2-day increments

EQUIPMENT NOT ON THE JOB SITE REQUIRED FOR ORIGINAL CONTRACT WORK

For equipment not on the job site at the time required to perform work paid by force account and required for original-Contract work, the time paid is the time the equipment is operated to perform work paid by force account and the time to move the equipment to a

location on the job site when the work paid by force account is completed.

The minimum total time paid is:

1. 1 day if daily rates are paid.
2. 8 hours if hourly rates are paid.

If daily rates are recorded, equipment:

1. Idled is paid as 1/2 day.
2. Operated 4 hours or less is paid as 1/2 day.
3. Operated 4 hours or more is paid as 1 day.

If the minimum total time exceeds 8 hours and if hourly rates are listed, the City rounds up hours operated to the nearest 1/2-hour increment and pays based on the hours shown the following table. The table does not apply when equipment is not operated due to breakdowns, in which case rental hours are the hours the equipment was operated.

Equipment Rental Hours

Hours operated	Hours paid
0.0	4.00
0.5	4.25
1.0	4.50
1.5	4.75
2.0	5.00
2.5	5.25
3.0	5.50
3.5	5.75
4.0	6.00
4.5	6.25
5.0	6.50
5.5	6.75
6.0	7.00
6.5	7.25
7.0	7.50
7.5	7.75
≥8.0	hours used

EQUIPMENT NOT ON THE JOB SITE NOT REQUIRED FOR ORIGINAL CONTRACT WORK

For equipment not on the job site at the time required to perform work paid by force account and not required for original-Contract work, the time paid is the time:

1. To move the equipment to the location of work paid by force account plus an equal amount of time to return the equipment to its source when the work paid by force account is completed
2. To load and unload equipment
3. Equipment is operated to perform work paid by force account

NON-OWNER OPERATED DUMP TRUCK RENTAL

Submit the rental rate for non-owner-operated dump truck rental. The Engineer determines the payment rate. Payment for non-owner-operated dump truck rental is for the cost of renting a dump truck, including its driver. For the purpose of markup payment only, the non-owner-operated dump truck is rental equipment and the owner is a subcontractor.

The above markups shall constitute full compensation for all home office overhead, field office overhead, bond costs, profit, labor liability insurance, and other fixed or administrative costs that are not costs specifically designated as cost or equipment rental as stated above. The total payment made as provided above shall be deemed to be the actual cost of the work and shall constitute full compensation therefor.

SC-13.03 Unit Price Work

SC-13.03 Delete Paragraph 13.03.E in its entirety and insert the following in its place:

- E. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:
1. if the extended price of a particular item of Unit Price Work amounts to 25 percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and
 2. if there is no corresponding adjustment with respect to any other item of Work; and
 3. if Contractor believes that Contractor has incurred additional expense as a result thereof, Contractor may submit a Change Proposal, or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, Owner may make a Claim, seeking an adjustment in the Contract Price.

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

SC-15.01 Progress Payments

SC-15.01 Amend the first sentence in Paragraph 15.01.B.1 to read as follows:

1. At least 30 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.

SC-15.01 Add following new paragraphs immediately after the last sentence in 15.01.B.1:

- a. Payments for stored materials and equipment shall be based only upon the actual cost of the materials and equipment to Contractor and shall not include any overhead or profit to Contractor.
- b. Partial payments will not be made for undelivered materials or equipment, except for payments associated with prepurchase vendor contracts initiated by Owner and assigned to Contractor.

SC-15.01 Amend the first sentence in Paragraph 15.01.C.1 to read as follows:

1. Engineer will, within 7 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.

SC-15.01 Amend the first sentence in Paragraph 15.01.D.1 to read as follows:

1. Thirty 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.

SC-15.01 Add the following new paragraph immediately after Paragraph 15.01.D.1:

- a. Contractor shall disburse money paid to him, including any interest Contractor receives, to Subcontractors and Suppliers within 15 days after Contractor receives the money, in direct proportion to the Subcontractors' and Suppliers' basis in the total Contract between Contractor and Owner. Any money which is payable to a Subcontractor pursuant to this Section accrues interest at the legal rate. Contractor may withhold a portion of any partial payment as may be set forth in a subcontract. Thereafter Contractor shall pay any additional funds if, in the opinion of Contractor, satisfactory progress is being made in the work under the subcontract, and the payment must be equal to that paid by Owner to Contractor for the Work performed by the Subcontractor:
 - 1) The Contractor may retain the amount withheld under the subcontract until the subcontract is satisfactorily completed.

- 2) The amount withheld under the subcontract is due within 15 days after the acceptance of the subcontract work by Contractor.
- 3) Whenever Contractor receives a payment of interest earned on the amount withheld from the Contract, Contractor shall within 15 days pay to each Subcontractor that portion of the interest received from the state which is attributable to the amount of money withheld from the Subcontractor.

SC-15.03 Substantial Completion

SC-15.03 Add the following subparagraphs immediately after Paragraph 15.03.A:

1. The Work shall be Substantially Complete when the Work may treat water with the new facilities in accordance with the Contract Documents. All process and transmission equipment shall be installed and operational, or temporary arrangements satisfactory to Owner shall have been made. Operational testing must be completed prior to the date of Substantial Completion.
2. To be considered substantially complete, all Work must be operational and ready for Owner's continuous use as intended:
3. Portions of the Work not essential to plant operation, which can be completed without interruption of plant operation, may be completed after the Work is accepted as Substantially Complete, and may include the following items:
 - a. Final O&M manuals.
 - b. Spare parts.
 - c. As-built documents.
 - b. Final clean-up.

SC-15.03 Add the following new subparagraph to Paragraph 15.03.B:

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, shall be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

SC-15.05 Final Inspection

SC-15.05 Add the following new paragraph immediately after Paragraph 15.05.A:

- B. If some or all of the Work has been determined not to be at a point of Final Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, shall be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

SC-17.01 Methods and Procedures

SC-17.01 Add the following subparagraphs immediately after Paragraph 17.01.B.3:

4. resolve claims of \$375,000 or less pursuant to California Public Contract Code Section 20104 et seq., unless Owner elects to resolve the dispute pursuant to California Public Contract Code Section 10240 et seq.

END OF DOCUMENT

^{AD3} Addendum No. 3

SECTION 01460
CONTRACTOR QUALITY CONTROL PLAN

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Contractor Quality Control Plan.

1.02 SUBMITTALS

- A. Qualifications of the Contractor's Quality Control (CQC) Plan Manager.
- B. Contractor's Daily Quality Control Report: Submit to Engineer within 1 day of completion of each inspection.
- C. Daily Inspection Report: Submit to Engineer at the end of each working day or no later than prior to the beginning of the next working day.

1.03 CONTRACTOR'S INSPECTION OF THE WORK

- A. Work performed by Contractor shall be inspected by the Contractor's CQC Plan Manager. Non-conforming Work and any safety hazards in the Work area shall be noted and promptly corrected.
- B. No materials or equipment shall be used in Work without inspection and acceptance by Contractor's CQC Plan Manager.

1.04 QUALIFICATIONS

- A. Contractor's CQC Plan Manager: Demonstrate having performed similar CQC functions on similar type projects. Submit records of personnel experience, training, and qualifying registrations.
- B. Minimum qualifications: Candidate must have a minimum of 10 years of experience on projects of similar type and size.

1.05 COVERING WORK

- A. Whenever Contractor intends to backfill, bury, cast in concrete, or otherwise cover any Work, notify Engineer not less than 24 hours in advance to request inspection before beginning any such Work of covering. Failure of Contractor to notify Engineer in accordance with this requirement shall be resolved according to Article 14 of the General Conditions.

1.06 CONTRACTOR'S QUALITY CONTROL PROGRAM

- A. General: Establish and execute a Quality Control (CQC) Plan for Work. The plan shall establish adequate measures for verification and conformance to defined

requirements by Contractor personnel and lower-tier Subcontractors (including Fabricators, Suppliers, and Subcontractors). This program shall be described in a Plan responsive to this Section.

B. CQC personnel:

1. Contractor's CQC Plan Manager shall report to a Senior Project Manager of the Contractor, or be the senior project manager^{AD3} and ~~shall have no can have~~^{AD3} supervisory or managerial responsibility over the workforce.
2. The Contractor CQC Plan Manager shall be on-site as often as necessary, but not less than the daily working hours specified in the Contract Documents to remedy and demonstrate that Work is being performed properly and to make multiple observations of Work in progress.
3. The Contractor is to furnish personnel with assigned CQC functions reporting to the CQC Manager. Persons performing CQC functions shall have sufficient qualifications, authority, and organizational freedom to identify quality problems and to initiate and recommend solutions.

C. CQC Plan:

1. Contractor's CQC Plan shall include a statement by the Senior Project Manager designating the CQC Plan Manager and specifying the authority delegated to the CQC Plan Manager to direct cessation or removal and replacement of defective Work.
2. Describe the CQC program and include procedures, work instructions, and records. Describe methods relating to areas that require special testing and procedures as required by the specifications.
3. Include specific instructions defining procedures for observing Work in process and comparing this Work with the Contract requirements (organized by specifications section).
4. Describe procedures to ensure that equipment or materials that have been accepted at the Site are properly stored, identified, installed and tested.
5. Include procedures to verify that procured products and services conform to the requirements of the Specifications. Requirements of these procedures shall be applied, as appropriate, to lower-tier Suppliers and/or Subcontractors.
6. Commissioning quality control: Include procedures to verify that the commissioning requirements of the Contract Documents are integrated into the Contractor's CQC Plan and conform to the requirements of the Specifications. Requirements of these procedures shall be applied, as appropriate, to the Contractor and the lower-tier Suppliers and/or Subcontractors.
7. Include instructions for recording inspections and requirements for demonstrating through the Daily Inspection Reports that Work inspected was in compliance or a deficiency was noted and action to be taken.
8. Procedures to preclude the covering of deficient or rejected Work.
9. Procedures for halting or rejecting Work.
10. Procedures for resolution of differences between the CQC Plan Manager and the production personnel.
11. Identify contractual hold/inspection points as well as any Contractor-imposed hold/inspection points.

D. Daily Inspection Report: Include, at a minimum:

1. Inspection of specific work.
2. Quality characteristics in compliance.

3. Quality characteristics not in compliance.
 4. Corrective/remedial actions taken.
 5. Statement of certification.
 6. CQC Manager's signature.
 7. Information provided on the daily report shall not constitute notice of delay or any other notice required by the Contract Documents.
- E. Deficient and Non-conforming Work and Corrective Action: Include procedures for handling deficiencies and non-conforming Work. Deficiencies and non-conforming Work are defined as documentation, drawings, material, equipment, or Work not conforming to the indicated requirements or procedures. The procedure shall prevent non-conformances by identification, documentation, evaluation, separation, disposition, and corrective action to prevent reoccurrence. Conditions having adverse effects on quality shall be promptly identified and reported to the senior level management. The cause of conditions adverse to quality shall be determined and documents and measures implemented to prevent recurrence. In addition, at a minimum, this procedure shall address:
1. Personnel responsible for identifying deficient and non-complying items within Work.
 2. How and by whom deficient and non-compliant items are documented "in the field."
 3. The personnel and process utilized for logging deficient and non-compliant Work at the end of each day onto a deficiency log.
 4. Tracking processes and tracking documentation for deficient and non-conforming Work.
 5. Personnel responsible for achieving resolution of outstanding deficiencies.
 6. Include detailed procedures for the performance and control of special process (e.g., welding, soldering, heat treating, cleaning, plating, nondestructive examination, etc.).
- F. Audits: The CQC program shall provide for regularly scheduled documented audits to verify that CQC procedures are being fully implemented by Contractor and its Subcontractors. Audit records shall be made available to Engineer upon request.
- G. Documented control/quality records:
1. Establish methods for control of Contract Documents that describe how Drawings and Specifications are received and distributed to ensure the correct issue of the document being used. Describe how record document/drawing data are documented and furnished to Engineer.
 2. Maintain evidence of activities affecting quality. Including operating logs, records of inspection, audit reports, personnel qualification and certification records, procedures, and document review records.
 3. Maintain quality records in a manner that provides for timely retrieval and traceability. Protect quality records from deterioration, damage and destruction.
 4. Develop a list of specific records as required by the Contract Documents that will be furnished to Engineer at the completion of activities.
- H. Acceptance of CQC Plan: Engineer's acceptance of the CQC Plan shall not relieve Contractor from any of its obligations for performance of Work. Contractor's CQC staffing is subject to Engineer's review and continued acceptance. Owner, at its sole

discretion, and without cause, may direct Contractor to remove and replace the CQC Plan Manager.

1. Acceptance of the CQC Plan by the Engineer is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction.
2. After acceptance of the CQC Plan, notify the Engineer in writing of any proposed change. Proposed changes are subject to acceptance by the Engineer.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

^{AD3} Addendum No. 3

SECTION 01756

COMMISSIONING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Requirements for each Commissioning phase of, the Project equipment/system and/or facility.

1.02 DEFINITIONS

- A. Clean Water Facility Testing - Testing of complete facility utilizing clean water for purposes of confirming extended equipment/system operation prior to Process Start-up Phase.
- B. Commissioning - The process of planning, testing, and process start-up of the installation for compliance with contract requirements and demonstrating, through documented verification, that the project has successfully met the Contractual requirements. It includes training the Owner's staff to operate the facility.
- C. Commissioning Phases - The work activities of facility commissioning are grouped into the phases defined in the table below.

<u>Commissioning</u>		
<u>Planning Phase</u>	<u>Testing and Training Phase</u>	<u>Process Start-Up Phase</u>
Owner Training Plan and Schedule	Source Testing	Process Start-up
Commissioning Schedule	Owner Training	Process Operational Period
Subsystem Testing Plan	Installation Testing	PCIS Optimization and Fine-Tuning
Clean Water Facility Testing Plan	Functional Testing	
	Clean Water Facility Testing	
	Closeout Documentation	

- D. Component - A basic building block of equipment, subsystems, and systems that requires installation or functional testing but does not have an electrical connection or internal electronics. (Examples: filter effluent piping and manual isolation valves).
- E. Device - A basic building block of equipment, subsystems, and systems that requires installation or functional testing and does have an electrical connection or internal electronics. (Examples: filter level transmitter or water pump pressure transmitter).

- F. Equipment - An assembly of component(s) and devices(s) that requires installation or functional testing. (Examples: Pump, motor, VFD, Ozone Generator, UV Disinfection System, etc.).
- G. Facility - A grouping of process areas, systems, subsystems, equipment, components, and devices (Examples: treatment plant, pump station, etc.).
- H. Functional Testing - Testing performed on a completed subsystem to demonstrate that equipment/system meets manufacturers' calibration and adjustment requirements and other requirements as specified. Functional testing includes operating equipment/system manually in local, manually in remote (or remote manual), and automatically in remote (in remote auto).
- I. Installation Testing - Testing to demonstrate that subsystem component (piping, power, networks, devices, etc.) is ready and meets the project requirements in advance of functional testing. Installation testing also includes manufacturers' certification of installation and other requirements as specified to prepare equipment/system for Functional Testing. Also referred to as Field Acceptance Testing.
- J. Manufacturer's Certificate of Source Testing - When applicable, the form is used during Source Testing for the manufacturer to confirm that the applicable source tests have been performed and results conform to the Contract Documents. The form is provided at the end of this Section.
- K. Manufacturer's Certificate of Installation and Functionality Compliance - The form is used during Installation Testing and Functional Testing. It is submitted at the end of Functional Testing to confirm that the equipment/system is installed in conformance with the Contract Documents and that it meets the Functional Testing requirements defined in the Contract Documents. The form is provided at the end of this Section.
- L. PCIS Optimization and Fine-Tuning - Test and adjust the entire process control system under standard operating conditions.
- M. Process Area - A grouping of systems, subsystems, equipment, components, and devices that divide a facility into functional areas. (Examples: Filter Process Area or Chemical Area).
- N. Process Operational Period - A period of time after completion of the process start-up set aside for final Operational Testing to verify facility performance meets the Contract Document requirements. This period may specifically limit other construction activities.
- O. Process Start-up Phase - Operating the facility to verify performance meets the Contract Document requirements.
- P. Process Start-Up - Activities conducted after the testing and training phase that are necessary to place systems or process areas into operational service.
- Q. Product - A system, subsystem or component.
- R. Subsystem - A building block of systems made up from a grouping of components, devices, and equipment that perform a definable function. (Examples: Filter No. 1

Backwash Subsystem, Sedimentation Basin No. 1 Hoseless Sludge Removal Subsystem).

- S. System - A grouping of subsystems, equipment, components, and devices that perform a definable function. (Examples: Filter No. 1, Sedimentation Basin).

1.03 SUBMITTALS

- A. Qualifications:
 - 1. Commissioning Coordinator's qualifications.
 - 2. Manufacturer's representative's qualifications.
- B. Schedules:
 - 1. Owner Training Plan Schedule.
 - 2. Commissioning Schedule.
- C. Certificates:
 - 1. Manufacturer's Certificate of Source Testing.
 - 2. Manufacturer's Certificate of Installation and Functionality Compliance.
- D. Reports:
 - 1. Test reports.
- E. Plans:
 - 1. Owner Training Plan.
 - 2. Source Test Plan.
 - 3. Installation and Functional Testing Plan:
 - a. Subsystem Testing Plans.
 - 4. Clean Water Facility Testing Plan.
 - 5. Process Start-Up Plan:
 - a. Process Start-Up.
 - b. Process Operational Period.
 - c. PCIS Optimization and Fine-Tuning.
 - 6. Final Operational Testing Plan.
- F. Documentation:
 - 1. Preliminary documentation.
 - 2. Final documentation.
 - 3. Closeout documentation.

1.04 COMMISSIONING COORDINATOR (CC)

- A. Designate and provide a CC for this project:
 - 1. Submit summary of the CC's qualifications within 30 days of NTP:
 - a. Include description of previous experience as a CC on similar projects for the designated CC with a list of references including phone numbers for review and Owner approval.
 - 2. The CC must have minimum of 10 years of experience in similar construction projects.
- B. CC responsibilities include the following:
 - 1. Lead efforts relating to Commissioning.

2. Be thoroughly familiar with commissioning requirements in the Contract Documents.
3. Be regularly engaged and experienced in all aspects of commissioning.
4. Provide technical instruction for commissioning.
5. Provide primary interface with Engineer and Owner for efforts relating to Commissioning of Project facilities.
6. Coordinate training efforts.

1.05 SERVICES OF MANUFACTURER'S REPRESENTATIVES

- A. Qualification of manufacturer's representative as specified in the Contract Documents technical sections include the following:
 1. Authorized representative of the manufacturer, factory trained and experienced in the technical applications, installation, operation, and maintenance of respective equipment/system with full authority by the equipment/system manufacturer to issue the certifications required of the manufacturer.
 2. Competent, experienced technical representative of equipment/system manufacturer for assembly, installation, testing guidance, and training.
 3. Additional qualifications may be specified in the individual sections.
 4. Submit qualifications of the manufacturer's representative no later than 30 days in advance of required observations.
 5. Representative subject to approval by Owner and Engineer.
 6. No substitute representatives will be allowed until written approval by Owner and Engineer has been obtained.
- B. Completion of manufacturer on-site services: Engineer approval required.
- C. Manufacturer is responsible for determining the time required to perform the specified services:
 1. Minimum times specified in the Contract Documents are estimates.
 2. No additional costs associated with performing the required services will be approved.
 3. Manufacturer required to schedule services in accordance with the Contractor's project schedule up to and including making multiple trips to project site when there are separate milestones associated with installation of each occurrence of manufacturer's equipment.
- D. Manufacturer's on-site services as specified in the Contract Documents include the following:
 1. Assistance during Commissioning Phase and Process Start-Up Phase.
 2. Provide a copy of manufacturer's representatives field notes and data to Engineer after each trip.
 3. Other requirements as specified in the Contract Documents.

1.06 PLANNING PHASE

- A. Overview of Planning Phase:
 1. Define approach and timing for Commissioning.

