

**RANCHO MURIETA COMMUNITY SERVICES DISTRICT
WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
CHLORINE CONTACT BASIN EXPANSION – PHASE 1**

TECHNICAL SPECIFICATIONS

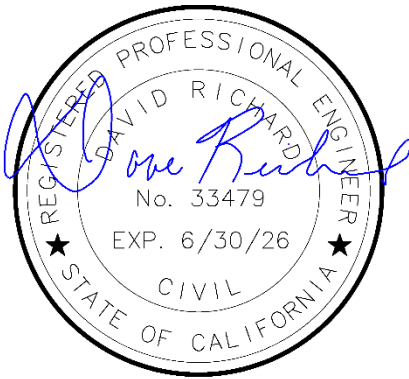


Bid Set

September 2024



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Bid Set

September 2024

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**RANCHO MURIETA COMMUNITY SERVICES DISTRICT
WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
CHLORINE CONTACT BASIN EXPANSION – PHASE 1**

Division 0 – Bidding and Contract Requirements

Section 00020	Invitation to Bid
Section 00100	Instructions to Bidders
Section 00160	Bidder Questionnaire
Section 00170	Authorized Officers
Section 00180	Statement Acknowledging Penal and Civil Penalties Concerning the Contractors' Licensing Laws
Section 00190	Liability and Insurance Requirement
Section 00220	Geotechnical Data
Section 00300	Bid Form
Section 00400	Bid Bond Affidavit
Section 00410	Bid Bond Form
Section 00420	Certification of Bidder's Experience and Qualifications
Section 00430	Proposed Subcontractors
Section 00450	Site Visit Affidavit
Section 00480	Non-Collusion Affidavit
Section 00490	Department of Industrial Relations and SB 96 Compliance Affidavit
Section 00500	Contract
Section 00610	Performance Bond
Section 00620	Payment Bond
Section 00630	Warranty Bond
Section 00650	Workers' Compensation Insurance Certificate
Section 00700	Standard General Conditions of the Construction Contract
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Division 1 – General Requirements

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Section 01015	Contract Time
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Section 01050	Field Engineering
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Section 01070	Environmental Stewardship
Section 01200	Project Meetings
Section 01300	Submittals
Section 01310	Construction Schedule and Reports
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Section 01660	Installation, Testing, and Commissioning

Section 01700 Contract Closeout
Section 01730 Operating and Maintenance Information

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Section 02100 Site Preparation
Section 02160 Excavation Support Systems
Section 02210 Excavation, Backfilling, and Compaction for Utilities
Section 02220 Excavation, Backfilling, and Compaction for Structures

Division 3 – Concrete

Section 03055 Adhesive Bonding Reinforcing Bars and All Thread Rods in Concrete
Section 03100 Concrete Formwork
Section 03200 Concrete Reinforcement
Section 03300 Cast-in-Place Concrete
Section 03600 Grout

Division 5 – Metals

Section 05031 Hot-Dip Zinc Coating
Section 05100 Structural and Miscellaneous Metals
Section 05501 Anchor Bolts and Powder Actuated Fasteners

Division 6 – Wood and Plastics

Section 06741 Fiberglass Reinforced Gratings

Division 7 – Thermal and Moisture Protection

Section 07900 Joint Sealers

Division 9 – Finishes

Section 09800 Painting and Special Coating Systems

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Section 11000 General Requirements for Equipment

Division 13 – Special Construction

Section 13100 Chemical Storage Tanks
Section 13340 Metal Building Systems

Division 15 – Piping

Section 15060	Piping Systems
Section 15066	Steel Pipe
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Division 16 – Electrical

Section 16010	Electrical General Requirements
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WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
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Section 00805	Supplementary Conditions

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SECTION 00020

**INVITATION TO BID
WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
CHLORINE CONTACT BASIN EXPANSION – PHASE 1
(ESTIMATED CONSTRUCTION COST: \$1.3-\$1.6 MILLION)**

Sealed Bids will be received until **Thursday, October 3, 2024, at 2:00 pm** at the Rancho Murieta Community Services District (“District”) office, 15160 Jackson Rd, Rancho Murieta, California, for the Sodium Hypochlorite Improvements/Chlorine Contact Basin Expansion – Phase 1 Project (Project). As soon as practical thereafter, sealed bids for the project will be publicly opened and read for performing work as follows:

Demolition of existing chemical storage tank facility; replacement of chemical piping, demolition of chemical handling equipment and systems, construction of chemical storage tank facility including four chemical storage tanks, relocation of chemical metering pumps, and instrumentation/SCADA improvements.

Project shall comply with the Milestone dates and Final Completion within 210 calendar days from the date specified in the Notice to Proceed. Time is of the essence for commencement and completion of the work.

A mandatory pre-bid meeting is scheduled for this project. The pre-bid meeting shall be held September 25, 2024 from 9:00 am to 11:00 am at the Rancho Murieta Wastewater Treatment Facility, 15160 Jackson Rd, Rancho Murieta, California.

The focus of the meeting is to review the RFP process, submittal requirements, and evaluation criteria. Attendees will be allowed to ask questions at this conference. Oral responses given at this conference are not binding to the District. Only responses and clarifications issued via formal written addenda shall be binding.

Geotechnical data may be obtained by bidders in accordance with Section 00220, GEOTECHNICAL DATA.

Contract Documents for this project are available through Public Purchase (publicpurchase.com). Electronic or hard copies of the documents are not available from the District.

BIDDERS SHALL SUBMIT BIDS ON A HARD COPY OF THE BID PROPOSAL FORMS IN THE CONTRACT DOCUMENTS. All bids and required bid documents submitted must be bound into the hard copy bid package.

Plan holders lists are available on Public Purchase.

Section 00020
INVITATION TO BID

Questions regarding the contract documents shall be submitted electronically to:

Dave Richard, PE
Principal Engineer
Dewberry Engineers Inc.
11060 White Rock Road, Suite 200
Rancho Cordova, CA 95670
drichard@dewberry.com

All bid-related questions and answers will be provided through addenda to bidders registered on the Public Purchase website.

Refer to this web address periodically as it will be updated with bid-related questions and answers until three (3) working days prior to the due date. The questions and answers posted at the web address above shall form part of the Contract Documents.

All bids shall be based on a bound, full size, hard copy, of the bidding documents. No AutoCAD copies of bid documents will be provided for bidding.

Bidding procedures are prescribed in the contract documents. Bids shall only be executed upon the bound bid forms provided, which are a part of said contract documents. Bid guarantee in an amount not less than ten percent (10%) of the total bid dollar amount and conforming to the prescribed bidding procedures is required to be submitted with each bid, as a guaranty to be forfeited should the bidder, if awarded the contract, fail to enter into the same, or fails to furnish in a timely manner the bonds and/or proof of insurance.

Pursuant to the provisions of California Labor Code Section 6707, each bid submitted in response to this Invitation to Bid shall contain, as a bid item, 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. By listing this sum, the bidder warrants that its actions pursuant to this bid item shall not impose tort liability on the District, the Design Engineer, and their employees, agents, and subconsultants.

Pursuant to Section 1770, et. seq., of the California Labor Code, the successful bidder shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations. Copies of such prevailing rate of per diem wages are on file and can be obtained from the Department of Industrial Relations.

Pursuant to Public Contract Code Section 22300, for moneys earned by the Contractor and withheld by the Rancho Murieta Community Services District to ensure the performance of the Contract, the Contractor may, at its option, choose to substitute securities meeting the requirements of said Public Contract Code Section 22300.

All bidders shall be licensed under the provisions of Chapter 9, Division 3 of the Business and Professions Code of the State of California to do the type of work contemplated in the project. In accordance with provisions of California Public Contract Code Section 3300, the District has

determined that the **Contractor shall possess a valid Class A license** at the time that the bid is submitted. Failure to possess the specified license shall render the bid non-responsive.