- B. Owner training plan and schedule:
1. Training outcomes:
 - a. Owner's operations, maintenance, and engineering staff have the information needed to safely operate, maintain, and repair the equipment/systems provided in the Contract Documents.
 2. Training objectives:
 - a. To instruct personnel in the operation and maintenance of the equipment/system. Instruction shall include step-by-step troubleshooting procedures with all necessary test equipment/system.
 - b. To instruct personnel in the removal, inspection, and cleaning of equipment/system as needed.
 - c. Training tailored to the skills and job classifications of the staff attending the classes (e.g., plant superintendent, treatment plant operator, maintenance technician, electrician, etc.).
 - d. Provide supporting documentation, such as vendor operation and maintenance manuals.
 3. Training schedule:
 - a. Schedule Owner's staff training within the constraints of their workloads. Those who will participate in this training have existing full-time work assignments, and training is an additional assigned work task, therefore, scheduling is imperative. Owner staff work schedules regularly shift, as treatment facilities are typically operated on an around-the-clock basis.
 4. Training plan:
 - a. Coordinate and arrange for manufacturer's representatives to provide both classroom-based learning and field (hands-on) training, based on training module content and stated learning objectives.
 - b. Conduct classroom training at location designated by Owner.
 - c. Scope and sequence:
 - 1) Plan and schedule training in the correct sequence to provide prerequisite knowledge and skills to trainees:
 - a) Describe recommended procedures to check/test equipment/system following a corrective maintenance repair.
 5. Training scheduling coordination:
 - a. CC is responsible for the following:
 - 1) Coordinate schedule for training periods with the Owner's personnel and manufacturer's representatives (instructors).
 - b. Complete Owner training no sooner than 15 calendar days prior to start of process start-up of each system.
 6. Meetings:
 - a. CC is responsible for setting commissioning coordination meeting dates and times, as well as preparing the agendas and meeting minutes.
 - b. CC shall meet with Engineer and Owner's designated training coordinator to develop list of personnel to be trained and to establish expected training outcomes and objectives at least 60 calendar days prior to commissioning of equipment/system.
 - c. CC shall conduct commissioning progress meetings throughout construction, to plan, scope, coordinate, and schedule future activities, resolve problems:
 - 1) Frequency: Monthly minimum. Increase frequency as needed based on complexity and quantity of commissioning activities.

7. Submittals:
 - a. Submit Training Plan Schedule 30 calendar days before the first scheduled training session, including but not limited to lesson plans, participant materials, instructor's resumes, and training delivery schedules.
 - b. Submit training documentation including the following:
 - 1) Training plan:
 - a) Training modules.
 - b) Scope and sequence statement.
 - c) Contact information for manufacturer's instructors including name, phone, and e-mail address.
 - d) Instructor qualifications.
 - 2) Training program schedule:
 - a) Format: Bar chart:
 - (1) Additionally include in the Project Progress Schedule.
 - b) Contents:
 - (1) Training modules and classes.
 8. Training sessions:
 - a. Provide training sessions for equipment/system as specified in the individual equipment/system section.
- C. Commissioning Schedule:
1. Commissioning overview:
 - a. Comply with Commissioning Roles and Responsibilities Matrix specified at the end of this Section.
 2. Submittal due date:
 - a. Submit Commissioning Schedule not less than 60 calendar days prior to planned initial commissioning of each subsystem or system.
 3. Schedule requirements:
 - a. Schedule durations and float for commissioning activities to ensure Work does not fall behind schedule due to complications or delays during commissioning.
 - b. Time-scaled network diagram detailing the work to take place in the period between 210 calendar days prior to planned initial commissioning of equipment and systems, and prior to the date of Substantial Completion, together with supporting narrative.
 - c. Provide detailed schedule of commissioning activities including durations and sequencing requirements:
 - 1) Identify the following activities:
 - a) Testing and Training Phase:
 - (1) Source Testing.
 - (2) Owner Training.
 - (3) Installation Testing.
 - (4) Functional Testing.
 - (5) Clean Water Facility Testing.
 - (6) Closeout Documentation.
 - b) Process Start-Up Phase:
 - (1) Process Start-Up.
 - (2) Process Operational Period.
 - (3) PCIS Optimization and Fine-Tuning.

- d. Schedule manufacturer's services to avoid conflict with other on-site testing or other manufacturers' on-site services.
- e. Verify that conditions necessary to allow successful testing have been met before scheduling services.

D. Installation and Functional Testing Plan:

- 1. Submit Installation and Functional Testing Plan.
- 2. Subsystem testing plans:
 - a. Submit separate testing plans for each individual subsystem and system that include the following:
 - 1) Approach to testing including procedures, schedule, and recirculation requirements.
 - 2) Test objective: Demonstrate subsystem meets the design requirements as specified in the technical sections.
 - 3) Test descriptions, forms, temporary systems (pumps, piping, etc.), shutdown requirements for existing systems, test forms, test logs, witness forms, and checklists to be used to control and document the required tests.
 - 4) Test forms: Include, but not limited to, the following information:
 - a) Tag and name of equipment/system to be tested.
 - b) Test date.
 - c) Names of persons conducting the test.
 - d) Names of persons witnessing the test, where applicable.
 - e) Test data.
 - f) Applicable project requirements.
 - g) Check offs for each completed test or test step.
 - h) Place for signature of person conducting tests and for the witnessing person, as applicable.
 - 5) Define start-up sequencing of unit processes:
 - a) Include testing of alarms, interlocks, permissives, control circuits, capacities, speeds, flows, pressures, vibrations, sound levels, and other parameters.
 - b) Provide detailed test procedures setting forth step-by-step descriptions of the procedures for systematic testing of equipment/system.
 - c) Demonstrate proper rotation, alignment, speed, flow, pressure, vibration, sound level, adjustments, and calibration:
 - (1) Perform initial checks in the presence of and with the assistance of the manufacturer's representative.
 - d) Demonstrate proper operation of each control loop function including mechanical, electrical, alarms, local and remote controls, instrumentation, and other equipment/system functions:
 - (1) Generate signals with test equipment/system to simulate operating conditions in each control mode.
 - b. Engineer approval of test plan is required prior to performing test.
 - 1) Revise and update test plans based on review comments, actual progress, or to accommodate changes in the sequence of activities.
 - 2) Submit test reports for each phase of testing for each equipment/system.

- 3) Engineer approval of preceding test reports is required prior to start of next test.
 - 4) Tests will be rescheduled if test plan is not approved by the required deadline:
 - a) Contractor is responsible for any resulting delay.
 - c. Contractor is responsible to reproduce and distribute final test procedures:
 - 1) Provide 3 copies for Engineer.
 - d. Tests may commence only after Engineer has received approved test plan copies.
 - e. Submittals:
 - 1) Submit test plans not less than 30 calendar days prior to planned installation testing of subsystem or system.
 - 2) Completed Manufacturer's Certificate of Installation and Functionality Compliance.
 - 3) Test procedures and forms: Provide signed-off copy of test forms and test reports upon completion of the test.
 - 4) Test reports:
 - a) Submit preliminary copies within 1 day after testing completion.
 - b) Submit final copies and report within 14 days after testing completion.
- E. Clean Water Facility Testing Plan:
- 1. Submit a Clean Water Facility Testing Plan equivalent to the requirements of the subsystem test plans a minimum of 45 calendar days prior to Clean Water Facility Testing.

1.07 TESTING AND TRAINING PHASE

- A. Overview of Testing and Training Phase:
- 1. General:
 - a. Include specified Source Testing, Owner Training, Installation Testing, Functional Testing, Clean Water Facility Testing, and Closeout Documentation required by this Section and the technical sections.
 - 2. Contractor responsibilities:
 - a. Furnish labor, tools, equipment, instruments, and services required for and incidental to completing commissioning activities in accordance with the approved Commissioning Plans.
 - b. Prior to testing, verify equipment protective devices and safety devices have been installed, calibrated, and tested.
 - c. Acceptable tests: Demonstrate the equipment/system performance meets the requirements stated in the Contract Documents:
 - 1) When the equipment/system fails to meet the specified requirements, perform additional, more detailed, testing to determine the cause, correct, repair, or replace the causative components and repeat the testing that revealed the deficiency.
- B. Source testing:
- 1. Also referred to as factory testing or factory acceptance testing (FAT).
 - 2. Test components, devices, and equipment/system for proper performance at point of manufacture or assembly as specified in the technical sections.
 - 3. Notify the Engineer in writing when the equipment/system is ready for source inspection and testing.

4. Source Test Plan:
 - a. As specified in this Section and other technical sections.
 - b. Source testing requirements as specified in technical sections:
 - 1) Non-witnessed: Provide Manufacturer's Certificate of Source Testing.
 - 2) Witnessed: 1 Owner's representative and 1 Engineer's representative present during testing, unless otherwise specified, and provide Manufacturer's Certificate of Source Testing.
 - c. Prepared by Contractor as a result of discussions and planning emerging from regularly conducted commissioning meetings for source tests as specified in the Contract Documents.
 - d. Provide the following items for each Source Test:
 - 1) Purpose and goals of the test.
 - 2) Identification of each item of equipment/system, including system designation, location, tag number, control loop identifier, etc.
 - 3) Description of the pass/fail criteria that will be used.
 - 4) Listing of pertinent reference documents (Contract Documents and industry standards or sections applicable to the testing).
 - 5) Complete description, including drawings or photographs, of test stands and/or test apparatus.
 - 6) Credentials of test personnel.
 - 7) Descriptions of test equipment to be used, product information, and all appropriate calibration records for the test equipment.
 - 8) Test set-up procedures.
 - 9) Detailed step-by-step test procedures:
 - a) The level of detail shall be sufficient for any witness with a rudimentary technical aptitude to be able to follow the steps and develop confidence that the tests were being performed as planned.
 - b) All steps are significant, and all steps shall be included in the procedures.
 - 10) Sample data logs and data recording forms.
 - 11) Sample computations or analyses with the results in the same format as the final report to demonstrate how data collected will be used to generate final results:
 - a) Complete disclosure of the calculation methodologies.
 - b) Include a sample for each type of computation required for the test and analysis of the results.
 - 12) Detailed outline of the Source Test report.
 - 13) Sample test reports.
 - e. Submit Source Test Plan and forms as specified in the technical sections:
 - 1) Submit a copy of the Source Test Plan at least 21 days before any scheduled test date.
 - 2) Engineer approval of Source Test Plan required prior to beginning source testing.
 - 3) Schedule the testing after approval of the Source Test Plan submittal.
 - f. Indicate the desired dates for source inspection and testing:
 - 1) Notify the Engineer of the scheduled tests a minimum of 15 days before the date of the test.
5. Test results:
 - a. Prepare and submit test results with collected data attached.

6. Contractor is responsible for costs associated with Owner's and Engineer's representatives when witnessing is specified:
 - a. Include costs for at least the following:
 - 1) Transportation:
 - a) Travel on commercial airline to and from site including related fees.
 - b) Rental car to and from airport, hotel, and test site including related fees.
 - 2) Hotel/Meals:
 - a) Hotel costs at a facility with an American Automobile Association 3-star rating or higher equivalent for single occupancy room per person per day.
 - b) Meal allowance based on government per diem guidelines per location.
 - b. If Source Test is not ready when the witnesses arrive or if the Source Test fails, the witnesses will return home with Contractor responsible for costs associated with the trip including costs described above:
 - 1) Contractor is responsible for rescheduling the Source Test and witnesses' costs associated with the second trip including costs described above.
 7. Contractor is responsible for witnesses' costs associated with retests including costs described above.
- C. Owner training:
1. Training instruction format:
 - a. The training for operations and maintenance personnel shall be provided as one entity.
 - b. Instructors shall apply adult education best practices, emphasizing learner participation and activity.
 - c. Training delivery may include problem solving, question/answer, hands-on instruction, practice, evaluation/feedback tools, and lecture.
 - d. Visual aids and hands-on practice sessions must support training objectives.
 - e. Lecturing should be less than 30 percent of class time.
 - f. Conduct hands-on instruction according to the following descriptions:
 - 1) Present hands-on demonstrations of at least the following tasks:
 - a) Proper start-up, shutdown, and normal and alternative operating strategies.
 - b) Common corrective maintenance repairs for each group.
 - c) Recommended procedures to check/test equipment/system following a corrective maintenance repair.
 - d) Preventative maintenance points.
 - e) Calibration, if applicable.
 - 2) Use tools and equipment provided by manufacturer to conduct the demonstrations:
 - a) Submit requests for supplemental assistance and facilities with the Contractor's proposed lesson plans.
 - 3) Contractor remains responsible for equipment disassembly or assembly during hands-on training situations involving equipment disassembly or assembly by Owner's personnel.

2. Class agenda:
 - a. Include the following information in the agenda:
 - 1) Instructor name.
 - 2) Listing of subjects to be discussed.
 - 3) Time estimated for each subject.
 - 4) Allocation of time for Owner staff to ask questions and discuss the subject matter.
 - 5) List of documentation to be used or provided to support training.
 - b. Owner may request that particular subjects be emphasized and the agenda be adjusted to accommodate these requests.
 - c. Distribute copies of the agenda to each student at the beginning of each training class.
3. Number of students:
 - a. Estimated maximum class size: 10-15 persons:
 - 1) Owner will determine the actual number of students.
 - 2) Engineer will provide an estimated headcount 1 week prior to the class, so that the instructor can provide the correct number of training aids for students.
4. Instructor qualifications:
 - a. Provide instructors completely knowledgeable in the equipment/system for which they are training.
 - b. Provide instructors experienced in conducting classes.
 - c. Provide instructor's technical preparation and instructional technology skills and experience.
 - d. Sales representatives are not qualified instructors unless they possess the detailed operating and maintenance knowledge required for proper class instruction.
 - e. If, in the opinion of the Owner, an appropriately knowledgeable person did not provide the scheduled training, such training shall be rescheduled and repeated with a suitable instructor.
5. Training aids:
 - a. Instructors are encouraged to use audio-visual devices, P&IDs, models, charts, etc. to increase the transfer of knowledge.
 - b. Instructors shall provide such equipment (televisions, video recorder/player, computer, projectors, screens, easels, etc.), models, charts, etc. for each class.
 - c. Instructor is responsible for confirming with Engineer and Owner in advance of each class that the classroom will be appropriate for the types of audiovisual equipment to be employed.
6. Classroom documentation:
 - a. Trainees will keep training materials and documentation after the session.
 - b. Operations and maintenance manuals, as specified in technical sections:
 - 1) Provide the quantity final Engineer-approved operations and maintenance manuals as specified in Section 01782 - Operation and Maintenance Manuals for use during the classroom instruction.
 - 2) Owner reserves the right to delay training for a particular equipment item if the operations and maintenance manuals for that equipment are incomplete, inaccurate, or otherwise unsuitable for use by the Owner's staff.
 - 3) No contract extensions or extra costs will be allowed for training delays due to operations and maintenance manual submittal delays.
 - c. Provide supplemental documentation handouts to support instruction.

- d. Digitally record audio and video of each training session:
 - 1) Include classroom and field instruction with question and answering periods.
 - 2) Engineer approval required for producer of video materials from one of the following options:
 - a) Qualified, professional video production company.
 - b) Contractor demonstrates satisfactory skill.
 - 3) Record in digital format and recording shall become property of the Owner:
 - a) Provide audio quality that is not degraded during the recording of the field sessions due to background noise, space, distance or other factors.
 - 4) Video files shall be file format and delivery medium as directed and approved by Owner.
 - 5) Provide 2 complete sets of video materials fully indexed and cataloged with printed labels stating session content and dates recorded.
 - 6) The Contractor shall provide a written release from all claims to the recorded training material produced, if required.
- e. Training modules:
 - 1) Provide a training module for each equipment category.
 - 2) Divide each training module's instructional content into discrete lesson plans.
- f. Lesson plans:
 - 1) Provide performance-based learning objectives.
 - 2) State learning objectives in terms of what the trainees will be able to do at the end of the lesson.
 - 3) Define student conditions of performance and criteria for evaluating instructional success.
 - 4) Instruction lesson plan outlines for each trade:
 - a) Provide specific components and procedures.
 - 5) Minimum requirements:
 - a) Hands-on demonstrations planned for the instructions.
 - b) Cross-reference training aids.
 - c) Planned training strategies such as whiteboard work, instructor questions, and discussion points or other planned classroom or field strategies.
 - d) Attach handouts cross-referenced by section or topic in the lesson plan.
 - e) Indicate duration of outlined training segments.
 - 6) Provide maintenance instruction lesson plans including mechanical, HVAC, instrumentation, and electrical aspects:
 - a) Equipment operation:
 - (1) Describe equipment's operating (process) function and system theory.
 - (2) Describe equipment's fundamental operating principles and dynamics.
 - (3) Identify equipment's mechanical, electrical, and electronic components and features.
 - (4) Identify support equipment associated with the operation of subject equipment.

- (5) Detail the relationship of each piece of equipment or component to the subsystems, systems, and process.
 - (6) Cite hazards associated with the operations, exposure to chemicals associated with the component, or the waste stream handled by the component.
 - (7) Specify appropriate safety precautions, equipment, and procedures to eliminate, reduce, or overcome hazards.
 - b) Detailed component description:
 - (1) Define Preventative Maintenance (PM) inspection procedures required on equipment in operation, spot potential trouble symptoms (anticipate breakdowns), and forecast maintenance requirements (predictive maintenance):
 - (a) Review preventive maintenance frequency and task analysis table.
 - (2) Identify each component function and describe in detail.
 - (3) Where applicable, group relative components into subsystems.
 - (4) Identify and describe in detail equipment safety features, permissive and controls interlocks.
 - 7) Provide the following information in equipment troubleshooting lesson plans:
 - a) Define recommended systematic troubleshooting procedures as they relate to specific craft problems.
 - b) Provide component specific troubleshooting checklists as they relate to specific craft problems.
 - 8) Provide the following information in equipment Corrective Maintenance (CM) troubleshooting lesson:
 - a) Describe recommended equipment preparation requirements as they relate to specific craft problems.
 - b) Identify and describe the use of any special tools required for maintenance of the equipment as they relate to specific craft problems.
 - c) Describe component removal/installation and disassembly/assembly procedures for specific craft repairs.
 - d) Perform at least 2 hands-on demonstrations of common corrective maintenance repairs.
 - (1) Additional demonstrations may be required by the Owner.
 - e) Describe recommended measuring instruments and procedures, and provide instruction on interpreting alignment measurements, as appropriate.
7. Class logistics:
- a. Delivery time minimum: 2 hours.
 - b. Delivery time maximum: 4 hours:
 - 1) Longer time requires Engineer approval.
 - c. Class agenda:
 - 1) Refreshment break: One 10-minute break.
 - 2) Meal break: One 45-minute break, unless otherwise specified.
 - 3) Schedule refreshment breaks and meal breaks to meet the class needs and Owner work rules.

- d. Schedule specific sessions:
 - 1) Minimum of 30 days in advance to allow Owner staffing arrangements to take place.
 - 2) At the times requested by the Owner, within the period 8 a.m. to 4 p.m. Monday through Friday:
 - a) Times scheduled will be at Owner's discretion.
 - 3) Owner approval and confirmation required for session schedules.
 - 4) Provide minimum of 2 sessions for each class unless otherwise noted:
 - a) The purpose of having multiple sessions on each class is to accommodate the attendance of as many Owner personnel working different shifts as possible.
 - b) A maximum of 1 session per day for each class.
- 8. Submittals:
 - a. Prior to the training session:
 - 1) Instructor qualifications: Due 30 calendar days prior to initial training session.
 - 2) Training course materials: Due 14 calendar days prior to initial training session:
 - a) Training agenda, lesson plan, presentation, and handouts.
 - b) Other audio-visual aids utilized during each training course.
 - c) Format: 2 electronic copies and 3 hard copies organized in notebooks.
 - b. Post training session:
 - 1) Training course materials: Due 14 calendar days after class completion:
 - a) Video recordings.
 - b) Class attendance sheet.
 - c) Training agenda, final lesson plan, presentation, and handouts.
 - d) Other audio-visual aids utilized during each training course.
 - e) Provide materials for all sessions of the class in a single transmittal.
 - f) Format: 2 electronic copies and 3 hard copies organized in notebooks.