The Contractor must be properly licensed as a contractor from contract award through Contract acceptance (Public Contract Code § 10164).

The successful bidder will be required to furnish a Payment bond in the amount equal to one hundred percent (100%) of the Contract price, as well as a Faithful Performance Bond, in the amount equal to one hundred percent (100%) of the Contract price. All bonds submitted shall be from admitted sureties.

Bidder further represents and warrants that it presently has no interest and agrees that it will not acquire any interest that would present a conflict of interest under California Government Code Sections 1090 et seq. or 87100 et seq. during the performance of any contract resulting from this RFP and that it will not knowingly employ any person having such an interest. A violation of this provision by the successful Bidder may result in the awarded contract being deemed void and unenforceable. Submissions made in violation of the conflict of interest rules set forth herein shall be deemed nonresponsive. Contracts made with a proposer in violation of the conflict of interest rules set forth herein shall be deemed void and unenforceable.

The District is subject to the California Public Records Act (Gov. Code, § 7920.000 et seq.) Non-exempt public records are open to inspection during the office hours of every public agency, and every person has a right to inspect any non-exempt public record. The District's receipt, review, evaluation, or any other act or omission concerning any such information shall not create any obligation or duty on the part of the District to prevent the disclosure of any non-exempt information. Bidders should not submit information that they consider proprietary or confidential. Any notice to the effect that information in any RFP response or submittal is confidential or proprietary, or is a trade secret, will be disregarded. However, no RFP submittal will be disclosed in response to a Public Records Act request until a determination is made by the District until the award of the contract is made; or that all Bids are rejected; or that this RFP process is terminated without further action.

Costs for developing RFP responses are entirely the responsibility of the Bidder and shall not be chargeable to the District. The District shall not be liable for any costs incurred in response to this RFP, including, but not limited to, costs for any interviews, presentations, or other follow-up information necessary as part of the selection process. All costs shall be borne by the Bidder responding to this RFP. The Bidder responding to this RFP shall hold the District harmless from any liability, claim, or expense whatsoever incurred by or on behalf of the Bidder.

Each bidder shall submit with its bid a statement setting forth its experience on the forms included in the Bid Proposal.

Telephones will not be available to bidders for the preparation of the bids or for calling in bid results. Bid forms received after the designated time will not be accepted. Bidders and their authorized agents are invited to attend the bid opening.

Section 00020
INVITATION TO BID

No bidder may withdraw its bid for sixty (60) days after the date set for the opening of bids.

The successful bidder shall insure that employees and applicants for employment are not discriminated against on the basis of age, color, race, national origin, ancestry, religion, sex, sexual preference, marital status, and comply with the Americans with Disabilities Act.

The District reserves the right to reject, in whole or in part, any or all bids; to make any awards or any rejections in what it alone considers to be in the best interest of the District; and waive any irregularities in the bids. Each bid shall be signed by or on behalf of the bidder and shall be enclosed in a SEALED ENVELOPE with the following information on the outside:

1. Name and address of bidder
2. Project for which the bid is being submitted
3. Date and time of bid opening

The envelope shall be addressed to the Murieta Community Services District office, 15160 Jackson Rd, Rancho Murieta, California 95683.

Dated: September 13, 2024

Rancho Murieta Community Services District

****END OF SECTION****

SECTION 00100

INSTRUCTIONS TO BIDDERS

1.00 WORK TO BE DONE

It is the intention of the District to construct improvements as shown and set forth on the plans, and in the particular locations shown on the plans. All of the work is particularly set forth in the plans and specifications, and all of said work, together with all other work incidental thereto, is included.

The work includes the furnishing of labor, materials, incidentals and equipment necessary for the construction of the PROJECT. The Bidder shall be required to provide, at its own cost and expense, all necessary insurance, as required by law or these specifications, and shall pay the cost and expense of any and all incidental matters herein required.

2.00 EXAMINATION OF CONTRACT DOCUMENTS

Each bidder shall thoroughly examine and be familiar with the contract documents. The submission of a bid shall constitute an acknowledgment, upon which the District may rely, that the bidder has thoroughly examined and is familiar with the contract documents. The failure or neglect of a bidder to receive or examine any of the contract documents shall in no way relieve it from any obligation with respect to its proposal or to the Contract. No claim for additional compensation will be allowed which is based upon a lack of knowledge of any contract documents.

3.00 INSPECTION OF SITE

Bidders are required to inspect the site of the work to satisfy themselves by personal examination or by such other means, as they may prefer, of the location of the proposed work, and of the actual conditions, including subsurface, of and at the site of work. If, during the course of its examination, a bidder finds facts or conditions which appear to be in conflict with the letter or spirit of the bidding documents, the Bidder may apply to the District, in writing, for additional information and explanation before submitting its bid.

Submission of a bid by the bidder shall constitute conclusive evidence that, if awarded the Contract, it has relied and is relying on its own examination of (1) the site of the work, (2) access to the site, (3) all other data and matters requisite to the fulfillment of the work and on its own knowledge of existing facilities on and in the vicinity of the site of the work to be constructed under the Contract, (4) the conditions to be encountered, (5) the character, quality and scope of the proposed work, (6) the quality and quantity of the materials to be furnished, and (7) the requirements of the bid, the plans, the specifications, and the other contract documents.

The information provided by the District is not intended to be a substitute for, or a supplement to the independent verification by the bidder to the extent such independent investigation of site conditions is deemed necessary or desirable by the bidder.

4.00 **INTERPRETATION OF CONTRACT DOCUMENTS**

No oral representations or interpretations will be made to any bidder as to the meaning of the contract documents. Requests for an interpretation shall be made in writing and received at least five (5) days before the time announced for opening the bids to:

Dave Richard, PE
Principal Engineer
Dewberry Engineers Inc.
11060 White Rock Road, Suite 200
Rancho Cordova, CA 95670
drichard@dewberry.com

Requests to clarify possible ambiguous or incomplete statements or designs require issuance of an addendum by the District for the interpretation to become effective. All requests for clarifications shall be made in writing.

5.00 **POSTPONEMENT OF OPENING**

The District reserves the right to postpone the date and time for receiving and/or opening of bids at any time prior to the date and time established in the Invitation to Bid. Postponement notices shall be posted to the Public Purchase Website in the form of an addendum.

6.00 **OPENING OF BIDS**

All bids, irrespective of any irregularities or informalities, if received on time, will be opened and publicly read aloud at the time and place set forth in the Invitation to Bid. Bidders, their representatives and other interested persons may be present at the opening and reading of bids.

Any bids received after the scheduled closing time as set forth in the Invitation to Bid or as postponed by addenda will be considered non responsive and will not be opened. Any such bids will be returned unopened to the Bidder. The public reading of each bid will include at least the following:

- A. Name and address of bidder.
- B. The total amount of bid.
- C. The nature and amount of the security furnished with the bid.

7.00 PREPARATION OF BID FORMS

Bid shall be made on the bound bid forms provided in the contract documents and shall be submitted at the time and place stated in the Invitation to Bid. All blanks in the bid forms shall be appropriately filled in either in ink or typed, and all prices shall be stated in figures. All bid forms shall be submitted in sealed envelopes bearing on the outside the name of the bidder, its address, and the name of the project for which the bid is submitted. It is the sole responsibility of the bidder to see that its bid is received in proper time. Any bid received after the scheduled closing time for receipt of bids will be returned to the bidder unopened. District shall not be responsible for errors or omissions in the bid. Bidders shall write their names on each bid form at the space provided.

To ensure submittal of a complete bid, bidders are required to include all bid forms, Addenda, and Q&A responses, in bound contract documents and specifications submitted at the time of bid. Bid packets shall be spiral bind, comb bind, or three hole punch with binder. Addenda, Q&A sheets, surety forms, and other loose documents shall be bound into the documents behind the front cover. The bid forms, should be filled out on the original bound document or stapled to the appropriate bid sheet. Paper clips and other clips are not acceptable. Loose papers of any kind are not acceptable.

8.00 BIDDER'S SIGNATURE AND AUTHORITY

If the bid is made by an individual, this person's name, signature, and post office address shall be shown; if made by a firm or partnership, the name and post office address of the firm or partnership, a list of the general partners, and the signature of at least one of the general partners shall be shown, if made by a corporation, the bid shall show the name of the state under the laws of which the corporation is chartered, the name and post office address of the corporation, and the title of the person who signs on behalf of the corporation. If the bid is made by the corporation, a certified copy of the bylaws or resolution of the Board of Directors of the corporation shall be furnished showing the authority of the officer or agent signing the bid to execute Contracts on behalf of the corporation. If the bid is made by a joint venture, the bid shall be signed by a representative of one of the joint venture firms. Additionally, the bid shall include a copy of the resolution or agreement empowering the representative to execute the bid and bind the joint venture.

9.00 ERASURES AND CORRECTIONS

The bid submitted shall not contain any erasure, interlineations, or other corrections unless each such correction is suitably authenticated by affixing, in the margin immediately opposite the correction, the initials of the person or persons submitting the bid.

10.00 BID IRREGULARITIES

Changes in or additions to the bid form, recapitulations of the work bid upon, alternative bids, omissions, or any other modifications of the bid form which are not specifically called for in the contract documents may result in rejection of the bid by the District, as not being

responsive to the Invitation to Bid. No oral or telephonic modification of any bid submitted will be considered.

11.00 **MODIFICATION OF BID**

On written request filed with the District, a bid already received may be modified or withdrawn at any time prior to the time established for receiving bids. The request shall be executed by the bidder or its authorized representative as described in Part 00100-8.00, **BIDDER'S SIGNATURE AND AUTHORITY**. Modifications shall be made in writing, executed, and submitted in the same form and manner as the original bid. Withdrawal of a bid does not prejudice a bidder's right to submit a new bid within the time designated for the submission of bids. No bid may be withdrawn after the scheduled closing time except as provided in Part 00100-12.00, **WITHDRAWAL OF BIDS**.

12.00 **WITHDRAWAL OF BIDS**

In accordance with Public Contract Code 5103, within five days after the opening of bids, a bidder may withdraw its bid providing the bidder can establish to the District's satisfaction that a mistake was made in preparing the bid. A bidder desiring to withdraw shall give written notice to the District, specifying, in detail, how the mistake occurred and how the mistake made the bid materially different than it was intended to be. Withdrawal will not be permitted for mistakes resulting from errors in judgment or carelessness in inspecting the site of the work or in reading the contract documents.

The bidder is not relieved of their bid until notified by the District in writing.

Include in their Request for Withdrawal of Bid a statement and supporting documentation that describes the following in detail:

- A. The mistake in their bid and how it was made.
- B. How the mistake made the bid materially different than intended.
- C. How the mistake was made in filling out the bid.
- D. How the mistake was not resulting from errors in judgment or carelessness in inspecting the site of the work or in reading the contract documents.
- E. Signed certification by the owner or officer of the company authorized to sign for the Bid.

Submit the written Request for Bid Relief statement and supporting documentation to the Rancho Murieta Community Services District offices, 15160 Jackson Rd, Rancho Murieta, California 95683.

Certification shall include the following statement:

- A. By my signature on this form, I certify, under penalty of perjury that the attached statement, including any supporting documents, are true and correct.

- B. As well as date of signature, Signature of Bidder, and signatory's title within the bidding organization.

13.00 **ADDENDA**

Addenda issued during the time of bidding shall become a part of the documents furnished bidders for the preparation of bids, shall be covered in the bids, and shall be made a part of the Contract. Each bid shall include specific acknowledgment in the space provided of receipt of all Addenda issued during the bidding period. Failure to so acknowledge may result in the bid being rejected as not responsive. Failure of any bidder to receive such Addenda shall not be grounds for non compliance with the terms of the instructions.

14.00 **BID PRICES**

Bid prices shall include everything necessary for the completion of the work including but not limited to providing the materials, equipment, tools, plant and other facilities, and the management, superintendence, labor and services. Bid prices shall include allowance for all federal, state and local taxes.

In the event of a difference between a price quoted in words and a price quoted in figures for the same quotation, the words shall be the amount bid. In the event that the product of a unit price and an estimated quantity does not equal the extended amount quoted, the unit price shall govern, and the correct product of the unit price and the estimated quantity shall be deemed to be the amount bid. If the sum of two or more items in a bidding schedule does not equal the total amount quoted, the individual item amounts shall govern and the correct total shall be deemed to be the amount bid.

The award of contract, if it is awarded, will be awarded to the lowest responsive, responsible Bidder whose proposal complies with all the requirements prescribed.

15.00 **BID GUARANTY**

The bid form shall be accompanied by a bid guaranty bond provided by an admitted surety insurer authorized to carry on business in the State of California with a minimum A Class IV rating with Best's Rating Guide for payment to the District or meeting the following minimum requirements:

If the Best's Rating for any surety company who has furnished a bid guaranty for the bidder is less than A - Class IV and/or not Treasury Rated, bidder may be required to, within five working days of bid opening, submit to the District an original or certified copy of each of the following documents for each surety company which has furnished a bid guaranty for that bidder:

- A. Appropriate authorization of the signatory to execute each bid guaranty.
- B. A certificate of authority issued by the State Insurance Commissioner.
- C. A certificate from the County Clerk that the above certificate is not ineffective; and

- D. The surety company's financial statement for the prior quarter as specified in Section 995.670 of the California Code of Civil Procedure.

Simultaneously with the submission of the documents described in the preceding paragraphs, the bidder shall also submit an affidavit or declaration, under penalty of perjury under the laws of the State of California, demonstrating the following facts for each bid guaranty submitted or to be submitted on the bidder's behalf.

- A. That the surety company's assets exceed its liabilities by more than the amount of the bid guaranty or guaranties submitted on the bidder's behalf, and
- B. That in issuing the bid guaranty or guaranties submitted on the bidder's behalf, the surety company shall be in full compliance with California Insurance Code Section 12090, supported by appropriate references to the surety company's most recent financial statement on file in the office of the State Insurance Commissioner.

Any bidder wishing to object to the sufficiency of any surety company used by another bidder shall comply fully with the provisions of Section 995.650 of the California Code of Civil Procedure.

The bid guaranty bond shall be in the sum of at least ten (10) percent of the total amount of the bid price, or, alternatively, by a certified or cashier's check, payable to the District in the sum of at least ten (10) percent of the total amount of the bid price. The bid guaranty bond shall be provided on the form included in Section 00410, BID GUARANTY BOND, of these contract documents.

The amount payable to the District under the bid guaranty bond, or the certified or cashier's check and the amount thereof, as the case may be, shall be forfeited to the District as liquidated damages in case of a failure or neglect of the bidder to furnish, execute, and deliver to the District the required performance and payment bonds, evidences of insurance, and to enter into, execute, and deliver to the District the Agreement on the form provided herewith, within ten (10) calendar days after receiving written notice from the District that the award has been made and the Agreement is ready for execution.

The bid guarantees of the three lowest bidders will be retained until the Agreement is signed, evidence of insurance provided, and satisfactory bonds furnished or other disposition made thereof. The bid guarantees of all bidders except the three lowest responsive bids will be returned within 15 calendar days after the bids are opened.

16.00 **QUALIFICATION OF BIDDER**

Each bidder shall complete and submit with their bid Section 00420, CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS.