D. Installation Testing:

- 1. Perform subsystem testing according to approved Subsystem Testing Plans.
- 2. Initiate the Manufacturer's Certificate of Installation and Functionality Compliance for all equipment:
 - a. Manufacturer's Certificate of Installation and Functionality Compliance form is included in this Section.
 - b. Manufacturer's Certificate of Installation and Functionality Compliance certifies the equipment meets the following requirements:
 - 1) Has been properly installed, adjusted, aligned, and lubricated.
 - 2) Is free of any stresses imposed by connecting piping or anchor bolts.
 - 3) Is able to be operated as necessary for Functional Testing.
 - c. Form shall be submitted after completion of Functional Testing, as specified in this Section.
- 3. Coordinate Installation Testing with restrictions and requirements as specified in Section 01140 - Work Restrictions.
- 4. Perform coating holiday testing as specified in Section 09960 - High-Performance Coatings.

5. Perform pressure and leakage testing as specified in individual component Sections and Section 15956 - Piping Systems Testing.
6. Instrumentation devices and subsystems Installation Testing: As specified below, in Section 17950 - Testing, Calibration, and Commissioning, and technical sections.

E. Functional Testing:

1. Prerequisite: Successful completion with Engineer approval of Installation Testing.
2. Complete valve and gate labeling as specified in Section 15076 - Pipe Identification prior to the start of Functional Testing.
3. Perform subsystem testing according to approved Subsystem Testing Plan.
4. Notify the Engineer 5 days prior to when the Work is ready for Functional Testing:
 - a. Perform testing in the presence of the Engineer.
5. Determine Functional Testing durations with Owner's input:
 - a. Durations will vary depending on the availability of water for testing.
 - b. Target minimum Functional Test duration: 8 hours:
 - 1) Identify equipment/system that cannot be tested for a minimum of 8 hours as specified in technical sections.
6. Perform Functional Testing as specified in technical sections:
 - a. Perform Functional Testing in addition to the other tests specified in the technical sections.
 - b. Perform Functional Testing to demonstrate that the component equipment functions as an entire system in accordance with the design requirements.
 - c. Perform Functional Testing to demonstrate that the unit process has operated in a manner necessary to demonstrate equipment/system functions manually in local, manually in remote (or remote manual), and automatically in remote (in remote auto).
 - d. Perform testing with Owner-provided water.
 - e. Repair or replace parts that operate improperly and retest.
 - f. Submit testing reports as specified in the technical sections to the Owner and Engineer for approval of Functional Testing reports.
7. Provide completed Manufacturer's Certificate of Installation and Functionality Compliance forms for all equipment:
 - a. Manufacturer's Certificate of Installation and Functionality Compliance form is included in this Section.
 - b. Manufacturer's Certificate of Installation and Functionality Compliance certifies the equipment/system meets the following requirements:
 - 1) Is suitable for satisfactory full-time operation under full-load conditions.
 - 2) Operates within the allowable limits for vibration and noise.
 - 3) Electrical and instrumentation requirements:
 - a) Electrical equipment, instrumentation, and control panels are properly installed, calibrated, and functioning.
 - b) Electrical Installation Testing is complete, and test results have been approved by the Engineer:
 - (1) Noted deficiencies have been corrected.
 - (2) Relays, circuit breakers, and other protective devices are set.

- c) Control logic for start-up, shutdown, sequencing, interlocks, control, and emergency shutdown has been tested and is properly functioning.
 - d) Motor control is calibrated and tested.
- F. Clean Water Facility Testing:
 - 1. Utilize plant water.
 - 2. Prerequisite: Successful completion with Engineer approval of Functional Testing.
 - 3. Test entire facility with recirculating water supply at the design flow for the largest single process or system train to ensure proper complete facility (equipment/system) hydraulic performance.
 - 4. Perform testing in the presence of the Engineer unless such presence is expressly waived in writing.
 - 5. The purpose of Clean Water Facility Testing is to confirm extended equipment/system operation prior to process start-up:
 - a. Testing shall occur for a minimum of 7 days with all systems operational to the extent possible.
 - 6. Reset to condition prior to testing:
 - a. Remove, clean and replace permanent and temporary filters and strainers in pipeline systems.
 - b. Replace HVAC filters, dewater and clean sumps.
 - c. Dewater process units, where directed by the Engineer.
- G. Closeout documentation submittals:
 - 1. Provide records generated during Commissioning Phase of Project including but not limited to:
 - a. Training documentation.
 - b. Manufacturer's Certificate of Source Testing.
 - c. Manufacturer's Certificate of Installation and Functionality Compliance.
 - d. Daily logs of equipment/system testing identifying tests conducted and outcome.
 - e. Test forms and documentation.
 - f. Functional Testing results.
 - g. Logs of time spent by manufacturer's representatives performing services on the job site.
 - h. Equipment lubrication records.
 - i. Electrical phase, voltage, and amperage measurements.
 - j. Insulation resistance measurements.
 - k. Bearing temperature measurements.
 - l. Data sheets of control loop testing including testing and calibration of instrumentation devices and setpoints.
 - m. Provide: electronic copies
 - n. Due date: Within 14 calendar days of Substantial Completion.

1.08 PROCESS START-UP PHASE

- A. Overview of Process Start-Up Phase:
 - 1. Operating the facility to verify performance meets the Contract Document requirements.

- B. Process Start-Up:
1. Prerequisite: Successful completion with Engineer approval of Clean Water Facility Testing.
 2. Perform process start-up in the presence of the Engineer.
 3. Pre-start-up activities and submittals:
 - a. Commissioning Documentation and Data Review.
 - b. Start-Up Go/No-Go Decision Criteria.
 - c. Building and Fire Inspection Compliance Check.
 - d. Process Start-Up Sequence Review.
 - e. Process Start-Up plan for review by Engineer not less than 30 calendar days prior to planned commencement of process start-up activities.
 - 1) Include the following:
 - a) Pre-start-up activities.
 - b) Process Start-Up.
 - c) Process Operational Period.
 - d) PCIS Optimization and Fine-Tuning.
 - f. Description of Temporary Testing Arrangement, if applicable.
 - g. Final Process Start-Up Forms and Documentations.
 - h. Final Operational Testing Plan.
 4. Control loop tuning:
 - a. Perform control loop tuning during system testing with water to the extent possible.
 5. Process area start-ups:
 - a. Process start-up individual process areas comprised of multiple interdependent systems where possible and beneficial to reduce complexity and risk of complete facility testing.
 - b. Process area test flows may be limited by upstream and downstream process constraints (i.e., tank and basin volumes) and/or localized recirculation capabilities.
 6. Facility-wide process start-up:
 - a. Upon approved completion of pre-start-up activities, perform entire facility process start-up:
 - 1) Complete control loop tuning during this phase of process start-up.
 - 2) Continue process start-up operations until facility meets or exceeds the Contract requirements.
 - b. HVAC systems start-up and testing:
 - 1) Test complete HVAC system for the facility.
 - c. Ancillary systems start-up and testing:
 - 1) Test complete security system, phone system, fire alarm system, etc. for the facility.
 - d. Remaining equipment/system tests:
 - 1) Conduct remaining specified equipment/system performance tests that could not be performed during the Testing and Training Phase due to inter-system and/or treatment process dependencies.
- C. Process Operational Period:
1. Prerequisite: Successful completion with Engineer approval of Process Start-Up.
 2. Prior to beginning the Process Operational Period:
 - a. Conformance with treatment standards is required prior to Operational Testing, if applicable.
 - b. Correct any outstanding punch list items prior to the Operational Testing.

3. Duration: 7 calendar days.
4. Engineer will be present for process operational period unless such presence is expressly waived in writing.
5. Prove facility conformance with Contract Document requirements.
6. Contractor to provide:
 - a. Specified start-up materials and operating supplies.
 - b. Necessary craft of labor assistance, in the event of an emergency equipment failure requiring immediate attention (emergency is defined as a failure of function which precludes the further operation of a critical segment of or the whole of the Work) with a response time of not more than 4 hours from the time of notification.
 - c. Manufacturer's authorized representative to supervise placing equipment/systems in operation and provide guidance during Operational Testing per applicable section.
 - d. Necessary manufacturer's representatives and operating supplies for retesting systems that fail to pass the initial Operational Testing due to deficiencies in products of workmanship at no additional cost to the Owner.
 - e. List of 24-hour "on-call" representative supervisory persons who will monitor the Operational Testing and serve as liaison for the Engineer and Owner.
7. Owner will provide:
 - a. Operations personnel for duration of test.
8. Contractor's CC shall oversee Process Operational Period:
 - a. Owner staff will operate the completed Project construction.
 - b. Entire system shall continuously meet performance requirements and shall operate without fault, failure, or defect for a continuous period.
 - c. Individual equipment/system failures that are corrected within 24 hours and do not prevent the entire project from continuously satisfying the established operational requirements shall not require the consecutive day test to be restarted unless the failure recurs.
 - d. Restart the consecutive test period for any of the following conditions:
 - 1) Any failure of the complete Project construction to meet operational requirements.
 - 2) When malfunctions or deficiencies cause shutdown or partial operation of the facility, or results in failure of the complete Project construction to meet operational requirements.
 - 3) Any individual equipment/system failure that meets any of the following conditions:
 - a) Requires more than 24 hours to correct, unless otherwise specified in Section 17950 - Testing, Calibration, and Commissioning.
 - b) Recurs within the 24-hour correction period requiring further correction.
 - 4) Immediately correct defects in material, workmanship, or equipment/system which became evident during Operational Testing.

D. PCIS Optimization and Fine-Tuning:

1. Prerequisite: Successful completion with Engineer approval of Process Operational Period.

2. Test PCIS system for additional 60 days as specified in Section 17950
- Testing, Calibration, and Commissioning to identify issues and make corrections, as needed.
3. ~~Permitting approval of PCIS Optimization and Fine-Tuning results required for Final Completion.~~^{AD3}

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

MANUFACTURER'S CERTIFICATE OF SOURCE TESTING

OWNER _____ EQPT/SYSTEM _____
PROJECT NAME _____ EQPT TAG NO. _____
PROJECT NO. _____ EQPT SERIAL NO. _____
SPECIFICATION NO. _____
SPECIFICATION TITLE _____

Comments: _____

I hereby certify Source Testing has been performed on the above-referenced equipment/system as defined in the Contract Documents, and results conform to the Contract Document requirements. Testing data is attached.

Date of Execution: _____, 20____

Manufacturer: _____

Manufacturer's Authorized Representative Name (*print*): _____

(Authorized Signature)

If applicable, Witness Name (*print*): _____

(Witness Signature)

**MANUFACTURER'S CERTIFICATE OF
INSTALLATION AND FUNCTIONALITY COMPLIANCE**

OWNER _____ EQPT/SYSTEM _____
PROJECT NAME _____ EQPT TAG NO. _____
PROJECT NO. _____ EQPT SERIAL NO. _____
SPECIFICATION NO. _____
SPECIFICATION TITLE _____

I hereby certify the installation and function of the above-referenced equipment/system as defined in the Contract Documents. The above-referenced equipment/system has been: (Check Applicable)

- ☐ Installed in accordance with manufacturer's recommendations.
- ☐ Inspected, checked, and adjusted.
- ☐ Serviced with proper initial lubricants.
- ☐ Electrical/instrumentation and mechanical connections meet quality and safety standards.
- ☐ All applicable safety equipment has been properly installed.
- ☐ Functionally tested.
- ☐ System has been performance tested, and meets or exceeds specified performance requirements.

NOTES: Attach test results with collected data and test report.

Attach written certification report prepared by and signed by the electrical and/or instrumentation subcontractor.

Comments: _____

I, the undersigned manufacturer's representative, hereby certify that I am (i) a duly authorized representative of the manufacturer, (ii) empowered by the manufacturer to inspect, approve, and operate this equipment/system, and (iii) authorized to make recommendations required to ensure that the equipment/system furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.

Date: _____

Manufacturer: _____

Manufacturer's Authorized Representative Name (*print*): _____

By Manufacturer's Authorized Representative: _____
(Authorized Signature)

COMMISSIONING

COMMISSIONING ROLES AND RESPONSIBILITIES MATRIX

NO.	TASK	OWNER	CONTRACTOR	ENGINEER
Testing and Training Phase				
Source Testing				
1	Source Testing	No Action	Lead	Witness, Review
Installation Testing				
2	Electrical Conductor Testing	No Action	Lead	Witness
3	Electrical Field Acceptance Tests	No Action	Lead	Witness
4	Instrument Field Calibration	No Action	Lead	Witness
5	Network Installation Testing	Witness	Lead	Witness
6	Loop Testing	Witness	Lead	Witness
7	Pressure Testing	No Action	Lead	Witness
8	Leak Testing	No Action	Lead	Witness
9	Holiday Testing	No Action	Lead	Witness
10	HVAC Testing	No Action	Lead	Witness
11	Motor Electrical Testing	No Action	Lead	Witness
Functional Testing				
12	Network Operational Testing	Witness	Lead	Review
13	Preliminary Run Testing Local/Manual Control	Witness	Lead	Review
14	PCIS Functional Demonstration Testing - Local/Auto Control Testing - Remote/Manual Contact Testing - Alarm Testing - Control Loop Testing	No Action	Lead	Review
15	Subsystem Start-Up and Testing	Witness	Lead	Review
16	Equipment/System Start-Up and Testing	Witness	Lead	Review
17	HVAC Start-Up and Testing	Witness	Lead	Review
18	Corrosion Control Start-Up and Testing	Witness	Lead	Review
19	Wide Area Network Communications Testing	Support	Lead	Witness
20	Manufacturer's Certificate of Installation and Functionality Compliance	No Action	Lead	Witness, Review
Clean Water Facility Testing				
21	Test Water Management Plan Finalization	Support	Lead	Review
22	Clean Water Facility Testing	Witness	Lead	Witness, Review

NO.	TASK	OWNER	CONTRACTOR	ENGINEER
Testing and Training Phase				
Process Start-Up Phase				
Process Start-Up				
23	Commissioning Documentation and Data Review	Review	Support	Lead
24	Start-Up Go/No-Go Decision Criteria	Lead	Support	Review
25	Building and Fire Inspection Compliance Check	No Action	Lead	Witness
26	HVAC Functionality Check	No Action	Lead	Witness
27	Start-Up Sequence Review	Support	Lead	Review
28	Temporary Testing Arrangement Finalization	Support	Lead	Support
29	Start-Up Forms Finalization	Support	Lead	Support
30	Operation Testing Plan Finalization	Review	Support	Lead
31	Test Water Management Plan Finalization	Support	Lead	Review
32	System Testing	Support	Lead	Witness
33	Control Loop Tuning	Support	Lead	Witness
34	Process Area Start-Ups	Support	Lead	Witness
35	Facility-Wide Start-Up	Support	Lead	Witness
36	Process Control Systems Testing	Support	Lead	Witness
38	HVAC Final Testing, Adjust, and Balancing	Witness	Lead	Witness, Review
Process Operational Period				
39	Operational Testing	Support	Lead	Witness, Review
40	Final Testing Reports	Support	Lead	Review
41	Water Quality Testing and Documentation	Support	Lead	Review
PCIS Optimization and Fine-Tuning				
42	As specified in Section 17950 - Testing, Calibration, and Commissioning	Support	Lead	Review
Legend: Lead: Primarily responsible for organization, coordination, and execution of task work product or result. Support: Assist the lead with organization, coordination, and execution of task work product or result. Witness: Observe and document completion of task work product or result. Review: As necessary to accept task work product result. No Action: Limited or no involvement.				

AD3 Addendum No. 3

SECTION 13206A

FIBERGLASS REINFORCED PLASTIC ABOVEGROUND STORAGE TANKS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Fiberglass reinforced plastic aboveground storage tanks.

1.02 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. B16.1 - Gray Iron Pipe Flanges and Flanged Fittings, Classes 25, 125, and 250.
 - 2. B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24.
 - 3. RTP-1 - Reinforced Thermoset Plastic Corrosion Resistant Equipment.
- B. ASTM International (ASTM):
 - 1. D2240 - Standard Test Method for Rubber Property-Durometer Hardness.
 - 2. D3299 - Standard Specification for Filament-Wound Glass Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks.
 - 3. D4097 - Standard Specification for Contact-Molded Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks.

1.03 DESIGN CRITERIA

- A. Design tanks in accordance with ASTM D3299, follow the procedures and methods, utilize the equations and formulas, and incorporate safety factors and allowable design stresses and strains set forth in ASME RTP-1 and other design requirements as specified in Section 06608 - Fiberglass Reinforced Plastic.
- B. Dechlorination Storage Tanks:
 - 1. Two by 12-foot diameter tanks, with nominal storage capacity of 12,000 gallons.
- C. Coagulant Storage Tanks:
 - 1. Two by 12-foot diameter tanks, with nominal storage capacity of 12,000 gallons.
- D. Normal/maximum 80/150 degrees Fahrenheit.
- E. Static head of contents.
- F. Chemical environment: Product shall be resistant to corrosion by cationic and anionic polymers used in the wastewater field as specified:
 - 1. Dechlorination Storage System:
 - a. Chemical: Sodium Bisulfite, NaHSO_3 .
 - b. Concentrations: 20 to 45 percent.
 - c. Specific Gravity: 1.2 to 1.4.

- d. Temperature: 40-110 degrees Fahrenheit.
 - e. pH levels: 3-5.
- 2. Coagulant System:
 - a. Chemical: Liquid, Aluminum Sulfate, $\text{Al}_2(\text{SO}_4)_3 \cdot 49.6 \text{ H}_2\text{O}$.
 - b. Concentrations: 30-50 percent (Al_2O_3).
 - c. Specific Gravity: 1.33.
 - d. Temperature: 40-110 degrees Fahrenheit.
 - e. pH levels: 5.5-7.5.
- G. Fire retardancy required.
- H. Seismic design criteria shall be as specified in Section 01612 - Seismic Design Criteria.
- I. Wind design criteria shall be as specified in Section 01614 - Wind Design Criteria.
- J. Platforms, Stairs, Walkway, and Grating criteria shall be as specified in Section 06611 – Fiberglass Reinforced Plastic Fabrications.
- K. Dead loads 20 psf, live loads 100 psf. Tank wall structural design shall not include corrosion barrier thickness in design calculations for the structural wall thickness required to meet design loads as specified in this Section.
- L. Support conditions as indicated on the Drawings.

1.04 SUBMITTALS

- A. Submit as specified in Section 06608 - Fiberglass Reinforced Plastic.
- B. Engineering design calculations for restraint and anchoring system signed by a civil or structural engineer registered in the state where the project is located.

1.05 QUALITY ASSURANCE

- A. Manufacturer qualifications: Manufacturer of proposed corrosion-resistant fiberglass reinforced plastic structures for a minimum of 5 years with satisfactory performance record as specified in Section 06608 - Fiberglass Reinforced Plastic.
- B. The manufacturer-approved installer shall have installed products of similar fiberglass reinforced plastic equipment on a minimum of 5 projects with a satisfactory performance record.
- C. Manufacturer shall be ASME RTP-1 certified, and tanks shall be stamped as ASME RTP-1.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. One of the following or equal:
 - 1. Ershigs, Inc.

2.02 MATERIALS

- A. Materials as specified in Section 06608 - Fiberglass Reinforced Plastic:
 - 1. Submit manufacturer's data sheets for each resin used to verify compatibility of the resin with the product the tank will be storing.
- B. Resin:
 - 1. For fire-retardant applications:
 - a. Premium grade vinyl ester resin as recommended by the resin manufacturer for the specific operating environment.
 - b. Add antimony trioxide or pentoxide for Class I fire rating to the structural laminate only.
 - c. Manufacturers: One of the following or equal:
 - 1) Derakane, 510B.
 - 2) Ineos/Ashland, Hetron 992FR.
 - 3) Interplastic, VE 8440.
 - 4) Reichhold Dion, VER 9300FR.
- C. Minimum corrosion liner:
 - 1. 1 "C" or synthetic veil.
 - 2. In addition to 1 "C" or synthetic veil, include 1-1/2 ounces per square foot mat to a total minimum thickness of 0.096 inches on surfaces exposed to the service environment.
- D. Ultra-violet stabilizer: Add to the resin used in the wax coat for exterior surfaces in the type and amount recommended by the resin manufacturer.