Upon the request of District, any bidder whose bid is under consideration for the award of the Contract shall promptly submit satisfactory evidence showing the bidder's financial

resources, its construction experience, and its organization's availability for the performance of the Contract.

The bidder may be required to establish, to the satisfaction of the District, the reliability and responsibility of the persons or entities proposed to furnish and perform the work described in the contract documents.

17.00 **SUBCONTRACTORS**

In accordance with California Public Contracting Code Section 4100, et. seq., the bidder shall list, in Section 00430, PROPOSED SUBCONTRACTORS, the name, portion of work to be performed, and location of the place of business for the following.

- A. Each subcontractor who will perform work or labor or render service to the bidder in or about the construction of the work or improvement, in an amount in excess of one half of one percent of the bidder's total bid.
- B. Any subcontractor licensed by the State of California who, under subcontract to the bidder, will specially fabricate and install a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of one half of one percent of the bidder's total bid.

Failure to list the subcontractors defined in subparts A and B above will render the bid non responsive and will be grounds for rejection of the bid. Failure to comply with the provisions of the California "Subletting and Subcontracting Fair Practices Act" shall make the Contractor subject to the sanctions as set forth in the Act.

18.00 **SUBSTITUTIONS DURING BIDDING**

Manufacturers or suppliers of materials and equipment may offer an alternative product to the Contractor and request that alternatives to specified products be considered equal. Inclusion of such alternatives in the bid is the responsibility of the Contractor. Inclusion should only be considered if the Contractor believes the offered alternative is equal in quality and performance to the specified product. After award of the Contract, such offers of alternative products will be reviewed and processed as a substitution as provided under Section 00700, GENERAL CONDITIONS.

19.00 **BIDDERS INTERESTED IN MORE THAN ONE BID**

No person, firm, or corporation, under the same or different name, shall make, file, or be interested in more than one bid for the same work unless alternate bids are called for. Pursuant to Public Contract Code Section 7106, bidders shall execute and furnish with their bids Section 00480, NON-COLLUSION AFFIDAVIT. Reasonable grounds to believe that any individual, partnership, corporation, or combination is interested in more than one bid for the proposed work may cause rejection of all bids in which that individual, partnership, corporation, or combination is interested.

A person, firm, or corporation may, however, submit subproposals or quote prices on materials to more than one bidder.

20.00 SHEETING, SHORING AND BRACING

Pursuant to the provisions of California Labor Code Section 6707, each bid submitted shall contain, in the bid item indicated, the amount included in the bid 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. By listing this sum, the bidder warrants that its actions pursuant to this bid item shall not impose tort liability on the District, the Design Engineer, or their employees, agents, and subconsultants.

Pursuant to California Labor Code Section 6705, the Contractor shall submit a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If such plan varies from the shoring system standards, the plan shall be prepared by a registered civil or structural engineer.

21.00 WAGE RATES

Pursuant to provisions of the Labor Code Section 1770, et. seq., of the State of California, the Director of the Department of Industrial Relations has ascertained the prevailing rate of wages of the locality in which the Work is to be performed and applicable to the work to be done. Prevailing wage for each job category shall be as published by Department of Industrial Relations at the time of project work.

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

Bidders shall complete the form in Section 00490, DEPARTMENT OF INDUSTRIAL RELATIONS AND SB 96 COMPLIANCE AFFIDAVIT and submit with their Bid.

No Contractor or subcontractor may be listed on a bid proposal for a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor code section 1771.1(a)].

No Contractor or subcontractor may be awarded a contract for public work on a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5.

Contractor shall post job site notices prescribed by regulation.

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

22.00 OFFER OF ASSIGNMENT OF ANTITRUST ACTIONS

As provided by Section 7103.5, of the California Public Contract Code, in entering into a public works contract or subcontract, the Contractor or subcontractor offers and agrees to assign to the District all rights, title and interest in, and all causes of action it may have under Section 4 of the Clayton Act (15 U. S.C. Section 15) or under the Cartwright Act (Chapter 2) commencing with Section 16700 (of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services or materials pursuant to the public works contract or subcontract. This assignment shall be made and become effective at the time the District tenders final payment to the Contractor, without further acknowledgment by the parties.

23.00 ASSIGNMENT OF CONTRACT

Any attempted assignment by the Contractor of any contract to be entered into hereunder, or any part thereof, or of funds to be received thereunder by the Contractor, is void unless such assignment has had prior written approval of District and the Surety has been given due notice of such assignment in writing and has consented thereto in writing.

24.00 REJECTION OF BIDS

The District reserves the right, at its sole discretion, to reject any and all bids and further reserves the right to reject any bids which are: a) non responsive (e.g.: bids which are incomplete, obscure, or irregular, bids which omit a bid on any one or more items on which the bids are required, bids which are unbalanced, bids accompanied by insufficient or irregular bid guaranties), b) any bids from bidders who have previously failed to perform properly or to complete on time contracts of any nature with the District; or c) any bid which fails to provide satisfactory documentation of the bidder's qualifications as required by Section 00100-16.00, QUALIFICATION OF BIDDER. The District reserves the right to waive irregularities.

25.00 BONDS AND INSURANCE

The successful bidder, simultaneously with the execution of the Agreement, will be required to furnish a Payment Bond on forms provided by the District in an amount equal to one hundred percent (100%) of the Contract Price, a Faithful Performance Bond in an amount equal to one hundred percent (100%) of the Contract Price, the Workers Compensation Insurance Certificate, and evidences of insurance. Said insurance and bonds shall only use the forms attached and shall be secured from a surety company satisfactory to District with a minimum a Class IV rating with Best's Rating Guide or meeting the following minimum requirements:

If the Best's Rating for any surety company from which the bidder intends to procure the payment bond, performance bond, or both, is less than a Class IV and/or not Treasury Rated, bidder may be required to, within 5 working days after bid opening, submit to the

District an original or certified copy of each of the following documents for each surety company from which the bidder intends to procure such bond or bonds:

- A. Appropriate authorization of the signatory to execute each bond.
- B. A certificate of authority issued by the State Insurance Commissioner.
- C. A certificate from the County Clerk that the above certificate is not ineffective; and
- D. The surety company's financial statement for the prior quarter as specified in Section 995.670 of the California Code of Civil Procedure.

Simultaneously with the submission of the documents described in the preceding paragraphs, the bidder shall also submit an affidavit or declaration, under penalty of perjury under the laws of the State of California, demonstrating the following facts for the bond or bonds submitted or to be submitted on the bidder's behalf:

- A. That the surety company's assets exceed its liabilities by more than the amount of the bond or bonds submitted on the bidder's behalf, and
- B. That in issuing the bond or bonds submitted on the bidder's behalf, the surety company shall be in full compliance with California Insurance Code Section 12090, supported by appropriate references to the surety company's most recent financial statement on file in the office of the State Insurance Commissioner.

Any bidder wishing to object to the sufficiency of any surety company used by another bidder shall comply fully with the provisions of Section 995.650 of the California Code of Civil Procedure.

The form of Agreement, as provided in Section 00500, AGREEMENT, which the successful bidder as Contractor will be required to execute, and the forms of bonds as provided in Sections 00610, PERFORMANCE BOND and 00620, PAYMENT BOND, which it will be required to furnish, shall be carefully examined by the bidder. The Performance Bond is to secure the faithful performance of the Contract, and the Payment Bond is to secure the payment of those to whom the bidder may become legally indebted for labor, materials, tools, equipment, or services of any kind used or employed by the bidder in performing the work.