2.03 FABRICATION

- A. Fabrication method: Hand lay-up or filament wound at construction with integral molded bottom knuckle in accordance with applicable portions of Section 06608 - Fiberglass Reinforced Plastic:
 - 1. Follow manufacturer's recommendations for BPO/DMA and post cures.
- B. Structural section with internal veil: Prohibited.
- C. Color: Ferro Gel Coat Color to be White.
- D. Tank rim reinforced support: Capable of supporting portable clamp-on agitator sized for particular tank, sturdy enough to support operating agitator without excessive vibration.
- E. Legs and tie-down lugs: Components laminated onto tank wall shall be Type 316 stainless steel.
- F. Anchor bolts: Type 316 stainless steel, of size and length recommended by tank manufacturer.

- G. Flanges:
1. All flange dimensions, except thickness, and bolting shall conform to the following standards:
 - a. 2 inches through 24 inches: ASME B16.5 Class 150.
 - b. 30 inches through 42 inches: ASME B16.1 Class 125.
 2. Flange faces shall be perpendicular to the centerline of the duct within 1 degree and shall be flat to plus or minus 1/32-inch up to and including 18-inch equivalent diameter and plus or minus 1/16-inch for equivalent diameters greater than 18 inches:
 - a. The minimum flange shear thickness shall be 4 times the flange thickness.
 - b. The flange thickness shall be 25 pounds per square inch pressure-rated flanges.
 3. Flanges shall be made by hand lay-up construction with nozzle neck and flange made integrally in 1 piece as specified in Section 06608 - Fiberglass Reinforced Plastic.
 4. Press molded or filament-wound flanges not allowed.
 5. Use 1/8-inch thick full-faced elastomeric gaskets having a Shore A Durometer hardness of 60, within plus or minus 5, in accordance with ASTM D2240 for flanged joints.
 6. Elastomer specified by Fabricator to be resistant to chemical environment.
- H. Gussets:
1. Reinforce nozzles, except manways, with plate or conical gussets to match piping.
 2. Conical gussets having comparable strength may be substituted for plate gussets.
- I. Reinforcement of nozzle and manhole openings in vessel walls:
1. In accordance with ASTM D3299 for filament wound vessels or ASTM D4097 for contact-molded, hand lay-up vessels as specified in Section 06608 - Fiberglass Reinforced Plastic.
 2. When reinforcing materials are cut to facilitate placement around an installed nozzle or opening, stagger joints in successive reinforcing layers to avoid overlapping and do not place so that the joints are parallel to the axis of the tank:
 - a. The principal fiber direction of the woven roving reinforcement (0 degree/90 degree) shall be parallel to the tank axis.
- J. Cover: Hinged lid:
1. Platforms and ladders: As indicated on the Drawings.
- K. Fall protection:
1. Provide safety harness tie-off points: at top of tank that is within reach from top of ladder.
- L. Tank Insulation:
1. Tank insulation shall be as scheduled and as specified herein.
 2. Material: Closed cell polyurethane foam.
 3. Thickness: 2 inches minimum.
 4. Density: 2.5 pounds per cubic foot minimum.

5. Factory Applied:
 - a. Insulation shall have an "R" factor of approximately 12. All "R" factors shall be calculated exclusive of tank wall values.
 - b. Insulation shall be of uniform density and thickness in order to avoid area of incalculable heat loss.
 - c. The insulation shall be covered with a 120 mil thick fiberglass laminate with the same resin used in the construction of the tank. The laminate shall consist of 100 mil chopped strand mat and 20 mil C-veil surfacing veil.
 - d. All nozzles and fittings shall have insulation placed around layup areas.
 - e. Insulated tank shall have a minimum of one external horizontal expansion joint to accommodate thermal expansion. Expansion joints shall be designed to prevent seepage from wind-blown rain.
 - f. Insulation, as specified above, shall be furnished for the exterior tank sides and dished top. For the tank bottom, the tank manufacturer shall furnish sufficient quantities of roofing felt.
 - g. Insulated tank shall be furnished with an exterior pigmented protective gel coat. Color of the protective gel shall be white or as selected by the ENGINEER from color chips furnished by the tank manufacturer.

M. Tank Electrical Heat Tracing:

1. Tank heat tracing shall be as scheduled and as specification herein.
2. Tank shall be fitted with self-regulating heat tracing system.
3. Heat tracing shall be Chemelex self-regulating heat tracing type BTV-CR by Raychem, or equal.
4. Materials and equipment:
 - a. Standard product of a manufacturer regularly engaged in the manufacture of the product.
 - b. Manufactured and tested in conformance to the manufacturer's published quality control program and quality assurance manual.
5. Components:
 - a. Factory Mutual approved for the application.
 - b. Conform to ANSI/IEEE 515 and National Electric Code.
6. Provide a maximum temperature of 150 degrees Fahrenheit against the tank wall.
7. Thermostatically controlled and adjustable to maintain tank liquid contents temperature between 50 and 75 degrees Fahrenheit.
8. Parallel type.
9. Self-regulating (such that power output varies inversely as a function of temperature, over the entire length of the heater cable).
10. NEC rating: T-6.
11. Manufacturers name, product code, voltage, and manufacture batch number shall be printed on the outer jacket.
12. Heat tracing shall be radiation cross-linked to insure stability.
13. Components shall include:
 - a. Ground braid.
 - b. Heater cable.
 - c. Thermostat.
14. Ground Braid:
 - a. Tin plated copper wires for installation on the non-metallic tanks.
 - b. Equivalent cross-sectional area at least equal to one of the heat trace bus wires.

- c. Maximum resistance: 3.0 ohms per 1,000 feet of heat trace.
 - d. Cover at least 80 percent of the primary jacket of the heat trace.
 - e. Have a continuous outer jacket.
 - f. Electrically grounded at the temperature control panel.
15. Heater cable:
- a. Attached to the bottom 1/3 of the tank shell using 2-inch-wide aluminum tape applied under and over the entire length of the heater cable to ensure adequate thermal conductance.
 - b. Installed in a spiral fashion around the tank.
 - c. Incorporated with a short wave or "hump" at regular intervals to ensure that the heater cable shall not be stretched or snapped in the event of tank wall expansion.
 - d. Install end deal over the ends of the heat tracing cable.
16. Controller:
- a. To be located in a NEMA 4X Box (316 SST).
 - b. Shall display the following information:
 - 1) Temperature Setpoint.
 - 2) Actual Temperature.
 - 3) Faults.
 - 4) Alarms.
 - 5) ON/OFF Indication.
 - c. Panel shall have visual and audible alarms for faults and alarms.

2.04 VESSEL ASSEMBLY

- A. All cutouts from the equipment shall be marked, indicating their original location, and retained. All cutouts shall become the property of the Owner.
- B. Do not remove centerlines marked on the equipment for use in assembly until after inspection by the Engineer.
- C. Install flanged nozzles with bolt holes straddling principal centerlines of the vessel:
 - 1. For tank tops, nozzle bolt holes straddle radial centerlines.
- D. When requested, Fabricator shall supply to the Owner, at the earliest possible time, a template which locates anchor bolt holes within plus or minus 1/8 inch for each vessel.
- E. Where specified, a non-skid surface shall be provided on the exterior surface of the cover:
 - 1. Silica grit may be applied in conjunction with the final resin coat.
 - 2. Other methods may be submitted.
- F. Furnish and overlay on the outside of the equipment a plastic nameplate showing the following information:
 - 1. Name of manufacturer.
 - 2. Date of manufacture.
 - 3. Owner's purchase order number.
 - 4. Equipment name/number.
 - 5. Resin number and manufacturer.
 - 6. Design pressure and temperature.
 - 7. Vessel diameter, height, and weight.

- G. Butt joints or shell joints shall be in the number and location(s) as indicated on the fabrication drawings:
 - 1. Additional joints are not allowed.
 - 2. Slip joints, "mod joints," or other methods not conforming to the fabrication drawings are not allowed.
 - 3. If joint locations are not indicated on the fabrication drawings, Fabricator shall submit number and location.
- H. Allowable tolerances shall be in accordance with ASTM D3299 or ASTM D4097, except as modified in this Section or on the fabrication drawings.
- I. When joining components, gaps at mating edges shall be limited to 1/4-inch maximum, and misalignment of inside surfaces shall not exceed 1/3-inch of the lesser wall thickness.
- J. The outside surface of vessel flat bottoms after assembly shall be flat within plus or minus 1/2-inch. In addition, localized indentations or protrusions shall not exceed plus or minus 1/4-inch within 2 feet.

2.05 IDENTIFICATION

- A. Identification of the health, flammability, and reactivity of hazardous materials shall be affixed to each tank, as specified in Section 10400 - Signage.

PART 3 EXECUTION

3.01 TANK INSTALLATION

- A. For flat bottom vessels without legs, the foundation must provide full non-elastic support to the flat bottom, preferably through the use of grout, which will allow continuous support even though surfaces may not be flat.
- B. All anchor lugs or leg pads shall be set on a 1-inch-thick layer of non-shrink grout:
 - 1. Do not use hard shim to fill void between the lugs and foundation.
- C. Unless otherwise agreed, independently support all piping so as not to apply loads to the vessel nozzles.
- D. Isolate potential load due to thermal expansion of piping from the vessel.
- E. During installation, do not force piping into alignment, which can create excessive stresses in the tank.
- F. Do not mate raised-face flanges or ring gaskets to full-faced fiberglass reinforced plastic nozzles.
- G. Vertically support ladders at the tank foundation or platform:
 - 1. Ladder lugs attached to the vessels shall provide lateral support only.
- H. Where tank foundations are cut out to accommodate full bottom drains, fill the cutout area after tank installation with grout or other material that will provide localized support.

3.02 TANK SCHEDULE

A. Tank Design Criteria:

	TK-1521 TK-1522	TK-1801 TK-1802
Diameter (ft)	12	12
Rated Volume (gallons)	12,000	12,000
Configuration	Vertical, domed top, flat bottom	Vertical, domed top, flat bottom
Chemical Service	30 to 50 percent aluminum sulfate solution	25 to 45 percent sodium bisulfite solution
Chemical Specific	1.2 to 1.5	1.2 to 1.4
Insulated	No	Yes
Heat Traced	No	Yes (Maintain Temperature of 80 degrees Fahrenheit with ambient Conditions per Section 01600.
<u>Notes:</u> Tanks shall be designed for atmospheric pressure and must be vented. Tank shall be designed to operate under a minimum internal pressure of 18 inches of water column, caused by the fume scrubber.		

B. Tanks Fittings:

	TK-1521 TK-1522		TK-1801 TK-1802	
	Number	Size (inches)	Number	Size (Inches)
Inlet Fill Piping Nozzle	1	2	1	2
Fill Piping Vent Nozzle	N/A	N/A	1	2
Outlet Process Nozzle	1	2	1	4
Drain Nozzle	1	2	1	4
Overflow Nozzle	1	4	1	4
UltraSonic Level Sensor Nozzle	1	3	N/A	N/A
Sight Level Gauge Nozzle	2	3	2	3
Tank Vent Nozzle	1	6	1	3
Vent from skids	1	2	1	2
Roof Manway	1	24	1	24
Sidewall Manway	1	30	1	30
<u>Notes:</u> (1) All connections shall be flanged.				

END OF SECTION

AD3 Addendum No. 3

SECTION 17950

COMMISSIONING FOR INSTRUMENTATION AND CONTROLS

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PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Testing requirements that apply to process control and instrumentation systems for the entire Project.

1.02 REFERENCES

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.
- B. Electronics Industries Alliance (EIA).
- C. Telecommunications Industry Association (TIA).

1.03 DEFINITIONS

- A. As specified in Sections 01756 - Commissioning and 17050 - Common Work Results for Process Control and Instrumentation Systems.
- B. Specific definitions:
 - 1. Complete End-to-End Testing (CEET) - Signals are tested from the field device through the PLC program, the network, and all the way to the operator's HMI graphic screens.
 - 2. Loop Validation Tests - Signals are tested from the field device to the PLC.
 - 3. Platform Testing: Testing of the PLC and SCADA/HMI at the manufacturer's shop to demonstrate the program's functionality based upon specified and designed control requirements.
 - 4. PTO: Profibus Trade Organization.

1.04 SYSTEM DESCRIPTION (NOT USED)

1.05 SUBMITTALS

- A. Furnish submittals as specified in Section 01330 - Submittal Procedures.
- B. General:
 - 1. Reference additional detailed test submittal scheduling and prerequisite requirements as specified in the Sequencing article of Section 17050 - Common Work Results for Process Control and Instrumentation Systems.

1.06 QUALITY ASSURANCE

- A. Test personnel:
 - 1. Furnish qualified technical personnel to perform all calibration, testing, and verification. The test personnel are required to be familiar with this Project and the equipment, software, and systems before being assigned to the test program.

1.07 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.08 PROJECT OR SITE CONDITIONS (NOT USED)

1.09 SEQUENCING (NOT USED)

1.10 SCHEDULING

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.

1.11 WARRANTY (NOT USED)

1.12 SYSTEM START-UP (NOT USED)

1.13 OWNER'S INSTRUCTIONS (NOT USED)

1.14 MAINTENANCE (NOT USED)

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 EXAMINATION (NOT USED)

3.02 PREPARATION (NOT USED)

3.03 INSTALLATION

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.
- B. Installation supervision:
 - 1. Provide as specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.

3.04 ERECTION, INSTALLATION, APPLICATION, CONSTRUCTION (NOT USED)

3.05 REPAIR/RESTORATION (NOT USED)

3.06 COMMISSIONING

- A. Commissioning as specified in Section 01756 - Commissioning.
- B. Testing and training phase:
 - 1. Source testing:
 - a. Manufacturer services: Provide as specified in the table below.

Section Number	Section Title	Source Testing (Witnessed or Non-Witnessed)
17055 (N/A)	Packaged Control System	Non-Witnessed
17100	Control Strategies	
17101	Specific Control Strategies	Witnessed
17710	Control Systems - Panels, Enclosures, and Panel Components	Witnessed
17950	Commissioning for Instrumentation and Controls	Witnessed

- b. Prerequisite requirements:
 - 1) Engineer approval of the hardware and equipment source testing submittal, Manufacturer Certificate of Source Testing, is required before proceeding to Preliminary FAT.
- c. Preliminary FAT (Pre-FAT):
 - 1) The purpose of the Pre-FAT is to provide assurance that the HMI/SCADA system is ready for the full, witnessed FAT, in terms of both stability and functionality:
 - a) Debugging of software and troubleshooting of hardware shall occur during and before the pre-FAT, not during the FAT.
 - b) Contractor shall fully test the HMI/SCADA system and fix all deficiencies found before the FAT.
 - 2) Conduct utilizing test procedures approved by Engineer.
 - 3) Owner shall have the right to witness any or all of the Pre-FAT testing and shall be notified in writing 20 days before the start of the pre-FAT.
 - 4) Submit a letter, signed by the Contractor's project manager or company officer, certifying that integrated system hardware and software has been tested and confirmed to be fully operational and in compliance with the requirements specified in the Contract Documents and is fully ready for the full, witnessed FAT:
 - a) Attach the completed pre-FAT test forms, signed by the Contractor's staff.
 - 5) Engineer approval of the pre-FAT submittal is required before proceeding to FAT.
- d. FAT hardware and communications testing:
 - 1) Perform tests to show that the integrated system hardware and software is fully operational and in compliance with the requirements specified in the Contract Documents.
 - 2) The complete PCIS system including operator stations, servers, network equipment, printers, PCMs, PLCs, RTUs, LCPs, CCS, peripherals, communications equipment, and other HMI/SCADA equipment, shall be assembled, connected, and software loaded for a fully functional FAT of the integrated system.
 - 3) Testing simulation:
 - a) Inputs and outputs shall be simulated and proper control and system operation shall be validated.
 - b) FAT shall make use of simulators that contain switches, pilot lights, variable analog signal generators, and analog signal level

displays, which shall be connected to the I/O points within the HMI/SCADA system:

- (1) The use of jumper wires, terminal block mounted pilot lights, and loose meters to act as or supply the functionality of a simulator shall not be allowed.
 - (2) The simulator may consist of a PLC, operating under an HMI/SCADA software package, or other approved software that has its I/O points wired to PLC's I/O points.
 - (3) Software operating on a PC may then act as the switches, pilot lights, variable analog signal generators, and analog signal level displays.
- 4) Additional source tests are specified in other sections of the Instrumentation and Control Specifications.
 - 5) Owner shall have the right to witness any or all of the FAT testing and shall be notified in writing 20 days before the start of the FAT.
 - 6) Verify communications between the hardware and the programmer's software comply with specified requirements:
 - a) For systems that contain RTUs or remote communications with other devices, the complete communications system must be factory tested, including actual interfacing with telephone company equipment and/or the actual radios used for radio-based telemetry systems.
 - 7) Panel inspections:
 - a) Engineer will inspect each control panel for completeness, workmanship, fit and finish, and compliance with the Contract Documents and the accepted shop drawings:
 - (1) Inspection to include, as a minimum: Layout, mounting, wire and data cable routing, wire tags, power supply, components and wiring, I/O components layout (including terminals, wiring and relays), device layout on doors and front panels, and proper ventilation operation.
 - b) Inspection forms:
 - (1) Provide panel inspection forms as part of the FAT procedures submittal.
 - (2) A sample FAT control panel form has been provided at the end of this Section.
 - 8) I/O test:
 - a) Engineer will verify that I/O is properly wired to field terminals and is properly mapped into the PLC and the rest of the SCADA system, including all operator interface devices.
 - b) Test methodology:
 - (1) Discrete inputs:
 - (a) Apply appropriate input from simulator at panel terminal, observe input card indicator, observe data value at each indicated data address, and observe data received at field wiring terminals or operator interface screen.
 - (2) Discrete outputs:
 - (a) Issue commands from operator interface screen or PLC, verify output card indicator light, and measure response at field wiring terminals or multimeter.

- (3) Analog inputs:
 - (a) Apply appropriate analog input signal at panel terminals on simulator, observe data value at each indicated data address, and observe data properly received at field wiring terminals or operator interface screen.
 - (b) Check each point at 0 percent, 50 percent, and 100 percent of scale.
- (4) Analog outputs:
 - (a) Enter scaled values in the output buffer file, observe the output data file value, and measure appropriate response at field wiring terminals or multimeter.
 - (b) Check each point at 0 percent, 50 percent, and 100 percent of scale.
- c) Test forms to include, but not be limited to the following data:
 - (1) PLC and panel number.
 - (2) I/O type.
 - (3) I/O tag name.
 - (4) Rack/slot/number of I/O point.
 - (5) Check-off for correct response for each I/O point.
 - (6) Comments field.
 - (7) Initials of individual performing test.
 - (8) Date test was performed.
 - (9) Witness signature lines.
- 9) System configuration test:
 - a) Demonstrate and test the setup and configuration of operator stations, servers, development stations, and peripherals.
 - b) Demonstrate utility software and functions, such as virus protection, backup, optical drive burning, network monitoring, etc.
 - c) Demonstrate the proper operation of peripheral hardware.
 - d) Demonstrate general HMI/SCADA functions.
 - e) Demonstrate proper operation of log-on and other security access functions.
 - f) Demonstrate the proper operation of all historical data storage, trend, display, backup, and report functions.
 - g) Test automatic fail over of redundant equipment.
 - h) Demonstrate the proper operation of the alarm display and acknowledgement functions.
 - i) Test forms:
 - (1) For each test, list the specification page and paragraph of the function demonstrated, and provide a description of the function.
 - (2) List the specific tests and steps to be conducted.
 - (3) For each function, list all of the different sub-functions or ways the function can be used, and provide a test check-off for each:
 - (a) Include signature and date lines.
- 10) Engineer approval of the FAT Communication Testing activities is required before proceeding to FAT Platform Testing.