26.00 **AWARD OF CONTRACT**

Within sixty (60) calendar days after the time of opening of the bids, the District will act either to accept a bid, to reject all bids or with the consent of the bidders and their sureties to extend the time in which the District may act. The acceptance of a bid will be evidenced by a Notice of Award of Contract in writing, delivered in person or by certified mail to the bidder whose bid is accepted. No other act of District will constitute acceptance of a bid. The issuance of a Notice of Award of Contract shall obligate the bidder whose bid is accepted to furnish performance and payment bonds and evidences of insurance, and to execute the Agreement in the form set forth in the contract documents. The Agreement will require the completion of the work according to the contract documents.

If award is made, it will be based on the lowest responsive, responsible bid.

27.00 EXECUTION OF CONTRACT

The Agreement shall be executed by the successful bidder and returned, together with the Contract bonds and evidences of insurance, within ten (10) days after receiving written Notice of the Award of the Contract. Time is of the essence in this regard. After execution by District, one copy of the Agreement shall be returned to Contractor.

Failure or refusal to enter into a Contract as herein provided or to conform to any of the stipulated requirements in connection therewith shall be just cause for annulment of the award and the forfeiture of the proposal guaranty. If the successful bidder refuses or fails to execute the agreement, the District may award the contract to the second lowest responsible bidder. If the second lowest responsible bidder refuses or fails to execute the agreement, the District may award the contract to the third lowest responsible bidder. On the failure or refusal of such second or third lowest bidder to execute the agreement, such bidder's guarantees shall be likewise forfeited to the District. The work may then be re-advertised.

28.00 CONSTRUCTION DOCUMENTS

Within five (5) days after the execution of the Agreement by the District, the District will furnish the Contractor up to three copies of the Specifications, full size plans, and if available, half size plans. The Contractor may obtain additional copies from:

Dave Richard, PE
Principal Engineer
Dewberry Engineers Inc.
11060 White Rock Road, Suite 200
Rancho Cordova, CA 95670

29.00 BIDDERS' SECURITIES

The District shall keep the securities of all bidders until the Agreement has been executed. The other bidders' securities and bidders' bonds shall be returned upon Agreement execution.

I, the undersigned, certify and declare that I have read and understood the INSTRUCTIONS TO BIDDERS.

Signature _____

Date _____

****END OF SECTION****

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SECTION 00160

BIDDER QUESTIONNAIRE

In accordance with Government Code Section 14310.5, the bidder shall complete, under penalty of perjury, the following questionnaire:

Questionnaire

1. Has the bidder, any officer of the bidder, or any employee of the bidder who has a proprietary interest in the bidder, ever been disqualified, removed, or otherwise prevented from bidding on, or completing a federal, state, or local government project because of a violation of the law or a safety regulation?	YES___ NO___
2. Has a contractor's license held by the Contractor's firm and/or any owner, officer or partner of the Contractor's firm been revoked at any time in the last five years?	YES___ NO___
3. Within the last five years, has a surety firm completed a contract on the Contractor's firms behalf, or paid for completion of a contract to which the Contractor's firm was a party, because the Contractor's firm was considered to be in default or was terminated for cause by the project owner?	YES___ NO___
4. At the time of submitting this questionnaire, is the Contractor's firm ineligible to bid on or be awarded a public works contract, or perform as a contractor on a public works contract, pursuant to either California Labor Code Section 1777.1 (prevailing wage violations) or Labor Code Section 1777.7 (apprenticeship violations)?	YES___ NO___
5. At any time in the last five years, has the Contractor's firm, or any of its owners, officers or partners been convicted of a crime involving the awarding of a contract for a government/public construction project, or the bidding or performance of a government/public contract?	YES___ NO___
6. Within the last five years, has the Contractor's firm been assessed liquidated damages on any public contract?	YES___ NO___
7. Within the last three years has the Contractor's firm or representatives been debarred from bidding on, or completing any public works construction contract for any reason?	YES___ NO___
8. Has CAL OSHA assessed penalties against the Contractor's firm for any serious or willful violation occurring on a construction project at any time in the last three years?	YES___ NO___
9. In the past three years, have civil penalties or Notice of Complaint (letter of warning) been issued or assessed against the Contractor's firm pursuant to California Labor Code 1777.7 for violation of California public works apprenticeship requirements by the California Division of Apprenticeship Standards (DAS)?	YES___ NO___
10. In the past three years, has a public agency in California withheld contract payments or assessed penalties against the Contractor's firm for	YES___ NO___

violation of public works prevailing wage requirements?	
11. Has the Contractor's firm been assessed penalties for violation of public works prevailing wage requirements by the DLSE (Labor Commissioner)?	YES___ NO___
12. Does the Contractor's firm have any pending complaints or investigations by a regulatory authority?	YES___ NO___

I, the undersigned, certify and declare that I have read and understood the questionnaire. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Bidder's Firm Name: _____

Date _____

Signature _____

****END OF SECTION****

SECTION 00170

AUTHORIZED OFFICERS

RESOLUTION

RESOLVED, that any one of the following persons, with titles as designated, are authorized and directed to execute on behalf of and as the act of this corporation the written proposal and/or contracts (and associated documents) to and with the Rancho Murieta Community Services District regarding the Wastewater Treatment Facility Sodium Hypochlorite Improvements/Chlorine Contact Basin Expansion – Phase 1 Project:

<u>NAME</u>	<u>TITLE</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

CERTIFICATE OF SECRETARY

I certify that:

I am duly qualified and acting Secretary of _____(name of corporation), a _____ Corporation.

The foregoing is a true copy of a resolution duly adopted by the Board of Directors of the corporation at a regular/special meeting duly held on _____, 20____ entered in the minutes of such meeting in the minute book of the corporation.

The resolution is in conformity with the articles of incorporation and bylaws of the corporation, has never been modified or repealed, and is now in full force and effect.

Dated: _____, 20____

Secretary

****END OF SECTION****

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SECTION 00180

**STATEMENT ACKNOWLEDGING PENAL AND CIVIL PENALTIES
CONCERNING THE CONTRACTORS' LICENSING LAWS**

[Business & Professions Code § 7028.15]

[Public Contract Code § 20103.5]

I, the undersigned, certify that I am aware of the following provisions of California law and that I, or the entity on whose behalf this certification is given, hold a currently valid California contractor's license as set forth below:

Business & Professions Code § 7028.15:

- (a) It is a misdemeanor for any person to submit a bid to a public agency in order to engage in the business or act in the capacity of a contractor within this state without having a license therefor, except in any of the following cases:
 - (1) The person is particularly exempted from this chapter.
 - (2) The bid is submitted on a state project governed by Section 10164 of the Public Contract Code or on any local agency project governed by Section 20104 [now § 20103.5] of the Public Contract Code.
- (b) If a person has been previously convicted of the offense described in this section, the court shall impose a fine of 20 percent of the price of the contract under which the unlicensed person performed contracting work, or four thousand five hundred dollars (\$4,500), whichever is greater, or imprisonment in the county jail for not less than 10 days nor more than six months, or both.

In the event the person performing the contracting work has agreed to furnish materials and labor on an hourly basis, "the price of the contract" for the purposes of this subdivision means the aggregate sum of the cost of materials and labor furnished and the cost of completing the work to be performed.

- (c) This section shall not apply to a joint venture license, as required by Section 7029.1. However, at the time of making a bid as a joint venture, each person submitting the bid shall be subject to this section with respect to his or her individual licensure.
- (d) This section shall not affect the right or ability of a licensed architect, land surveyor, or registered professional engineer to form joint ventures with licensed contractors to render services within the scope of their respective practices.
- (e) Unless one of the foregoing exceptions applies, a bid submitted to a public agency by a contractor who is not licensed in accordance with this chapter shall be considered nonresponsive and shall be rejected by the public agency. Unless one of the foregoing exceptions applies, a local public agency shall, before awarding a contract or issuing a purchase order, verify that the Contractor was properly licensed when the Contractor submitted the bid.