- e. FAT Platform Testing - Control logic test:
 - 1) Verify the PLC, HMI and SCADA, provides monitoring and control functionality based upon specified and designed control requirements.
 - 2) Testing requirements:
 - a) Demonstrate each function described in the Control Strategies.
 - b) Demonstrate in detail how each function operates under a variety of operating scenarios:
 - (1) Test to verify the application of each general control strategy function to each specific control strategy or loop description.
 - c) Demonstrate the proper operation of the programming and configuration for each control strategy or loop description:
 - (1) Test each strategy or loop description on a sentence by sentence and function by function basis.
 - (2) Loops with similar or identical logic must each be tested individually.
 - (3) Test the boundaries of each numeric operator input by entering values outside of the allowable range.
 - d) Demonstrate the proper operation of all digital communication links and networks:
 - (1) Verify each digital communication I/O point.
 - e) Failure testing: Demonstrate how the system responds to and recovers from abnormal conditions including, but not limited to: equipment failure, operator error, communications subsystem error, communications failures, simulated/forced software lockups, power failure (both utility power and power to HMI and/or SCADA hardware), process equipment failure, and high system loading conditions.
 - 3) Test forms:
 - a) Submit completed test forms for each loop including but not limited to the fully revised and approved control strategy.
 - b) Identify the cause and effect as each I/O point is toggled through the simulator:
 - (1) Identify and track proper and/or improper operation of the loop.
 - c) Note any deficiencies or operational changes on the forms for correction and documentation:
 - (1) Include signature and date lines.
 - 4) Engineer approval of the FAT submittal is required prior to shipment of system components.
2. Owner training:
 - a. Demonstration requirements are specified in this Section.

Table 1			
Course Title	Minimum Course Length (hours per session)	Personnel (Estimated Number of Students)	Minimum Number of Sessions
System Overview	0	10	2
Operator Training - Basic	8	10	2

Table 1			
Course Title	Minimum Course Length (hours per session)	Personnel (Estimated Number of Students)	Minimum Number of Sessions
Operator Training - Advanced			
PLC Hardware			
PLC Software			
LOI Hardware and Software			
Network Equipment			
Follow-Up Training			
Instrument Training			
Analytical Instrument Training			

- b. PCS computer equipment maintenance training (NOT USED):
 - 1) Furnish training courses that will enable maintenance technicians to perform troubleshooting and repair of all system computer equipment. Include the theory of operation of the system as a whole, including related operating system and utility software.
- c. HMI software training (NOT USED):
 - 1) Furnish training courses that will enable the Owner's staff to develop and maintain all aspects of the operator interface system applications.
 - 2) Include topics:
 - a) Operating systems and utilities such as virus protection software.
 - b) Point (tag) database development and modification.
 - c) Graphic screen creation and editing.
 - d) Scripting.
 - e) I/O servers, drivers, etc.
 - f) PLC interface functions and software.
 - g) Displays, scripts conventions, and documentation.
 - h) Trending.
 - i) Alarms and events.
 - j) System security, access levels, and areas of responsibility.
 - k) General system maintenance, including backups, history data archive, version control, file naming and cataloging conventions, and system file housekeeping.
 - 3) Address not only the procedures associated with the control system's standard software packages, but in addition include material explaining the specific conventions used in developing the Project's system applications (graphics, PLC/RTU interface, scripts, control strategies, trends, etc.). In addition, provide instruction in the use of techniques for developing and maintaining current, comprehensive documentation for all installed system applications.
- d. Historian system training (NOT USED):
 - 1) Furnish the following training:
 - a) Introduction to relational databases.

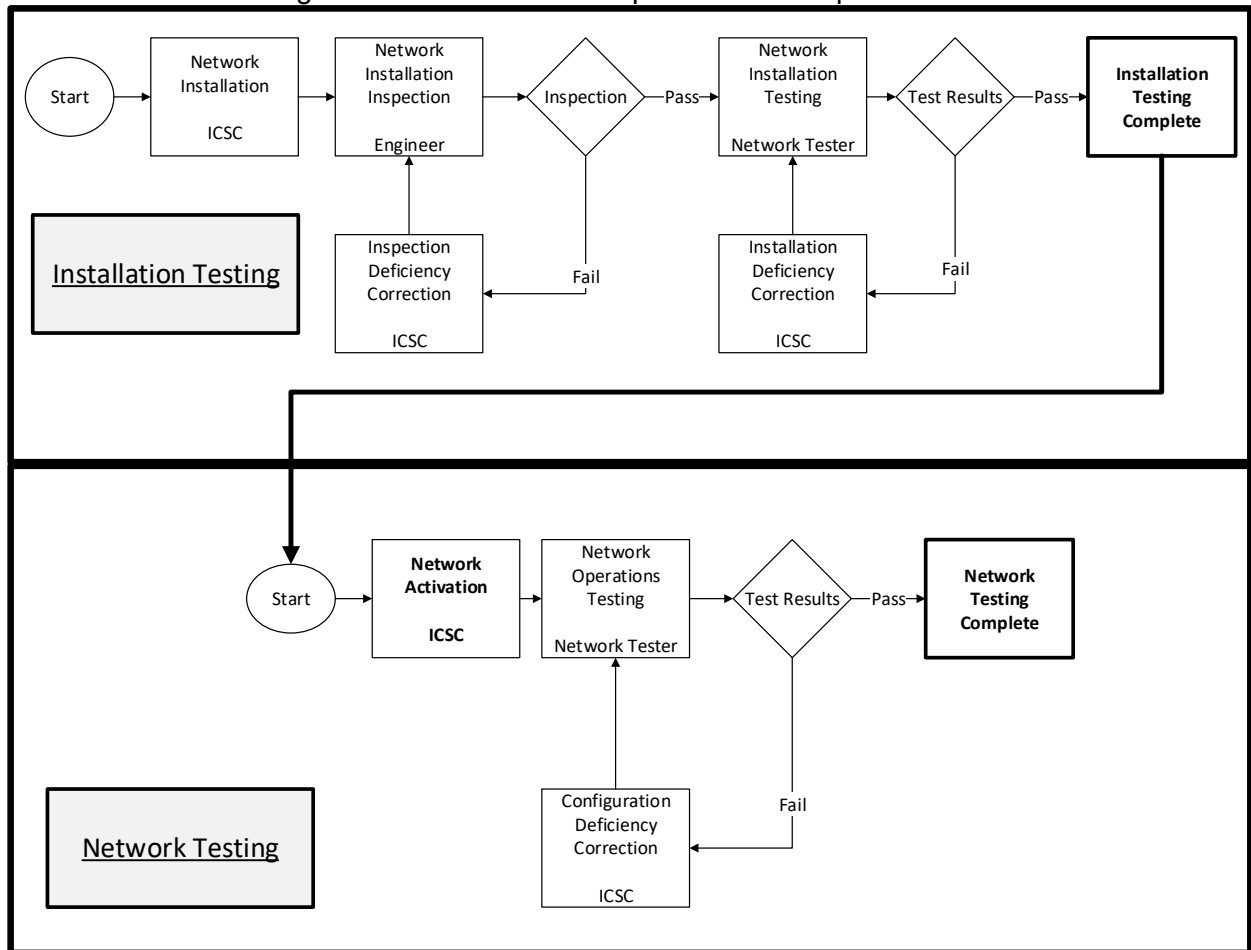
- b) Introductory training on the specific relational database program used for the historian server.
 - c) How to set up points for historian logging.
 - d) How to develop, edit, and print custom reports, in detail.
 - e) Introduction to use of the query language.
 - f) System maintenance.
 - g) Interface to networks outside of the control system.
- e. Report training (NOT USED):
 - 1) Furnish training courses that will enable the Owner's staff to develop and maintain all aspects of reports.
 - 2) Include topics:
 - a) Generation of a developed report.
 - b) Generation of a new report.
 - c) Modification and editing of reports.
 - d) Formatting reports.
 - e) Manual entry and automatic entry of data from a database.
- f. PLC hardware training (NOT USED):
 - 1) Furnish training on PLC hardware and on related components, including battery backup equipment, UPSs, LOI hardware, control circuits, and analog circuits.
 - 2) Furnish training on PLC hardware principles, product features, proper installation, operation, troubleshooting, and maintenance.
 - 3) PLC training may be provided by manufacturer's certified trainers.
- g. PLC software training (NOT USED):
 - 1) Furnish training on PLC software.
 - 2) 2 types of training are required, basic and project-specific:
 - a) Basic PLC software training covers the principles of PLC programming and the specific features and function of the PLC products used on this Project, provided by one of the PLC manufacturer's certified trainers.
 - b) Project-specific PLC software training covers the programming conventions, new standardized software modules, specific control strategy programs, and documentation created for the Work performed under this Contract. This training includes the specific knowledge needed to modify, expand, duplicate, troubleshoot, and repair the PLC programs provided under this Contract, provided by a qualified member of the ICSC or individual who is thoroughly familiar with the delivered system, and is one of the senior programmers who programmed the PLCs for this Project.
- h. LOI hardware and software training (NOT USED):
 - 1) Provide the following:
 - a) Overview of hardware and firmware, including starting, stopping, and PLC interface.
 - b) Configuration of tag database.
 - c) Creating, editing, and saving display screens.
 - d) Troubleshooting.
- i. Network equipment training (NOT USED):
 - 1) Furnish basic training on all network hardware, switch and router configuration and software, and network monitoring software.
 - 2) Include a detailed description and explanation of the installed network architecture, media, and functions.

- 3) Furnish an overview of the function and operation of each piece of network equipment.
- 4) Furnish training on network maintenance troubleshooting and repair.
- 5) Furnish training on how to install spare or off-line backup equipment.
- 6) Basic network overview:
 - a) Discuss a basic network overview for each site.
 - b) Discuss the architecture (loop, star, etc.), media redundancy, and items that are not readily apparent to staff.
 - c) Discuss how to monitor the network health through the HMI network screen.
 - d) Discuss both enterprise level networks, the PCS communications network, and the field network.
- 7) Ethernet switches (NOT USED):
 - a) Discuss the various types of switches (Layer 2, Layer 3, etc.).
 - b) Discuss switch health monitoring through the HMI.
 - c) Discuss the VLAN configuration (what ports should be used for what network, etc.).
 - d) Discuss testing procedures.
- j. Analytical instrument training:
 - 1) Furnish training covering all analytical instruments.
 - 2) Furnish the specified quantity of training, allocated to cover new analytical instruments as specified in this Section and specifically determined in the accepted training plan.
 - 3) Train maintenance staff in the use, cleaning, calibration, maintenance, and troubleshooting of all the analytical instruments furnished within this Project.
 - 4) Provide training by manufacturer.
3. Recording training sessions (NOT USED):
 - a. Record all training.
 - b. Furnish digital video disk (DVD) format.
 - c. These disks become the property of the Owner and cover, in detail, the training for the specific hardware and software of all the systems provided for the Project.
 - d. Provide all the necessary cameras and recording equipment.
4. Installation testing:
 - a. Calibration:
 - 1) Performed by Contractor and ICSC.
 - 2) Calibrate and adjust all instruments, devices, valves, and systems, in conformance with the component manufacturer's instructions and as specified in these Contract Documents.
 - 3) Replace either individually or within a system, defective elements that cannot achieve proper calibration or accuracy.
 - a) Calibration for discrete devices:
 - (1) Calibrate and adjust devices for reliable operation and to avoid nuisance tripping.
 - b) Calibration for ultrasonic and radar level devices:
 - (1) Provide Echo Transmission and signal quality on level transmitters including guided and unguided units:
 - (a) Submit printout of the actual transmission and parameters.

- (2) Adjust mounting, as required, to obtain accurate readings.
 - (3) Post mounting: Provide any additional calibration required by manufacturer.
 - c) Calibrating analog transmitters:
 - (1) Components having adjustable features are to be set accurately for the specific conditions and applications of this installation.
 - (2) Test and verify that components and/or systems are within the specified limits of accuracy.
 - (3) Calibration points:
 - (a) Calibrate each analog instrument at 0 percent, 25 percent, 50 percent, 75 percent, and 100 percent of span, using test instruments with accuracies traceable to NIST.
 - (4) Field verify calibration of instruments including units that have been factory-calibrated to determine whether any of the calibrations are in need of adjustment.
 - d) Analyzer calibration:
 - (1) Calibrate and test each analyzer system as a workable system after installation. Follow the testing procedures directed by the manufacturers' technical representatives.
 - (2) Submit completed instrument calibration sheets for every field instrument and analyzer.
 - (3) Calibration tags:
 - (a) Attach a calibration and testing tag to each instrument, piece of equipment, or system.
 - (b) Sign the tag when calibration is complete.
 - e) Calibration for industrial networking test equipment:
 - f) Submit calibration documentation.
- b. Loop check:
 - 1) Performed by the Contractor.
 - 2) Cabling installed, terminated, and labeled.
 - 3) Perform continuity check of wiring to each field device through intermediate devices to field terminals in the cabinet.
 - 4) Complete loop check form for each device.
 - 5) Submit loop check test results before proceeding to the next step.
- c. Loop validation tests:
 - 1) Performed by the Contractor, ICSC, and manufacturer's representative, working together, and witnessed by the Owner or Owner's representative.
 - 2) Perform tests on the signal from each field device through intermediate devices to the I/O module on the PLC.
 - a) The PLC may or may not be connected to the network.
 - 3) Engineer approval of the loop validation test submittal is required before proceeding to CEET.
- d. LAN cable post-testing:
 - 1) Performed by Contractor and ICSC.
 - 2) After installing the cable and connectors, test all cables using the LAN certification to confirm the installation meets the requirements of the specification.

- 3) Provide test documentation that includes the cable number, total length of cable, a permanent hard copy, as well as a USB or CD copy of all traces.
 - a) After installing connectors:
 - b) Perform cable end-to-end testing on all installed cables from both ends of the cable.
 - c) Test shall include cable system performance tests and confirm the absence of wiring errors.
 - d) Submit a signed test report presenting the results of the cable testing.
 - e) Repair or replace any portions of the system not meeting TIA/EIA standards for installed cabling. Repaired sections shall be retested.
 - 4) Submit final documentation (including traces), using the approved test form, to the Engineer upon successful completion of the testing.
 - 5) Engineer approval of the LAN cable post-testing submittal is required before proceeding to CEET.
- e. Industrial network testing:
- 1) General test requirements:
 - a) Provide necessary components and labor required to address changes required to bring the network into compliance.
 - b) Personnel shall be available at the time of network inspection and testing to address network deficiencies.
 - c) Before commencing any network inspection or testing activities:
 - (1) Verify that network segments and nodes are in their final installed condition.
 - (a) Network node devices installed.
 - (b) Field devices physically disconnected from the network.
 - (2) Process and process equipment is not dependent on operation of the network.
 - (3) Inspect network components and deficiencies addressed.
 - (4) Manufacturer's data and specifications for installed network components, available on-site for use by the network testing firm.
 - (5) A complete set of Contract Documents including addenda and change orders are available on-site for use by the network testing firm.
 - d) Network operation may be interrupted for inspection and testing.
 - e) Figure 1 - Network Test Sequence and Responsibilities defines the general test sequence.

Figure 1 - Network Test Sequence and Responsibilities



- 2) Test equipment:
 - a) Use the following test equipment:
 - (1) Oscilloscope: Fluke Scopemeter Series 190 or equivalent.
 - (2) Digital VOM: Fluke 87 Multimeter or equivalent.
 - (3) Network bus monitor, ProfiTrace v1.6 or equivalent.
- 3) Network installation testing:
 - a) Performed by Contractor/ICSC, Network Tester, and Owner's representative working together.
 - b) This activity focuses on the physical media and its installation.
 - c) Conduct a physical inspection to establish the network configuration as indicated on the Drawings:
 - (1) Validate the node type and quantity.
 - (2) Identify improper installation and damaged components.
 - d) Validate integrity of cables and connectors via a physical media test to confirm the signal propagation capabilities of the network media using visual and mechanical inspection:
 - (1) Compare network devices nameplate data with drawings and specifications.
 - (2) Confirm network components are PTO compliant.
 - (3) Verify labeling of trunk cables.
 - (4) Confirm permissible cable length.
 - (5) Confirm correct cable type.

- (6) Verify the presence/absence of stub lines.
- (7) Verify network terminators are in place.
- (8) Verify power supply source and connections for active terminations.
- (9) Verify total network node count.
- (10) Verify power supply specifications including quantity, ratings, locations, and configuration. Verify power supply source of supply location, conductor size, and rating.
- (11) Inspect accessible network cabling for adherence to specified installation practices:
 - (a) Cable installed in conduit or protective raceway.
 - (b) Cable proximity to high voltage wiring.
 - (c) Exposure to extreme temperatures, shock, vibration, chemicals, or moisture.
 - (d) Bend radius.
- (12) Inspect cable and conductor terminations for adherence to specified installation practices.
- (13) Check all accessible components for evidence of physical damage.
- (14) Check grounding techniques including ground conductor sizes and termination points.
- (15) Eliminate signal reflections.
- e) Electrical tests:
 - (1) Measure total network resistance.
 - (2) Cable length and configuration evaluation:
 - (a) Confirm the network cable topology (length and configuration) does not exceed data rate limitations.
 - (b) Confirm total stub length (if required by design) does not exceed data rate limitations.
 - (c) Calculate spare trunk length for the specified data rate.
 - (3) Line analysis for the following conditions:
 - (a) Short circuit between signal lines A and B.
 - (b) Short circuit between signal lines A and B and the cable shield.
 - (c) Shield continuity.
 - (d) Cross-wired signals lines.
 - (e) Terminator installed in wrong position.
 - (f) Poor transmission or reception levels.
 - (g) Non-permissible stub line.
 - (4) Examine the data traffic between the master and each slave device.
 - (5) Verify baud rate meets specified requirements.
 - (6) Confirm signal level meets specified requirements.
 - (7) Verify network cycle time meets specified requirements.
 - (8) Generate slave device list.
 - (9) Verify and record scanner diagnostic data including node status and error codes.
 - (10) Monitor and capture network waveform.
 - (11) Measure and record power supply voltage at active terminations.

- f) Submit corrective measures recommendations based on the results of the inspections and testing.
- g) Engineer approval of the network installation validation and testing submittal is required before proceeding to network operations validation and testing.
- 4) Network Operations Testing:
 - a) Performed by Contractor/ICSC, Network Tester, and Owner's representative, and Programmer working together.
 - b) General requirements:
 - (1) The network performance is monitored and measured using non-intrusive test equipment and procedures in accordance with the Referenced standards:
 - c) Online evaluation:
 - (1) Confirm specified slave devices appear on the live list.
 - (2) Evaluate data traffic between master and each slave to confirm proper slave configuration and performance.
 - (3) Inspect waveform capture for evidence of excessive noise.
 - (4) Evaluate and report any failed or questionable network tests.
 - (5) Evaluate and report network error codes and related symptoms.
 - d) Network Operations Validation and Testing Report:
 - (1) Prepare a report that documents the results of the qualification and testing activities include, but not limited to, the following:
 - (a) Document the installed condition of the network and provide baseline values for future network maintenance and testing activities.
 - (b) Executive summary for each network including the following:
 - Inspection and test results for each network.
 - Calculated network parameters.
 - Recommendations.
 - Description of test procedures and required test equipment.
 - Network agency specifications.
 - (c) Manufacturer's specifications and guidelines:
 - Include applicable manufacturer's specifications and guidelines.
 - Manufacturer's specifications and guidelines may supersede the specifications of the applicable governing body for the associated network but at a minimum must meet the governing body's requirements.
 - e) Submit final report of the industrial network testing to the Engineer upon successful completion of the testing.
- 5) Engineer approval of the industrial network testing submittals is required before proceeding to CEET.

- f. Complete End-to-End Testing (CEET):
- 1) Performed by Contractor, ICSC, and manufacturer's representative, and Programmer working together, with assistance from the Owner or the inspection staff, as needed:
 - a) The participants need to be dedicated full-time to CEET.
 - b) ICSC Programmer will provide staff to verify input signals at, and create output signals from, an HMI or Engineering Workstation.
 - c) Contractor and ICSC will be responsible for creating field signals and verifying proper operation of final control elements.
 - 2) Prerequisites:
 - a) CEET cannot begin until the successful completion of the preceding tests:
 - (1) Calibration.
 - (2) Loop check.
 - (3) Loop validation tests.
 - (4) LAN cable post-testing.
 - (5) Industrial network testing.
 - 3) Testing description:
 - a) This testing is to ensure all I/O signals operate to the intent of the design from the field device to the HMI and all other auxiliary controls and indicators in the PCS.
 - b) Connect PLC to the network to test signals from the field device through the PLC program, the network, and to the operator's HMI graphic screens. The outputs will be energized for a duration long enough to verify proper operation of the final control element.
 - c) SCADA screens:
 - (1) Test and record operator commands and signal readouts to each operator device where there is more than one operator interface point.
 - (2) For each signal, perform separate tests for SCADA computer screens, local operator interface (LOI) screens, and local control panels.
 - (3) Retest any loop following any necessary corrections.
 - 4) Check control loops under simulated operating conditions by causing a range of input signals at the primary control elements and observing appropriate responses of the respective control and monitoring elements, final control elements, and the graphic displays associated with the HMI/SCADA system:
 - a) Use actual process inputs wherever available.
 - b) Issue commands from the HMI/SCADA system and verify proper responses of field devices:
 - (1) Test SCADA system inputs from field device to SCADA system operator workstations:
 - (a) Track responses through trend charts in the HMI/SCADA system.
 - (2) Test SCADA system outputs from SCADA operator workstations to field devices and equipment.
 - b) Observe and record responses at intermediate devices.

- 2) Discrete device testing:
 - a) Exercise each field device providing a discrete input to the HMI/SCADA system in the field and observe the proper operation shall be observed at the operator workstation:
 - (1) Test limit switches, set limits mechanically, and observe proper operation at the operator workstation.
 - (2) Exercise starters, relay contacts, switch contacts, and observe proper operation.
 - (3) Calibrate and test instruments supplying discrete inputs, and observe proper operation.
 - b) Test each device accepting a discrete output signal from the HMI/SCADA. Perform the appropriate operator action at the SCADA operator stations (including LOIs, if present) and confirm the proper operation of the field device:
 - (1) Stroke valves through outputs from the HMI/SCADA system, and confirm proper directional operation. Confirm travel limits and any feedback signals to the HMI/SCADA system.
 - (2) Exercise motors starters from the HMI/SCADA system and verify proper operation through direct field observation.
 - (3) Exercise solenoids and other field devices from the HMI/SCADA system and verify proper operation through direct field observation.
- 3) Analog device testing:
 - a) Apply continuously variable up and down analog inputs to verify the proper operation and setting of discrete devices (signal trips, etc.).
 - b) Apply provisional settings on controllers and alarm setpoints.
- 4) Analog input:
 - a) Exercise each field device monitoring the analog signal, through the HMI/SCADA system.
 - (1) Apply simulated sensor inputs corresponding to 0 percent, 25 percent, 50 percent, 75 percent, and 100 percent of span for networks that incorporate analog elements, and monitor the resulting outputs to verify compliance to accuracy tolerance requirements.
- 5) Analog output:
 - a) Exercise each field device requiring an analog command signal, through the HMI/SCADA system:
 - (1) Vary the output from the PLC HMI/SCADA system and measure the end device position, speed, etc. to confirm the proper operation of the device for the supplied analog signal.
 - (2) Manually set the output from the HMI/SCADA screen at 0 percent, 25 percent, 50 percent, 75 percent, and 100 percent and measure the response at the final device and at any intermediate devices.
- 6) Submit completed test forms:
 - a) Discrete instrument input devices:
 - (1) Switch setting, contact action, and dead band.

- (2) Valve position switches:
 - (a) Response in the PLC as the valve is stroked from the PLC.
 - (b) Field observed actual valve position, and valve indicator position as the valve is stroked from the PLC.
 - (3) Operator interface switches (control stations and other pilot devices) and associated response.
 - (4) Starter and drive auxiliary device contact response.
 - (5) Response of all other discrete inputs to the PLC.
 - (6) Test equipment used and associated serial numbers.
 - b) Discrete output devices:
 - (1) Observed response of field device to the discrete output from the PLC.
 - (2) Observe the proper operation of Open, Close, Start, Stop, On, Off, etc.
 - (3) Test equipment used and associated serial numbers.
 - c) Analog input devices:
 - (1) Calibration range.
 - (2) Calibration data: Input, output, and error at each test value.
 - (3) Analog input associated PLC register address.
 - (4) Value in PLC register at each test point.
 - (5) Value displayed at each operator interface station (local operator interface displays and SCADA workstations).
 - (6) Test equipment used and associated serial numbers.
 - d) Analog output devices:
 - (1) Calibration range.
 - (2) Test value at each test point.
 - (3) Analog output associated PLC register address.
 - (4) Control variable value at field device at each test point.
 - (5) Physical device response at each test point:
 - (a) Response to be actual valve position, or motor speed, etc.
 - (6) Test equipment used and associated serial numbers.
 - 7) Failure testing:
 - a) Demonstrate how the system reacts and recovers from abnormal conditions including, but not limited to:
 - (1) Equipment failure.
 - (2) Communications sub-system error.
 - (3) Power failure.
 - (4) Process equipment failure.
 - (5) High system loading conditions.
 - 8) Engineer approval of the CEET submittals is required before proceeding to Functional Testing.
5. Functional testing:
- a. General:
 - 1) Testing to demonstrate proper operation of systems with process equipment operating over full operating ranges under conditions as closely resembling actual operating conditions as possible.
 - 2) Performed by Contractor, ICSC, and manufacturer's representative, and Programmer working together, with assistance from the Owner or the inspection staff, as needed.

- 3) Additional tests are specified in other Instrumentation and Control Sections.
- 4) Follow approved detailed test procedures and check lists for Functional Test activities.
- b. Control logic operational validation:
 - 1) The purpose of control logic validation is to field test the operation of the complete control system, including all parts of the HMI/SCADA system, all control panels (including vendor control panels), all control circuits, all control stations, all monitored/controlled equipment, and final control elements.
 - 2) Demonstrate control functionality shown on the P&IDs, control schematics, and other drawings, and specified in the loop descriptions, control strategies, Electrical Specifications, and Mechanical Equipment Specifications.
 - 3) Test in detail on a function-by-function and sentence-by-sentence basis.
 - 4) Thoroughly test hardware and software functions.
 - 5) Including all hardwired and software control circuit interlocks and alarms.
 - 6) Test final control elements, controlled equipment, control panels, and ancillary equipment under startup, shut down, and steady-state operating conditions to verify all logic and control is achieved.
 - 7) Control logic validation tests to include, but not limited to: a repeat of all control logic tests from the FAT, modified and expanded to include all field instruments, control panels, circuits, and equipment.
- c. Loop tuning:
 - 1) Optimally tune all electronic control stations and software control logic incorporating proportional, integral, or derivative control. Apply control signal disturbances at various process variable levels and adjusting the gain, reset, or rate settings as required to achieve proper response.
 - 2) Verify the transient stability of final control elements operating over the full range of operating conditions, by applying control signal disturbances, monitoring the amplitude and decay rate of control parameter oscillations and making necessary controller adjustments as required to eliminate excessive oscillatory amplitudes and decay rates. As a minimum, achieve 1/4-wave amplitude decay ratio damping (subsidence ratio of 4) under the full range of operating conditions.
 - 3) If excessive oscillations or system instability occur, as determined by the Engineer, continue tuning and parameter adjustments, or develop and implement any additional control algorithms needed to achieve satisfactory control loop operation.
 - 4) Functional validation sheets:
 - a) Document each Functional test on an approved test form.
 - b) Document loop tuning with a report for each loop, including two- pen chart recordings showing the responses to step disturbance at a minimum of 3 setpoints or process rates approved by the Engineer. Show tuning parameters on the charts, along with time, date, and sign-off by Contractor and Engineer.

- c) Include on the form, functions which can be demonstrated on a loop-by-loop basis:
 - (1) Loop number and P&ID number.
 - (2) Control strategy, or reference to specification tested.
 - (3) Test procedures: Where applicable, use the FAT function-by-function, sentence-by-sentence loop test checklist forms modified to meet the requirements of the Functional test. Otherwise, create new forms.
 - d) For functions that cannot be demonstrated on a loop-by-loop basis (such as overall plant power failure), include on the test form a listing of the specific steps and tests to be conducted. Include with each test description the following information:
 - (1) Specification page and paragraph of function demonstrated.
 - (2) Description of function and/or text from specification.
 - (3) Test procedures: use the FAT loop test checklist forms modified to meet the specific testing conditions of the Functional test.
 - 5) Functional certification:
 - a) Provide Manufacturer's Certificate of Installation and Functionality Compliance as specified in Section 01756 - Commissioning:
 - (1) Including all test forms with test data entered, submitted to the Engineer with a clear and unequivocal statement that all Functional test requirements have been satisfied.
 - 6. Clean Water Facility Testing.
- C. Process Start-up Phase:
- 1. Process Start-up:
 - a. Programmer shall be onsite to support Process Start-up activities and provide functional changes as required:
 - 1) ICSC shall be available as needed.
 - b. ICSC shall be onsite to support Process Start-up activities and provide functional changes as required.
 - 2. Process Operation Period:
 - a. Programmer shall be available to support Process Operational Period and provide functional changes as required:
 - 1) ICSC shall be available as needed.
 - b. ICSC shall be available to support Process Operational Period and provide functional changes as required.
 - 3. PCIS Optimization and Fine-Tuning:
 - a. General:
 - 1) After the Process Operational Period, test PCIS system for additional 60 days as specified in this Section to identify issues and make corrections, as needed.
 - 2) This part of the work must be started by Substantial Completion. Test can be run through final completion of the project. This is part of the Work that must be completed as a condition of substantial completion and final completion for the entire Project.^{AD3}
 - 3) The complete PLC control and HMI/SCADA system must run continuously for the duration of the PCIS Optimization and Fine Tuning.

- 4) Test and use the entire process control system under standard operating conditions.
 - 5) Exercise all system functions.
 - 6) Log failure, any system interruption and accompanying component, subsystem, or program failure including time of occurrence, duration of each failure, failure classification, and cause:
 - a) Provide a competently trained technician or programmer on call for the Project Site during all normal working days and hours from the start of the PCIS Optimization and Fine-Tuning until final acceptance of the system:
 - (1) Response time to the Project Site: 24 hours or less, for a major failure.
- b. SCADA system testing:
- 1) Exercise each system function, e.g., status report, alarms, logs, and displays several times at a minimum, and in a manner that approximates "normal" system operation.
 - 2) Failure of the HMI/SCADA system during testing shall be considered as indicating that the programs and operating system do not meet the requirements of the specifications:
 - a) Corrective action is required before restarting the PCIS Optimization and Fine-Tuning.
 - 3) Only those components, sub-systems, and systems covered in this Section and supplied under this Contract shall be considered for this acceptance test. Problems and failures of other systems shall not be considered as part of this test, except as they display the capabilities of this system to detect failures.
 - 4) Failures:
 - a) Classify failures as either major or minor:
 - (1) Minor failure:
 - (a) A small and non-critical component failure or software problem that can be corrected by the Owner's operators.
 - (b) Log this occurrence but this is not a reason for stopping the test and is not grounds for non-acceptance.
 - (c) Should the same or similar component failure occur repeatedly, this may be considered as grounds for non-acceptance.
 - (d) Failure of one printer or operator station is considered a minor failure providing all functions can be provided by backup equipment, i.e., alternate printers and operator station, and repairs can be made and equipment returned to service within 3 working days.
 - (2) Major failure:
 - (a) Considered to have occurred when a component, subsystem, software control, or program fault causes a halt in or improper operation of the system and/or when a technician's work is required to make a repair or to re-initiate operation of the system.
 - (b) Cause termination of the PCIS Optimization and Fine-Tuning.

- (c) Start a new acceptance test when the causes of a major failure have been corrected.
 - (d) A failure is also considered major when failure of any control system that results in an overflow, underflow, overdose, or underdose condition occurs.
- 5) Technician report:
 - a) Each time a technician is required to respond to a system malfunction, they must complete a report, which includes details concerning the nature of the complaint or malfunction and the resulting repair action required and taken.
 - b) If a malfunction occurs which clears itself or which the operator on duty is able to correct, no report is required or logged as specified above.
 - c) If a technician has performed work but no report is written, then a major failure is considered to have occurred.
 - d) Each report shall be submitted within 24 hours to the Engineer and the Owner, or its representative.

3.07 FIELD QUALITY CONTROL (NOT USED)

3.01 RE-INSTALLATION (NOT USED)

3.02 ADJUSTING (NOT USED)

3.03 CLEANING (NOT USED)

3.04 PROTECTION (NOT USED)

3.05 SCHEDULES

- A. Example test forms:
 - 1. Example test forms are attached at the end of this Section. They may be used as a starting point for the development of Project-specific test forms for this Project.
 - 2. The example test forms are not intended to be complete or comprehensive. Edit and supplement the forms to meet the requirements for testing and test forms specified in this Section and other Contract Documents.

END OF SECTION

	FACTORY ACCEPTANCE TEST - CONTROL PANELS	
1. GENERAL INSPECTION A. Structural Inspection <input type="checkbox"/> Verify Lifting Lugs Installed <input type="checkbox"/> Verify enclosure has lock and lock is functional <input type="checkbox"/> Confirm that seismic bracing components are provided per manufacturer's installation instructions B. Exterior Inspection <input type="checkbox"/> Cabinet exterior is clean, scratch, and dent free <input type="checkbox"/> Inspect externally for corrosion and damage <input type="checkbox"/> Verify enclosure door opens and closes easily <input type="checkbox"/> Verify enclosure has a 3-point latch <input type="checkbox"/> Verify enclosure has a flange mounted disconnect (where voltages greater than 120 VAC enter the cabinet) <input type="checkbox"/> Verify enclosure has the appropriate NEMA rating (1, 1G, 12, 3R, 4, 4X, etc.) <input type="checkbox"/> Verify enclosure is the appropriate size (not grossly larger than design, and will still fit in the plant) Nameplates <input type="checkbox"/> Cabinet has identification nameplate <input type="checkbox"/> All door labels are straight, spelled correctly, and match the tagging defined in the Contract <input type="checkbox"/> Cabinet has a nameplate that includes the following: <div style="display: flex; justify-content: space-between; margin-left: 20px;"> <div> <input type="checkbox"/> Power source(s) <input type="checkbox"/> Circuit ID(s) </div> <div> <input type="checkbox"/> Integrator's Logo <input type="checkbox"/> Short Circuit KAIC ratings </div> </div> <input type="checkbox"/> If labels are screwed to door, silicone was utilized to cover screw holes (Labels screwed to the door of a NEMA 4/4X panel technically violates the NEMA rating.) Door Devices <input type="checkbox"/> All devices penetrating the outside of panel have gaskets, silicone or both <input type="checkbox"/> All door devices are installed (HMIs, Pilot Devices, etc.) <input type="checkbox"/> Door mounted equipment is mounted straight and square <input type="checkbox"/> All exterior or door mounted equipment present and accounted for, installed and securely fastened <input type="checkbox"/> NEMA classification has not been violated due to penetrations <input type="checkbox"/> Door mounted equipment has the same NEMA rating as the panel <input type="checkbox"/> All door mounted equipment installed at the correct height <input type="checkbox"/> All door mounted equipment installed in the correct positions and order (layout of door mounted equipment is grouped properly and in a logical manner) <input type="checkbox"/> Doors with multiple penetrations have adequate bracing (if needed) <input type="checkbox"/> Visually check condition of indicators , controllers and annunciators <input type="checkbox"/> Check that pilot lights illuminate correctly <input type="checkbox"/> Check the Push-To-Test function <input type="checkbox"/> Ensure correct pilot light color Peripheral Devices <input type="checkbox"/> Horn / Beacon is installed (where required) <input type="checkbox"/> Silence and Reset pushbutton		
PROJECT NAME: _____ FACILITY NAME: _____ PROCESS AREA: _____ NETWORK ID: _____ WITNESSED BY: _____		TEST DATE: _____ TESTED BY: _____ COMPANY: _____ PAGE: _____ SIGNATURE: _____

	FACTORY ACCEPTANCE TEST - CONTROL PANELS			
<p>1. GENERAL INSPECTION (continued)</p> <p>C. Interior Inspection</p> <p><input type="checkbox"/> Cabinet is cleaned of marks and dirt.</p> <p><input type="checkbox"/> Inspect internally for corrosion and damage.</p> <p><input type="checkbox"/> Back panel is clean of marks and dirt.</p> <p><input type="checkbox"/> Interior of panel vacuumed and shall be free of all debris.</p> <p><input type="checkbox"/> Check that the panel roof is clean and clear of foreign materials.</p> <p><input type="checkbox"/> Bottom of panel has been cut out (where bottom entry is required), with angle iron welded around the bottom perimeter. Re-painting has been performed.</p> <p><input type="checkbox"/> If internal light door limit switch is provided, ensure the light automatically turns "on" when the doors are open.</p> <p><input type="checkbox"/> Check that a document pocket has been provided.</p> <p><input type="checkbox"/> Intrusion alarms (where required).</p> <p>Interior Labeling</p> <p><input type="checkbox"/> All panel mounted equipment has identification labeling, by using either a Brothers or Phenolic type tags.</p> <p><input type="checkbox"/> Verify that door mounted components are mounted square and symmetrical.</p> <p><input type="checkbox"/> Verify that nameplates are straight, legible, and spelled correctly.</p> <p><input type="checkbox"/> All terminal blocks are identified/labeled with permanent labels including tight end blocks and caps.</p> <p><input type="checkbox"/> All wiring shrink labeled and or phased correctly to the specifications.</p> <p><input type="checkbox"/> All wire labels shrunk completely rotated and aligned alike for easy identification.</p> <p><input type="checkbox"/> All fuses and circuit breakers are labeled with ID and current rating.</p> <p><input type="checkbox"/> System Integrator's label or labels installed on door.</p> <p><input type="checkbox"/> Panel manufacturer model/serial number tag is present.</p> <p><input type="checkbox"/> All required safety/warning tags installed and straight.</p> <p><input type="checkbox"/> Correct UL (typically UL 508) or cUL tag installed and registered and all other associated tags installed and straight (the UL tag might not be installed in the panel at the factory test. If the panel is modified due to changes during the factory test or a punch list generated from the factory test, the UL labeling would need to be re-applied. Some UL shops do not apply the UL label until the panel is released to be shipped.).</p> <p>Wireways</p> <p><input type="checkbox"/> Plastic wire way covers installed properly.</p> <p><input type="checkbox"/> Plastic wireways have no sharp edges.</p> <p><input type="checkbox"/> No wire Ties inside the wireways.</p> <p><input type="checkbox"/> No sharp edges on wire ties.</p> <p><input type="checkbox"/> Separation: White duct is used for DC voltages, Gray duct is used for AC voltages.</p> <p><input type="checkbox"/> Ensure wiring duct is not over-full, includes provision for 20% more wiring and the cover may easily be installed. Panduit recommends 50% duct fill, but 40% is a better practice.</p>				
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	FACTORY ACCEPTANCE TEST - CONTROL PANELS	
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1. GENERAL INSPECTION (continued)