Section 00180
STATEMENT ACKNOWLEDGING PENAL AND CIVIL
PENALTIES CONCERNING THE CONTRACTORS' LICENSING LAWS

Notwithstanding any other provision of law, unless one of the foregoing exceptions applies, the registrar may issue a citation to any public officer or employee of a public entity who knowingly awards a contract or issues a purchase order to a Contractor who is not licensed pursuant to this chapter. The amount of civil penalties, appeal, and finality of such citations shall be subject to Sections 7028.7 to 7028.13, inclusive. Any contract awarded to, or any purchase order issued to, a contractor who is not licensed pursuant to this chapter is void.

- (f) Any compliance or noncompliance with subdivision (e) of this section, as added by Chapter 863 of the Statutes of 1989, shall not invalidate any contract or bid awarded by a public agency during which time that subdivision was in effect.
- (g) A public employee or officer shall not be subject to a citation pursuant to this section if the public employee, officer, or employing agency made an inquiry to the board for the purposes of verifying the license status of any person or contractor and the board failed to respond to the inquiry within three business days. For purposes of this section, a telephone response by the board shall be deemed sufficient.

Public Contract Code § 20103.5:

In all contracts subject to this part where federal funds are involved, no bid submitted shall be invalidated by the failure of the bidder to be licensed in accordance with the laws of this state. However, at the time the contract is awarded, the Contractor shall be properly licensed in accordance with the laws of this state. The first payment for work or material under any contract shall not be made unless and until the Registrar of Contractors verifies to the agency that the records of the Contractors' State License Board indicate that the Contractor was properly licensed at the time the contract was awarded. Any bidder or contractor not so licensed shall be subject to all legal penalties imposed by law, including, but not limited to, any appropriate disciplinary action by the Contractors' State License Board. The agency shall include a statement to that effect in the standard form of pre-qualification questionnaire and financial statement. Failure of the bidder to obtain proper and adequate licensing for an award of a contract shall constitute a failure to execute the contract and shall result in the forfeiture of the security of the bidder.

Bidder's Firm Name: _____

License No.: _____ Class: _____ Expiration Date: _____

Date _____ Signature _____

Printed Name/Title: _____

****END OF SECTION****

SECTION 00190

LIABILITY AND INSURANCE REQUIREMENTS

1.00 INDEMNIFICATION

The Contractor shall indemnify, hold harmless and assume the defense of the District and the Design Engineer and their elected officials, officers, agents, employees and representatives from all damages, costs, or expenses in law or equity, including attorney's fees, that may at any time arise to cause damages to property, or of personal injury received by reason of or in the course of performing work, which may be occasioned by any willful or negligent act or omission of the Contractor, any of the Contractor's employees, or any of its subcontractors arising out of work under this Contract.

Approval of any insurance contracts by the District does not relieve the Contractor or subcontractors from liability under Part 00190-1.00, Indemnification, and the Contractor shall be responsible for payment of all amounts it is obligated to pay under Part 00190-1.00, Indemnification, which have not been paid by such insurance contracts. The District shall not be liable for any accident, loss, or damage to the work prior to its completion and acceptance.

2.00 INSURANCE REQUIREMENTS

A. General

After award of Contract, the Contractor shall promptly obtain, at its own expense, all the insurance required by Part 00190-2.01 B, Rancho Murieta Community Services District Insurance Requirements for Contractors, and shall submit coverage verification for review and approval by the District upon execution of the Contract.

The Notice to Proceed with the Work under this Contract will not be issued, and the Contractor shall not commence work, until such insurance has been approved by the District. The Contractor shall not allow any subcontractors to commence work on its subcontract until all similar insurance required of the subcontractor has been obtained and verified by Contractor. Such insurance shall remain in full force and effect at all times during the prosecution of the Work and until the final completion and acceptance thereof.

The Notice to Proceed does not relieve the Contractor of the duty to maintain such insurance as required by Part 00190-2.01 B, Rancho Murieta Community Services District Insurance Requirements for Contractors.

The District reserves the right to occupy existing facilities under construction or to use or occupy parts of the Work as provided for in Part 00700-14.05, Partial Utilization. Insurance policies shall not restrict or limit such use.

B. Rancho Murieta Community Services District Insurance Requirements for Contractors (with Construction Risks)

Contractor shall procure and maintain for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees or subcontractors.

Minimum Scope of Insurance

Coverage shall be at least as broad as:

1. Insurance Services Office Commercial General Liability coverage (occurrence form CG 0001).
2. Insurance Services Office form number CA 0001 (Ed. 1/87) covering Automobile Liability code 1 (any auto).
3. Workers' Compensation insurance as required by the State of California, with Statutory Limits, and Employer's Liability Insurance with limit of no less than \$1,000,000 per accident for bodily injury or disease.
4. Course of Construction insurance form providing coverage for "all risks" of loss.

Minimum Limits of Insurance

Contractor shall maintain limits no less than:

1. General Liability: Shall be written on an "occurrence" basis \$5,000,000 per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit.
2. Automobile Liability: \$5,000,000 per accident for bodily injury and property damage.
3. Employer's Liability: \$5,000,000 per accident for bodily injury or disease.
4. Course of Construction: equal to the completed value of the project and no coinsurance penalty provisions.

Deductibles and Self-insured Retentions

Any deductibles or self-insured retentions shall be declared to and approved by the Rancho Murieta Community Services District. At the option of the Rancho Murieta Community Services District, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the Rancho Murieta Community Services District, its officers, officials, employees, agents and volunteers or the Contractor shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

Other Insurance Provisions

The general liability and automobile liability policies are to contain, or be endorsed to contain, the following provisions:

1. The Rancho Murieta Community Services District, its officers, officials, employees, agents and volunteers are to be covered as insureds as respects: liability arising out of activities performed by or on behalf of the Contractor products and completed operations of the Contractor, premises owned, occupied or used by the Contractor: or automobiles owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the Rancho Murieta Community Services District, its officers, officials, employees, agents or volunteers.
2. For any claims related to this project, the Contractor's insurance coverage shall be primary insurance as respects the Rancho Murieta Community Services District, its officers, officials, employees, agents or volunteers. Any insurance or self-insurance maintained by the Rancho Murieta Community Services District, its officers, officials, employees, agents or volunteers shall be in excess of the Contractor's insurance and shall not contribute with it.
3. Any failure to comply with reporting or other provisions of the policies including breaches of warranties shall not affect coverage provided to the Rancho Murieta Community Services District, its officers, officials, employees, agents or volunteers.
4. The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.
5. Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the Rancho Murieta Community Services District.

Course of construction policies shall contain the following provisions:

1. The Rancho Murieta Community Services District shall be named as loss payee.
2. The insurer shall waive all rights of subrogation against Rancho Murieta Community Services District.

If the Contractor maintains higher limits than the minimums shown above, the Rancho Murieta Community Services District requires and shall be entitled to coverage for the higher limits maintained by the Contractor. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to the Rancho Murieta Community Services District.

Claims Made Policies

If any coverage required is written on a claims-made coverage form:

1. The retroactive date shall be shown, and this date shall be before the execution date of the contract or the beginning of contract work.
2. Insurance shall be maintained and evidence of insurance shall be provided for at least five (5) years after completion of contract work.
3. If coverage is canceled or non-renewed, and not placed with another claims-made policy form with a retroactive date prior to the contract effective, or start or work date, the Contractor shall purchase extended reporting period coverage for a minimum of five (5) years after completion of contract work.
4. A copy of the claims reporting requirements shall be submitted to the Rancho Murieta Community Services District for review.
5. If the services involve lead-based paint or asbestos identification/remediation, the Contractors Pollution Liability policy shall not contain lead-based paint or asbestos exclusions. If the services involve mold identification/remediation, the Contractors Pollution Liability policy shall not contain a mold exclusion, and the definition of Pollution shall include microbial matter, including mold.