C. Interior Inspection (continued)

Wiring

- ☐ Visually check terminals and condition of internal wirings
- ☐ Verify that the control panel has been assembled and wired as designed
- ☐ Verify that all components are operational and perform the functions intended
- ☐ Verify that all components are sized appropriately for the application
- ☐ Verify that equipment control circuits function as intended
- ☐ Back of door wiring is labeled and neatly formed
- ☐ Back panel to door wiring has sufficient bending radius with spiral wrap
- ☐ Wire connection has been verified wired to correct points within the panel
- ☐ Individual wires have been given a pull test to verify a good terminal connection
- ☐ Wire and cable minimum bending radius have not been violated
- ☐ All equipment installed straight and square to back panel
- ☐ Wire colors are correct:
 - ☐ Black and White > AC hot and neutral, respectively
 - ☐ Red > AC control signals
 - ☐ Blue > DC power and control (Blue w/White stripe for DC ground)
 - ☐ Yellow > Foreign voltages (those still present when panel power is disconnected)
 - ☐ Green > AC equipment ground
 - ☐ Black > TSP (+)
 - ☐ White > TSP(-)
- ☐ Analog wiring shields are continuous (connected by a dedicated terminal block for such shields)
- ☐ Analog shield wires are grounded within the panel, where not otherwise grounded at the transmitter itself
- ☐ Discrete inputs are separately fused or protected by a circuit breaker on a "per loop" basis
- ☐ Intrinsic Safety Wiring
 - ☐ Ensure wiring associated with intrinsic safety circuits or intrinsic safety barriers is kept away from all other wiring by UL minimum distances or by a physical (grounded metal) barrier preventing non-intrinsically safe wiring from coming in contact with intrinsically safe circuits or wiring
- ☐ Verify all spare terminals are installed according to the percentage listed in the specifications

Grounding

- ☐ Equipped with "Blackburn" or other grounding type lug
- ☐ Lug is securely fastened to the panel structure
- ☐ Verify Grounding bar is installed
- ☐ Verify Isolated ground bar is installed

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	FACTORY ACCEPTANCE TEST - CONTROL PANELS											
<p>2. POWER TEST</p> <p>A. AC Power</p> <p><input type="checkbox"/> AC Power is routed correctly within the panel, and is isolated from DC and network wiring.</p> <p><input type="checkbox"/> All fuses are installed and sized properly.</p> <p><input type="checkbox"/> All breakers are installed and sized properly.</p> <p><input type="checkbox"/> 24 VDC Power Supplies are functional.</p> <p><input type="checkbox"/> 24 VDC Power fail contacts are functional.</p> <p><input type="checkbox"/> 24 VDC power supplies are redundant, and have diode modules enabling the hot swap-over between supplies.</p> <p style="padding-left: 20px;"><input type="checkbox"/> 24 VDC supplies are equipped with dry contact failure alarms, wired as PLC inputs to signal failure of any DC power supply. Such alarm inputs to the PLC have been tested as being functional.</p> <p><input type="checkbox"/> Dedicated receptacle is wired to receive a dedicated AC supply.</p> <p><input type="checkbox"/> Verify continuity for all DC commons, ground and AC neutrals.</p> <p><input type="checkbox"/> Verify that the CP temporary input power is connected correctly and is the correct voltage.</p> <p><input type="checkbox"/> Close the CP main circuit breaker(s).</p> <p><input type="checkbox"/> Verify that voltages at subsequent circuit breakers are correct.</p> <p><input type="checkbox"/> Close circuit breakers.</p> <p><input type="checkbox"/> Verify that power feeding interruptible and uninterruptible power supplies is correct.</p> <p><input type="checkbox"/> Turn on power supplies if they are not already on.</p> <p><input type="checkbox"/> Verify that voltages at distribution terminals are correct.</p> <p><input type="checkbox"/> Energize any remaining hardware such as the PLC.</p> <p>B. Uninterruptible Power Supply (UPS)</p> <p><input type="checkbox"/> Mounted appropriately within the cabinet, on a dedicated shelf, or rear of a swing-out sub panel.</p> <p><input type="checkbox"/> Is equipped with maintenance bypass switch (or at least plug/receptacle means for bypassing the unit).</p> <p><input type="checkbox"/> Test all UPS alarms (on inverter, failure, battery failure etc.)</p> <p><input type="checkbox"/> Turn off the AC power supply and verify that the UPS will be switched on to supply the designated vital loads in the control panel.</p> <p>3. CONTROLS & AUXILIARY DEVICES TEST</p> <p><input type="checkbox"/> Verify all interposing and auxiliary relays are functioning.</p> <p><input type="checkbox"/> Verify panel lights are functioning.</p> <p>Ventilation and Heating</p> <p><input type="checkbox"/> If ventilation fans are fitted, check the fans operate correctly any associated air filters are clean and not blocked.</p> <p><input type="checkbox"/> Verify components are installed in the correct orientation for proper air flow.</p> <p>4. HARDWIRED INTERLOCK AND SAFETY TEST</p> <p><input type="checkbox"/> Verify that hardwired interlocks through the control panel as shown on schematic drawings are functioning. For example, outlet high pressure switch interlock to a pump.</p> <p><input type="checkbox"/> Verify that all hardwired safety devices through the control panel is functioning. For example, the pull cord emergency stops of conveyors.</p>												
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	FACTORY ACCEPTANCE TEST - CONTROL PANELS	
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5. PLC TEST

A. Components

- ☐ PLC interior High Temperature alarm is installed, wired to the PLC, and is shown to be functional.
- ☐ Relays have transient suppression across their coils. This is particularly important for DC coil relays, where diodes in reverse polarity are often used.
- ☐ TVSS is installed across the main incoming 120 VAC.

PLC and PLC Rack

- ☐ Verify all cards are securely seated.
- ☐ Ensure clearance around PLC rack has been met, such that convective heat transfer is not impeded by devices erroneously mounted in the "no encroachment" area. Confirm with manufacturer clearance recommendations.

B. PLC I/O Test

- ☐ Furnish **I/O test forms** and test all the listed input and output points as follows:
 - ☐ Discrete Inputs: Simulate a field contact closure by "shorting" across the appropriate terminal blocks. Observe the transition between a logical "0" and "1" in the PLC software.
 - ☐ Discrete Outputs: Force the output bit to toggle between logical "0" and logical "1" using the PLC software. Measure contact resistance at the wired terminal blocks using a digital meter selected for the "ohms" setting.
 - ☐ Analog Inputs: Connect a signal generator to the appropriate terminal blocks. Tailor the connection depending on whether a 2-wire or 4-wire simulation is required. Modulate the 4-20mA signal. Observe the associated PLC internal memory register to transition between 0-65535 or if scaled in engineering units, between 0 and the maximum scaled engineering unit. The latter method is preferred.
 - ☐ Analog Outputs: Force the output register to a value between 0-65535 or 0-100%, if the scaling block can be manipulated. Observe the measured 4-20mA value increment and decrement using a digital ammeter.

C. Redundant Controllers (where required) Test

- ☐ Remove Communication cable from primary PLC to verify switching to backup PLC
- ☐ Remove Communication cable from backup PLC to verify switching back to primary PLC
- ☐ Remove Power cable from primary PLC to verify switching to backup PLC
- ☐ Remove Power cable from backup PLC to verify switching back to primary PLC

D. PLC Control Logic Verification

- ☐ The PLC control strategy is verified by following the Control Logic Verification Form based on the specifications. Each control strategy will be verified by simulating the process and checking the state or value of PLC outputs. The results of equipment status and alarms and process instrument values and trends shall also be verified on the Plant SCADA graphic screens stored in a temporary SCADA computer. Since all PLC input and output wiring has been verified and some field devices are not available during Factory Acceptance Testing, certain inputs will be simulated either by means of additional hardware and/or software as described below.
 - ☐
 - ☐
 - ☐ DI states are either simulated by hardwired switches or forced inputs using a programming terminal.
 - ☐ For example, when starters and drives are not provided as part of the contract, jumpers may be installed from the output call relays to the running confirmation inputs to simulate the running state of the motors.

PROJECT NAME: _____	TEST DATE: _____
FACILITY NAME: _____	TESTED BY: _____
PROCESS AREA: _____	COMPANY: _____
NETWORK ID: _____	PAGE: _____
WITNESSED BY: _____	SIGNATURE: _____

	FACTORY ACCEPTANCE TEST - CONTROL PANELS											
<p>5. PLC TEST (continued)</p> <p>D. PLC Control Logic Verification (continued)</p> <p>Typical Fault Logic</p> <p><input type="checkbox"/> If the fault input is high and the disable (if applicable) for the fault is not high and the common disable (if applicable) is not high begin timing. If any of these conditions changes, stop timing and reset the timer. If the timer reaches its preset, activate the alarm output. If the fault alarm is a shutdown alarm stop the associated motor and latch the alarm so that it remains present even if the condition clears.</p> <p><input type="checkbox"/> The fault condition must return to normal and the alarm must be reset for a latched alarm to clear.</p> <p>Typical Fail to Start Logic</p> <p><input type="checkbox"/> If the motor is called to run (call output high) and no running feedback is received (running input is low) and the fail to start and common alarm disables (if applicable) are not high start timing. If any of these conditions changes, stop timing and reset the timer. If the timer reaches its preset, activate the alarm output, stop calling the motor and latch the alarm.</p> <p>6. HMI OR OIT TEST</p> <p>HMI / OIT Functionality</p> <p><input type="checkbox"/> Communication with PLC</p> <p><input type="checkbox"/> Screen Layouts</p> <p><input type="checkbox"/> Screen Navigation</p> <p><input type="checkbox"/> Set Point Entry</p> <p><input type="checkbox"/> Animation</p> <p><input type="checkbox"/> Color Correctness (Green=Run, Red=Off, Amber=Alarm, or the agreed upon convention)</p> <p><input type="checkbox"/> Alarms</p> <p><input type="checkbox"/> Acknowledge and Reset</p> <p><input type="checkbox"/> Security / Access Levels / Passwords</p> <p>7. NETWORK COMMUNICATION TEST</p> <p>A. Network Components</p> <p><input type="checkbox"/> Fiber optic cabling terminates in a patch panel</p> <p><input type="checkbox"/> Media converters are installed and functional</p> <p><input type="checkbox"/> Terminating resistors have been installed for trunk/tap topologies or where required</p> <p><input type="checkbox"/> Wire and cable bending limitations have not been violated</p> <p>B. Networking Functions</p> <p><input type="checkbox"/> Verify data transfer via the network to different PLCs as shown on the Network Block Diagrams</p> <p><input type="checkbox"/> Verify network traffic rate and error margin is acceptable</p>												
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">PROJECT NAME: _____</td> <td style="width: 50%; border: none;">TEST DATE: _____</td> </tr> <tr> <td style="border: none;">FACILITY NAME: _____</td> <td style="border: none;">TESTED BY: _____</td> </tr> <tr> <td style="border: none;">PROCESS AREA: _____</td> <td style="border: none;">COMPANY: _____</td> </tr> <tr> <td style="border: none;">NETWORK ID: _____</td> <td style="border: none;">PAGE: _____</td> </tr> <tr> <td style="border: none;">WITNESSED BY: _____</td> <td style="border: none;">SIGNATURE: _____</td> </tr> </table>			PROJECT NAME: _____	TEST DATE: _____	FACILITY NAME: _____	TESTED BY: _____	PROCESS AREA: _____	COMPANY: _____	NETWORK ID: _____	PAGE: _____	WITNESSED BY: _____	SIGNATURE: _____
PROJECT NAME: _____	TEST DATE: _____											
FACILITY NAME: _____	TESTED BY: _____											
PROCESS AREA: _____	COMPANY: _____											
NETWORK ID: _____	PAGE: _____											
WITNESSED BY: _____	SIGNATURE: _____											

	FACTORY ACCEPTANCE TEST - CONTROL PANELS											
<p>8. FAT DOCUMENTATION AND RECORD</p> <p>Panel Documentation</p> <ul style="list-style-type: none"> <input type="checkbox"/> As-built panel drawings showing actual panel construction and devices arrangement and c/w Bill of Material. <input type="checkbox"/> Panel schematic and interconnection drawings. <input type="checkbox"/> P&ID drawings and schematic drawings for the process area controlled by the panel that is to be tested. <input type="checkbox"/> I/O list test forms of the process area to be tested. <input type="checkbox"/> FAT procedure of the process area to be tested. <input type="checkbox"/> Test record forms of the process area to be tested. Forms shall include area for signature of responsible test personnel. <input type="checkbox"/> Hard copy of the PLC application program of the process area to be tested. <input type="checkbox"/> Hard copy of the HMI/OIT graphic screens of the process area to be tested. <p>9. FAT TOOLS AND SOFTWARE</p> <ul style="list-style-type: none"> <input type="checkbox"/> Simulation software if required <input type="checkbox"/> Digital volt meter Fluke 87 <input type="checkbox"/> Process meter Fluke 787 <input type="checkbox"/> Laptop computer with PLC application program <input type="checkbox"/> Temporary SCADA computer with HMI software and applicable graphic screens <input type="checkbox"/> Jumper wires 												
<table style="width: 100%; border: none;"> <tr> <td style="width: 60%;">PROJECT NAME: _____</td> <td style="width: 40%;">TEST DATE: _____</td> </tr> <tr> <td>FACILITY NAME: _____</td> <td>TESTED BY: _____</td> </tr> <tr> <td>PROCESS AREA: _____</td> <td>COMPANY: _____</td> </tr> <tr> <td>NETWORK ID: _____</td> <td>PAGE: _____</td> </tr> <tr> <td>WITNESSED BY: _____</td> <td>SIGNATURE: _____</td> </tr> </table>			PROJECT NAME: _____	TEST DATE: _____	FACILITY NAME: _____	TESTED BY: _____	PROCESS AREA: _____	COMPANY: _____	NETWORK ID: _____	PAGE: _____	WITNESSED BY: _____	SIGNATURE: _____
PROJECT NAME: _____	TEST DATE: _____											
FACILITY NAME: _____	TESTED BY: _____											
PROCESS AREA: _____	COMPANY: _____											
NETWORK ID: _____	PAGE: _____											
WITNESSED BY: _____	SIGNATURE: _____											

	INSTALLATION AND CERTIFICATION CHECKLIST DOCUMENTATION	
--	---	--

INSTRUMENT LOOP NO. _____

SERVICE DESCRIPTION _____

A COPY OF LATEST ISSUE OF THE FOLLOWING DOCUMENTS ARE INCLUDED IN THIS INSTRUMENT INSTALLATION CERTIFICATION FILE:

- ☐ INSTRUMENT SPECIFICATION SHEETS (FOR ALL INSTRUMENTS IN THE LOOP)
- ☐ INSTRUMENT INSTALLATION DETAILS (FOR ALL INSTRUMENTS IN THE LOOP)
- ☐ INSTRUMENT LOOP WIRING DIAGRAMS
- ☐ INSTRUMENT INSTALLATION CERTIFICATION CHECKLIST
- ☐ SIZING CALCULATIONS
- ☐ INSTRUMENT INSTALLATION SCHEDULE (APPLICABLE PART)
- ☐ NAMEPLATE SCHEDULE (APPLICABLE PART)
- ☐ VENDOR LITERATURE CALIBRATION INFORMATION

☐ ☐

INSTRUMENT LOOP IS PART OF EQUIPMENT START-UP/SHUTDOWN INTERLOCKS?

No Yes

REMARKS: _____

CHECKED BY (COMPANY) _____	ACCEPTED BY (COMPANY) _____
----------------------------	-----------------------------

SIGNATURE _____	SIGNATURE _____
-----------------	-----------------

DATE _____	DATE _____
------------	------------

	SWITCHES INSTALLATION AND CALIBRATION CHECKLIST	
--	--	--

INSTRUMENT LOOP NO. _____

SERVICE DESCRIPTION _____

CHECK BELOW, WHEN COMPLETED:

- ☐ BENCH CALIBRATED PER SPECIFICATION SHEET NO. _____
- ☐ VERIFIED PER P&ID NO. _____
- ☐ CORRESPONDS TO SPECIFICATION SHEET NO. _____
- ☐ WIRING CORRECT PER INSTRUMENT LOOP DRAWING NO. _____
- ☐ INSTALLATION CORRECT PER DETAIL NO. _____
- ☐ ACCESSORIES ARE PRESENT AND PROPERLY INSTALLED
- ☐ INSTRUMENT IS ACCESSIBLE FOR MAINTENANCE OR REMOVAL
- ☐ ENGRAVED LAMINATED NAMEPLATE (NO SPELLING ERRORS) PERMANENTLY INSTALLED

☐ ☐

INSTRUMENT LOOP IS PART OF EQUIPMENT START-UP/SHUTDOWN INTERLOCKS?

No Yes

<u>FIELD CALIBRATION CHECK</u>						
CONTACT NO.	FUNCTION	FOR SIGNAL	CONTACT IS TO	AT SPECIFIED VALUE FOR	ACTUAL TRIP POINT WAS	
1	<input type="checkbox"/> ALARM	<input type="checkbox"/> INCR	<input type="checkbox"/> OPEN	SET PT = _____	SET PT = _____	_____
	<input type="checkbox"/> S/D PERM	<input type="checkbox"/> DECR	<input type="checkbox"/> CLOSE	RESET = _____	RESET = _____	_____
2	<input type="checkbox"/> ALARM	<input type="checkbox"/> INCR	<input type="checkbox"/> OPEN	SET PT = _____	SET PT = _____	_____
	<input type="checkbox"/> S/D PERM	<input type="checkbox"/> DECR	<input type="checkbox"/> CLOSE	RESET = _____	RESET = _____	_____
3	<input type="checkbox"/> ALARM	<input type="checkbox"/> INCR	<input type="checkbox"/> OPEN	SET PT = _____	SET PT = _____	_____
	<input type="checkbox"/> S/D PERM	<input type="checkbox"/> DECR	<input type="checkbox"/> CLOSE	RESET = _____	RESET = _____	_____
4	<input type="checkbox"/> ALARM	<input type="checkbox"/> INCR	<input type="checkbox"/> OPEN	SET PT = _____	SET PT = _____	_____
	<input type="checkbox"/> S/D PERM	<input type="checkbox"/> DECR	<input type="checkbox"/> CLOSE	RESET = _____	RESET = _____	_____

NOTE: PERM IS ABBREVIATION FOR PERMISSIVE

	TRANSMITTER/CONTROLLER/INDICATOR INSTALLATION AND CALIBRATION CHECKLIST	
--	--	--

☐ ☐
 INSTRUMENT LOOP IS PART OF EQUIPMENT START-UP/SHUTDOWN INTERLOCKS? No Yes

INSTRUMENT TYPE ☐ TRANSMITTER ☐ CONTROLLER ☐
 INDICATOR ☐ OTHER DESCRIPTION _____

INSTRUMENT TAG NO. _____ SERIAL NO. _____

SERVICE DESCRIPTION _____

<u>BENCH CALIBRATION CHECK</u>				
INPUT RANGE = _____ HEAD CORRECTION = _____ CALIBRATED SPAN = _____			OUTPUT RANGE = _____ <input type="checkbox"/> LINEAR <input type="checkbox"/> SQUARE ROOT	
% CALIB SPAN	DESIRED VALUE	ACTUAL VALUE	EXPECTED VALUE	ACTUAL VALUE
0				
50				
100				

CHECK BELOW, WHEN COMPLETED:

- ☐ BENCH CALIBRATED PER SPECIFICATION SHEET NO. _____
- ☐ VERIFIED PER P&ID NO. _____
- ☐ CORRESPONDS TO SPECIFICATION SHEET NO. _____
- ☐ WIRING CORRECT PER INSTRUMENT LOOP DRAWING NO. _____
- ☐ INSTALLATION CORRECT PER DETAIL NO. _____
- ☐ ACCESSORIES ARE PRESENT AND PROPERLY INSTALLED
- ☐ INSTRUMENT IS ACCESSIBLE FOR MAINTENANCE OR REMOVAL
- ☐ ENGRAVED LAMINATED NAMEPLATE (NO SPELLING ERRORS) PERMANENTLY INSTALLED

<u>FIELD CALIBRATION CHECK</u>				
INPUT RANGE = _____			OUTPUT RANGE = _____	
% CALIB SPAN	DESIRED VALUE	ACTUAL VALUE	EXPECTED VALUE	ACTUAL VALUE
0				
50				
100				

	TRANSMITTER/CONTROLLER/INDICATOR INSTALLATION AND CALIBRATION CHECKLIST	
--	--	--

- ☐ DIRECT ☐ REVERSE
☐ ACTION VERIFIED AT 50% SPAN
☐ ACTION VERIFIED AT _____ SPAN

CONTROLLER SETTINGS								
SETTING	GAIN	PB	RESET (INTEGRAL)	DERIV. (RATE)	HIGH LIMIT	LOW LIMIT	ELEV. ZERO	ZERO SUPP
PRE-TUNE								
POST-TUNE								

PRE-TUNE SETTINGS					
	GAIN	PB	RESET (REPEAT/MIN)	RESET (MIN/REPEAT)	DERIVATION (MINUTES)
FLOW	1.0	100	10	0.1	N/A
LEVEL	1.0	100	MIN.	MAX.	N/A
PRESSURE	2.0	50	2.0	0.5	N/A
TEMP.	4.0	25	0.1	10	OFF

REMARKS _____

CHECKED BY (COMPANY) _____ ACCEPTED BY (COMPANY) _____

SIGNATURE _____ SIGNATURE _____

DATE _____ DATE _____

	ANALYZERS INSTALLATION AND CALIBRATION CHECKLIST	
--	---	--

INSTRUMENT LOOP IS PART OF EQUIPMENT START-UP/SHUTDOWN INTERLOCKS? ☐ No ☐ Yes

TYPE OF INSTRUMENT _____

INSTRUMENT TAG NO. _____ SERIAL NO. _____

SERVICE DESCRIPTION _____

CHECK BELOW, IF TRUE

- ☐ BENCH CALIBRATED PER SPECIFICATION SHEET NO. _____
- ☐ VERIFIED PER P&ID NO. _____
- ☐ CORRESPONDS TO SPECIFICATION SHEET NO. _____
- ☐ WIRING CORRECT PER INSTRUMENT LOOP DRAWING NO. _____
- ☐ INSTALLATION CORRECT PER DETAIL NO. _____
- ☐ ACCESSORIES ARE PRESENT AND PROPERLY INSTALLED
- ☐ INSTRUMENT IS ACCESSIBLE FOR MAINTENANCE OR REMOVAL
- ☐ ENGRAVED LAMINATED NAMEPLATE (NO SPELLING ERRORS) PERMANENTLY INSTALLED

REMARKS _____

CHECKED BY (COMPANY) _____ ACCEPTED BY (COMPANY) _____

SIGNATURE _____ SIGNATURE _____

DATE _____ DATE _____

	CONTROL VALVES INSTALLATION AND CALIBRATION CHECKLIST	
--	--	--

☐ ☐

INSTRUMENT LOOP IS PART OF EQUIPMENT START-UP/SHUTDOWN INTERLOCKS?

No Yes

- ☐ VALVE TAG NO. _____ SERIAL NO. _____
- ☐ TRANSDUCER TAG NO. _____ SERIAL NO. _____
- ☐ SOLENOID TAG NO. _____ SERIAL NO. _____
- ☐ VOLUME BOOSTER TAG NO. _____ SERIAL NO. _____
- ☐ POSITIONER _____ SERIAL NO. _____

SERVICE DESCRIPTION _____

TRANSducer CHECK					
INPUT RANGE =			OUTPUT RANGE =		
CALIBRATED SPAN =			CALIBRATED SPAN =		
BENCH					
SPAN	DESIRED	ACTUAL	SPAN	EXPECTED	ACTUAL
0%			0%		
50%			50%		
100%			100%		
FIELD					
SPAN	DESIRED	ACTUAL	SPAN	EXPECTED	ACTUAL
0%			0%		
50%			50%		
100%			100%		

CHECK BELOW, IF TRUE:

- ☐ BENCH CALIBRATED PER ABOVE _____
- ☐ VERIFIED PER P&ID NO. _____
- ☐ CORRESPONDS TO SPECIFICATION SHEET NO. _____
- ☐ VALVE SPECIFICATION NO. _____
- ☐ TRANSDUCER SPECIFICATION NO. _____
- ☐ SOLENOID SPECIFICATION NO. _____
- ☐ WIRING CORRECT PER INSTRUMENT LOOP DRAWING NO. _____
- ☐ INSTALLATION CORRECT PER INSTRUMENT INSTALLATION DETAILS _____
- ☐ VALVE DETAIL NO. _____
- ☐ TRANSDUCER DETAIL NO. _____
- ☐ SOLENOID DETAIL NO. _____

	CONTROL VALVES INSTALLATION AND CALIBRATION CHECKLIST	
--	--	--

- ☐ ACCESSORIES ARE PRESENT AND PROPERLY INSTALLED
- ☐ INSTRUMENT IS ACCESSIBLE FOR MAINTENANCE OR REMOVAL
- ☐ ENGRAVED LAMINATED NAMEPLATE (NO SPELLING ERRORS) PERMANENTLY INSTALLED

VALVE CHECK			
FLOW CHECK	<input type="checkbox"/> PROCESS FLOW DIRECTION THROUGH THE VALVE IS CORRECT		
SAFETY CHECK	ON LOSS OF AIR VALVE FAILS <input type="checkbox"/> OPEN <input type="checkbox"/> CLOSE		ON LOSS OF POWER SOLENOID FAILS <input type="checkbox"/> TO VENT <input type="checkbox"/> TO VALVE
TRAVEL CHECK	FULL OPEN AT _____ PSI	FULL CLOSED AT _____ PSI	MEASURED TRAVEL _____ INCHES
SEATING CHECK	<input type="checkbox"/> ON BENCH <input type="checkbox"/> IN-LINE	RESULTS	ACTUATOR BENCH SET
POSITIONER CHECK			
VALVE FULL OPEN AT _____ PSI TO POSITIONER			
VALVE FULL CLOSED AT _____ PSI TO POSITIONER			
VOLUME BOOSTER CHECK			
BYPASS VALVE (GAIN) ADJUSTING SCREW BACKED OUT _____ TURNS FROM CLOSED TO ENSURE QUICK BUT STABLE OPERATION (TYPICALLY 1-1/2 TO 2 TURNS)			

REMARKS _____

CHECKED BY (COMPANY) _____ ACCEPTED BY (COMPANY) _____

SIGNATURE _____ SIGNATURE _____

DATE _____ DATE _____

Network Power SuppliesPower Supply Equipment

- ☐ ODVA compliant
☐ Quantity and ratings

Supply Source (120 VAC)

- ☐ Overcurrent protection
☐ Conductor size

Network Power Tap (24 VDC)

- ☐ Overcurrent protection
☐ Conductor size

Comments:

CHECKED BY (COMPANY)

ACCEPTED BY (COMPANY)

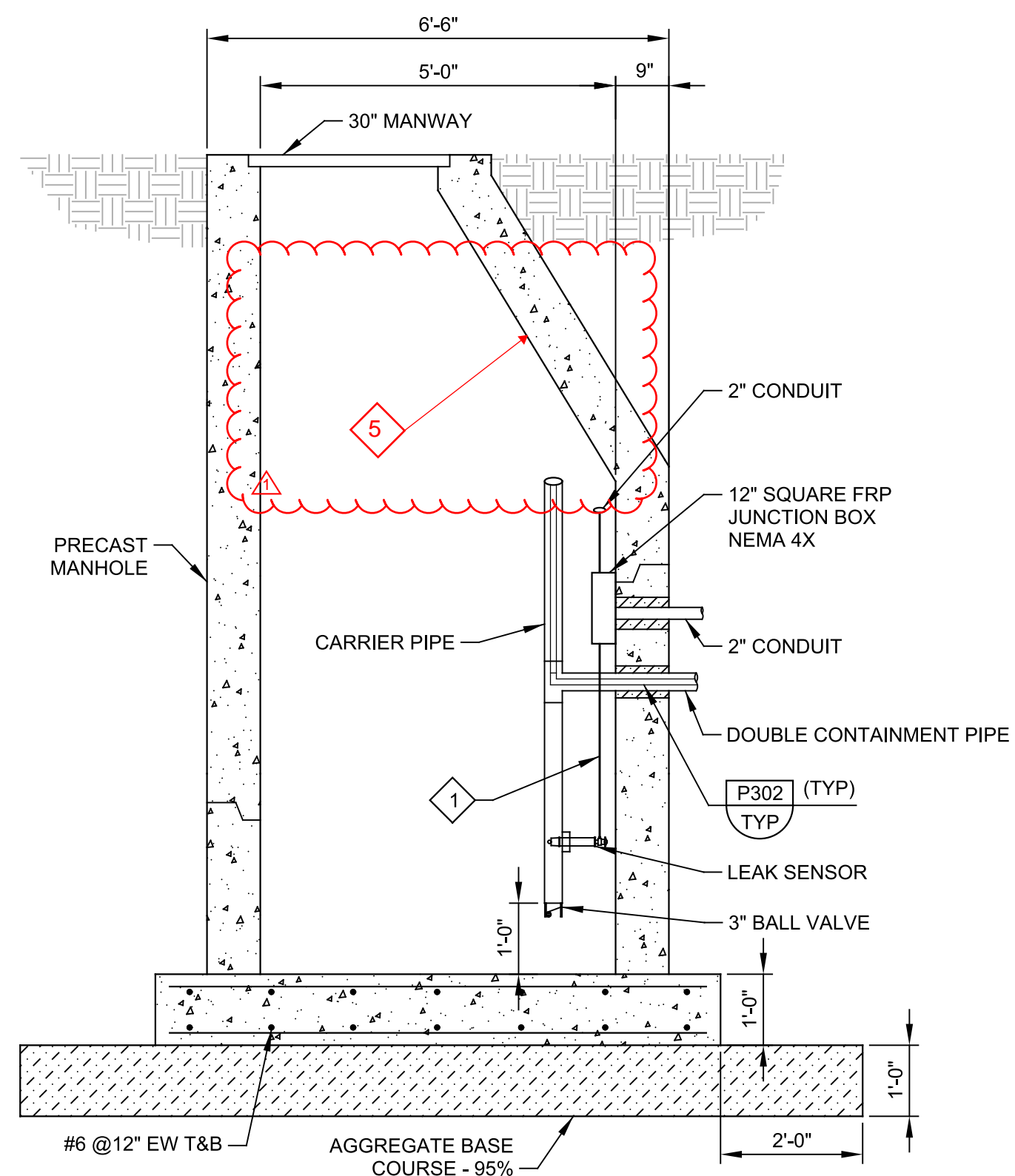
SIGNATURE

SIGNATURE

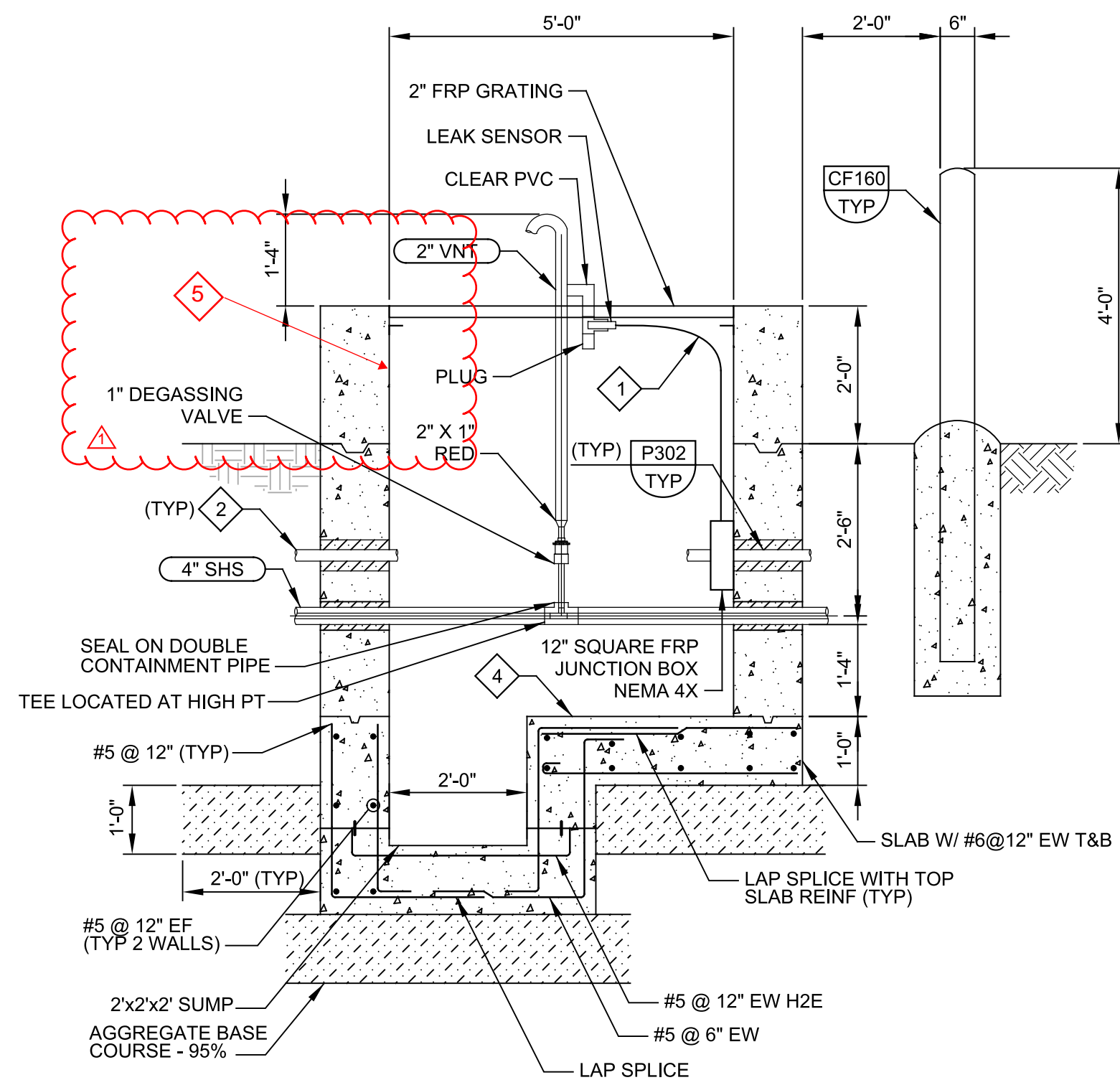
DATE

DATE

AD3 Addendum No. 3




1 LEAK DETECTION
 00YP01 SCALE: 1/2" = 1'-0"
 FILE: 12002A1010C402



2 AIR RELEASE VALVE
00YP01 SCALE: 1/2" = 1'-0"
FILE: 12002A1010C402

- # > KEY NOTES:**

 1. ROUTE SENSOR CABLE IN CONDUIT BACK TO CONTROLLER.
 2. 2" CONDUIT FOR ROUTING OF LEAK DETECTION SENSOR CABLE BACK TO CONTROLLER.
 3. INSTALL 2'-0" X 2'-0" X 2'-0" SUMP AT BOTTOM OF VAULT.
 4. SLOPE FLOOR OF VAULT TO DRAIN TO SUMP.
 5. COAT INSIDE OF VAULTS PER 09960 WITH VE-C-1

	5/05/2021	RS	ADDENDUM 3
REV	DATE	BY	DESCRIPTION

DESIGNED	KS
DRAWN	LZV
CHECKED	RMS
DATE	MARCH 2021



STANISLAUS COUNTY, CALIFORNIA

CITY OF TURLOCK PROJECT NO. 20-032
CHEMICAL SYSTEM UPGRADES PROJECT AT RWQCF
CIVIL
MISCELLANEOUS DETAILS 1

VERIFY SCALES

BAR IS ONE INCH ON
ORIGINAL DRAWING

0 1"

IF NOT ONE INCH ON
THIS SHEET, ADJUST
SCALES ACCORDINGLY

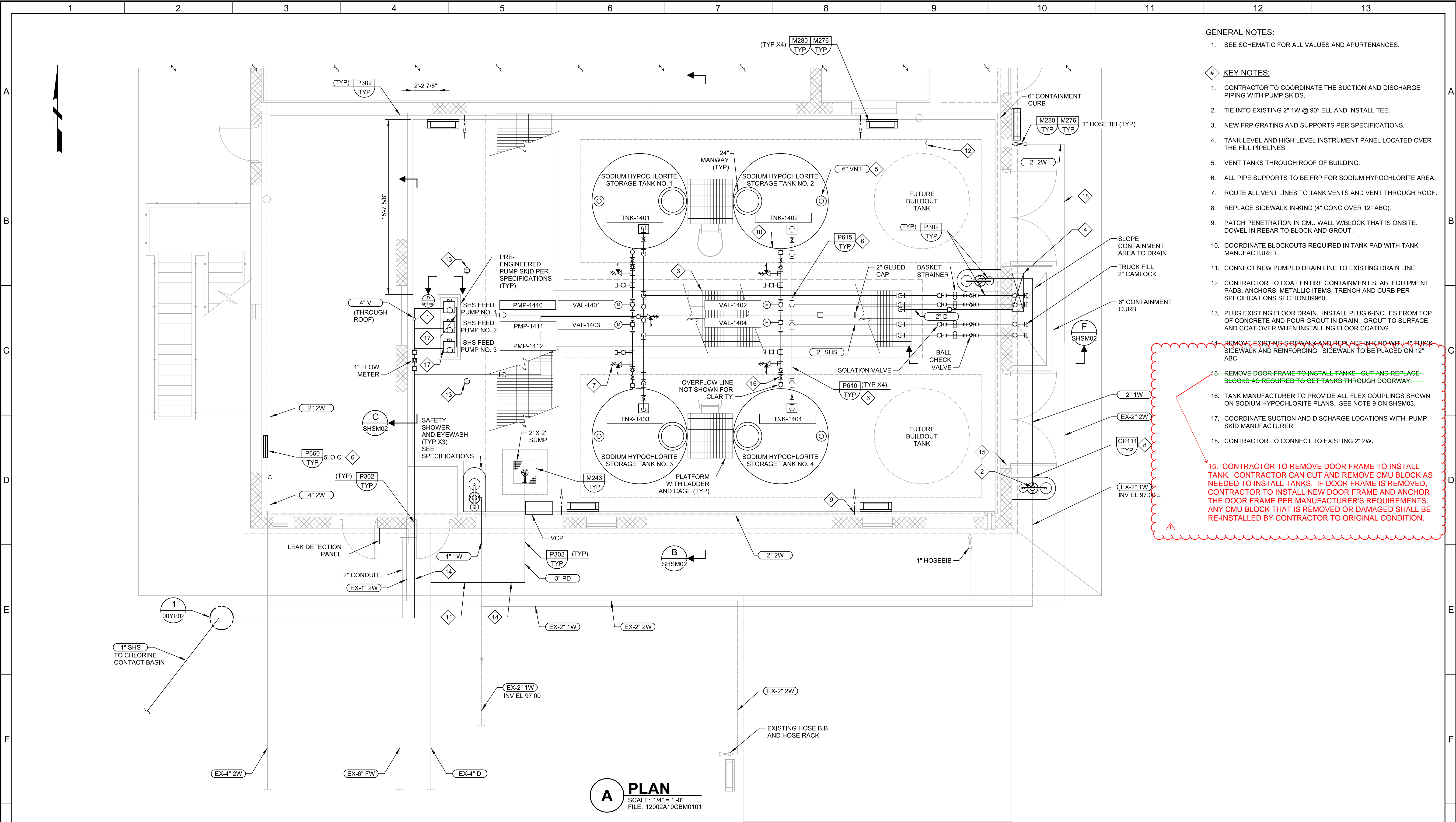
JOB NO. 12002A.10
DRAWING NO. 00YP02
SHEET NO. 22 OF 97

Plot Date: 15-MAR-2021 11:38:02 AM

User: svcPW

Model: Layout1 ColorTable: gshade.ctb DesignScript: Carollo Std Pen_v0905.pen PlotScale: 1:1

LAST SAVED BY: iveloz



A PLAN
SCALE: 1/4" = 1'-0"
FILE: 12002A10CBM0101

REV	DATE	BY	DESCRIPTION
1	5/05/2021	RS	ADDENDUM 3

DESIGNED
KS
DRAWN
BWS
CHECKED
AL
DATE
MARCH 2021



STANISLAUS COUNTY, CALIFORNIA

CITY OF TURLOCK PROJECT NO. 20-032
CHEMICAL SYSTEM UPGRADES PROJECT AT RWQCF
MECHANICAL
SODIUM HYPOCHLORITE BUILDING
MECHANICAL PLAN

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO.
12002A.10
DRAWING NO.
SHSM01
SHEET NO.
34 OF 97