Subcontractors

Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

Verification of Coverage

Contractor shall furnish the Rancho Murieta Community Services District with original endorsements effecting coverage required by this clause. The endorsements are to be signed by a person authorized by that insurer to bind coverage on its behalf. The endorsements are to be on forms provided by the Rancho Murieta Community Services District. All endorsements are to be received and approved by the District before work commences. As an alternative to the District's forms, the Contractor's insurer may provide complete, certified copies of all required insurance policies, including endorsements affecting the coverage required by these specifications.

Notice of Cancellation

Each insurance policy required above shall provide that coverage shall not be canceled, except with notice to the Entity.

Acceptability of Insurers

Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A:VII.

Waiver of Subrogation

Contractor hereby grants to The Rancho Murieta Community Services District a waiver of any right to subrogation which any insurer of said Contractor may acquire against the Entity by virtue of the payment of any loss under such insurance. Contractor agrees to obtain any endorsement that may be necessary to affect this waiver of subrogation, but this provision applies regardless of whether or not the Entity has received a waiver of subrogation endorsement from the insurer.

Insurance Forms

The Rancho Murieta Community Services District will accept the ACORD 25-S Certificate of Liability Insurance Form accompanied by a Commercial General Liability Endorsement Form No. CG 20 10 11 85 and an Automobile Liability Endorsement Form. The District will accept the Certificate of Worker's Compensation Insurance Form provided by the "State Compensation Insurance Fund".

Note: The General Liability and Automobile Liability endorsements shall contain the provisions listed in the section above titled "Other Insurance Provisions".

Submittal of any forms other than the above listed preapproved forms, failure to submit forms, failure to submit forms with required provisions may delay award of contract until all requirements are met in accordance with this Section.

INSURANCE ACKNOWLEDGMENT

I have reviewed the Rancho Murieta Community Services District's insurance requirements and I am aware of the types and amounts of insurance coverages that are required. I am also aware that my insurance company is required to use the Certificate of Insurance Form, and General Liability Special Endorsement, Automobile Liability Special Endorsement, and Workers' Compensation and Employer's Liability Special Endorsement Forms, provided herein. I have reviewed the Rancho Murieta Community Services District's insurance requirements with my insurance carrier and I will be able to provide the required insurance coverages on the specified forms if awarded this project.

Bidder's Firm Name: _____

Bidder's Signature _____

Date _____

****END OF SECTION****

SECTION 00220

GEOTECHNICAL DATA

Subsoil investigations have been conducted at the site of the work. Soil investigations were conducted for design purposes and the data shown in the reports are for subsurface conditions found at the time and place of the investigation.

The District disclaims responsibility for the bidder's interpretation of data, such as projecting or extrapolating from the test holes to other locations on the site of the work soil bearing values and profiles, soil stability and the presence, level, and extent of underground water for subsurface conditions during construction operations.

The geotechnical report has been bound separately from these Contract Documents. Bidders interested in receiving a copy shall fill out, sign, and fax to the District the Information Use Acknowledgment document included in this section prior to receipt of the geotechnical report.

Use of geotechnical data by the Contractor shall be in accordance with Part 00700-4.02A.

INFORMATION USE ACKNOWLEDGEMENT

**PROJECT: Wastewater Treatment Facility Sodium Hypochlorite
Improvements/Chlorine Contact Basin Expansion – Phase 1**

ACKNOWLEDGEMENT:

I hereby acknowledge that the geotechnical information provided by the Rancho Murieta Community Services District for the **Wastewater Treatment Facility Sodium Hypochlorite Improvements/Chlorine Contact Basin Expansion – Phase 1:**

1. cannot be used as a basis for future claims of changed conditions, and
2. is only representative of the time and location that the data was taken.

I further acknowledge that the Rancho Murieta Community Services District is strongly recommending to me that I should not rely on this information exclusively for any purpose, and that I should seek independent geotechnical analysis for this project.

SPECIAL NOTE:

Sign, date, and return this acknowledgement to the Rancho Murieta Community Services District, via Fax or Email tbohannon@rmcsd.com. The geotechnical information will not be released until the signed acknowledgement has been received.

END OF INFORMATION USE ACKNOWLEDGEMENT

FIRM _____

SIGNATURE _____

PRINT NAME _____

DATE _____

END OF SECTION

SECTION 00300

BID FORM

DATE: _____

NAME OF BIDDER: _____

BUSINESS ADDRESS: _____

TELEPHONE NO. : _____

LOCATION

The work to be done and referred to herein is for the Rancho Murieta Community Services District, upon District-owned property, and consists of improvements to be constructed in accordance with the provisions of this Contract Proposal, Special Notice to Bidders, Invitation To Bid, Special Provisions, Technical Specifications, Standard Plans, and Specifications attached hereto and by reference incorporated herein, and Addendum to any of the above incorporated by reference herein.

Said work to be done is shown upon the plans entitled;

**WASTEWATER TREATMENT FACILITY SODIUM HYPOCHLORITE
IMPROVEMENTS/CHLORINE CONTACT BASIN EXPANSION – PHASE 1**

TO THE BOARD OF DIRECTORS OF THE RANCHO MURIETA COMMUNITY
SERVICES DISTRICT:

The undersigned, as bidder, declares that the only person or parties interested in this proposal as principals are those named herein; that this proposal is made without collusion with any other person, firm, or corporation; that the bidder has carefully examined the location of the proposed work above described, that the bidder has examined the plans, special provision and conditions therefor, and is familiar with all proposal requirements, that the bidder has examined this Contract Proposal and the provisions incorporated by reference herein, and bidder hereby proposes, and agrees if this Contract Proposal is accepted by the District, to provide all necessary machinery, tools, apparatus, and other means of construction, and to do all the work and furnish all the materials and services required to complete the said construction in accordance with said Contract Proposal and the Contract, the Special Provisions, the Project Plan(s), the Addendum to any of the above as incorporated by reference in the time stated herein, for the unit prices and/or lump sum prices as follows:

1. Enter Into Agreement

The undersigned, as bidder, declares that we have received and examined the Contract Documents entitled Wastewater Treatment Facility Sodium Hypochlorite Improvements/ Chlorine Contact

Basin Expansion – Phase 1 Project, and will contract with the District, on the form of Agreement provided herewith, to do everything required for the fulfillment of the Contract Document for the construction of the Wastewater Treatment Facility Sodium Hypochlorite Improvements/ Chlorine Contact Basin Expansion – Phase 1 Project at the prices and on the terms and conditions herein contained.

2. Bidder Accepts

Bidder accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including, without limitation, those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for the period specified for Notice of Award after the day of Bid opening. Bidder will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Bidding Requirements within 10 days after the date of Owner's Notice of Award.

3. Bidder's Representations

In submitting this Bid, Bidder represents, as more fully set forth in the Agreement, that:

- A. Bidder has examined and carefully studied the Bidding Documents and the Addenda.

We acknowledge that the following addenda numbers have been received and have been examined as part of the Contract Documents.

<u>Addenda No.</u>	<u>Date Received</u>	<u>Initials</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

- B. Bidder has visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, performance and furnishing of the Work.
- C. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.
- D. Bidder has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except underground facilities) which have been identified in the Supplementary Conditions as provided in Part 4.02.A. of the General Conditions.

Bidder accepts the determination set forth in Paragraph SC-4.02. of the Supplementary Conditions of the extent of the "technical data" contained in such reports and drawings upon which Bidder is entitled to rely as provided in Paragraph 00700-4.02. of the General Conditions.

Bidder acknowledges that such reports and drawings are not Contract Documents and may not be complete for bidder's purposes.

Bidder acknowledges that the District does not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to existing underground facilities at or contiguous to the site.

- E. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by bidder and safety precautions and programs incident thereto.

Bidder does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of this bid for performance and furnishing of the Work in accordance with the times, price and other terms and conditions of the Contract Documents.

- F. Bidder is aware of the general nature of Work to be performed by Owner and others at the site that relates to Work for which this Bid is submitted as indicated in the Contract Documents.

- G. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.

- H. Bidder has given the District written notice of all conflicts, errors, ambiguities or discrepancies in the Contract Documents and the written resolution thereof by the District is acceptable to Bidder, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

Where conflicts, errors, ambiguities or discrepancies have been discovered in or between Contract Documents and/or other related documents, and where said conflicts, etc., have not been resolved through the interpretations or clarifications by the District as described in the Instructions to Bidders, because of insufficient time or otherwise, Bidder has included in the Bid the greater quantity or better quality of Work, or compliance with the more stringent requirement resulting in a greater cost.

- I. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or

induced any person, firm or corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

4. Attached Documents

We agree that the following shall be attached hereto and made a part of this bid.

SECTION	TITLE
00160	Bidder Questionnaire
00170	Authorized Officers
00180	Statement Acknowledging Penal and Civil Penalties Concerning the Contractors' Licensing Laws
00190	Insurance Acknowledgement
00400	Bid Bond Affidavit
00410	Bid Bond
00420	Certification of Bidder's Experience and Qualifications
00430	Proposed Subcontractors
00450	Site Visit Affidavit
00480	Non-Collusion Affidavit
00490	Department of Industrial Relations and SB96 Compliance Affidavit

In case of any discrepancy between unit prices and total cost of an item, the unit price shall prevail. The bid items listed in the Bid Schedule are intended to encompass all construction work as called out in these Contract Specifications and as shown on the plans. If an item of work is not specifically mentioned, it shall be assumed to be included in the most appropriate bid item.

The Contractor shall perform, with the Contractor's own organization, contract work amounting to not less than 50 percent of the original total contract price, except that any designated "Specialty Items" may be performed by subcontract and the amount of any designated "Specialty Items" performed by subcontract may be deducted from the original total contract price before computing the amount of work required to be performed by the Contractor with the Contractor's own organization. When Items of work in the Engineer's Estimate are preceded by the letters (S) or (S-F), those items are designated as "Specialty Items". Where an entire item is subcontracted, the value of work subcontracted will be based on the contract item bid price. When a portion of an item is subcontracted, the value of work subcontracted will be based on the estimated percentage of the contract item bid price, determined from the information submitted by the Contractor, subject to approval by the Department.

If this proposal shall be accepted and the undersigned shall fail to contract as aforesaid and to give the two (2) bonds in the sums to be determined as aforesaid, with surety satisfactory to the Board of Directors of the Rancho Murieta Community Services District, within ten (10) calendar days after the bidder has received notice from the District that the contract is ready for signature, the Board of Directors may, at its option, determine that the bidder has abandoned the contract, and thereupon this proposal and the acceptance thereof shall be null and void, and the forfeiture of such security accompanying this proposal shall be in accordance with Title 4, Division 3, Part 2, Chapter 6, article 2 of the Government Code of the State of California.

The undersigned understands and agrees that the District will not be responsible for any error or omissions on the part of the undersigned in making this proposal.

5. Bid Prices

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

BID SCHEDULE

BASE BID ITEMS

Bid Item	Description	Unit	Approx. Quantity	Unit Price	Extended Price
1	Mobilization/Demobilization	LS	1		
2	Prepare and Implement Water Pollution Control Plan	LS	1		
3	Sodium Hypochlorite Tanks Removal and Salvage	LS	1		
4	Alum Tanks Removal	LS	1		
5	Demolition of Chemical Tanks Containment Structure	LS	1		
6	Removal/Disposal of Chemical Piping	LS	1		
7	Construction of Chemical Tank Containment Structure	LS	1		
8	Furnish and Install Sodium Hypochlorite Tank	EA	2		
9	Furnish and Install Alum Tanks	EA	2		
10	Furnish and Install Chemical Piping	LS	1		
11	Reconstruct Plant Drain/Site Piping Improvements	LS	1		
12	Control Building Modifications	LS	1		
13	Chemical Metering Pumps Modifications	LS	1		
14	Electrical/Instrumentation Improvements	LS	1		
15	All Sheeting, Shoring, and Bracing	LS	1		
TOTAL BASE BID ITEMS 1-15					\$ _____

TOTAL BASE BID (ITEMS 1-15 WRITTEN OUT) _____

6. Completion

We agree, if our bid is accepted and a Contract for Performance of the Work is entered into with the District, to so plan work and to prosecute it with such diligence that the work shall be completed within the time stipulated.

If our bid is accepted, we agree to sign the Agreement without qualifications and to furnish the performance and payment bonds and the required evidences of insurance within 15 calendar days after receiving written Notice of Award of the Contract.

Attached is a bid guaranty bond as required.

Name of Bidder

6. Contractor's License and Address for Communications

The undersigned certifies that the undersigned holds California Contractor's License, Class _____, number _____, expiration date _____.

(Affix corporate seal)

Name of Bidder

Signature of Bidder

Title of Signator

Address of Bidder

Witness

Title of Witness

State of Incorporation

Phone Number

FAX Number

****END OF SECTION****

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SECTION 00400

BID BOND AFFIDAVIT

Accompanying this proposal is (Notice: Insert the words "Cash (\$..)", "Cashier's Check", "Certified Check", or "Bidder's Bond" as the case may be)

in an amount equal to at least ten percent (10%) of the total of the bid amount.

The undersigned further agrees that in case of default in executing the required contract together with the necessary bonds within the period of time provided by the Proposal Requirements, the proceeds of the security accompanying this proposal shall become the property of the Rancho Murieta Community Services District, and this proposal and the acceptance thereof may be considered null and void.

Name of person who inspected site of proposed work for the Contractor's firm:

NAME _____ DATE OF INSPECTION _____

Name, address, and telephone number of surety company and agent who will provide the required bonds for this contract:

IMPORTANT NOTICE: If bidder or other interested person is a corporation, state legal name of corporation, also names of the president, secretary, treasurer, and manager thereof; if a co-partnership, state true name of firm, also names of all individual co-partners composing firm; if bidder or other interested person is an individual, state firm name and individual's name in full.

BIDDER'S SIGNATURE

BIDDER'S TITLE

BUSINESS ADDRESS

DATE

****END OF SECTION****

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SECTION 00410

BID BOND FORM

KNOW ALL MEN BY THESE PRESENTS,

That _____ as Principal,
and _____ as Surety,
are held and firmly bound unto _____

hereinafter called "Owner", in the sum of _____ dollars, (not
less than 10 percent of the total amount of the bid)

for the payments of which sum, well and truly to be made, we bind ourselves, our heirs, executors,
administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, said Principal has submitted a bid to said Owner to perform all work required under
the bidding schedule(s) of the Owner's Contract Documents entitled _____

NOW THEREFORE, if said Principal is awarded a contract by said Owner and, within the time
and in the manner required in the "Notice Inviting Bids" and the "Instructions to Bidders" enters
into a written contract on the form of agreement bound with said Contract Documents, furnishes
the required Performance Bond and Payment Bond within 10 calendar days after receipt of
agreement forms from said Owner, then this obligation shall be null and void, otherwise it shall
remain in full force and effect. In the event suit is brought upon this bond by said Owner and
Owner prevails, said Surety shall pay all costs incurred by said Owner in such suit, including a
reasonable attorney's fee to be fixed by the court.

SIGNED AND SEALED, this _____ day of _____, 20 ____.

(Principal) (SEAL) _____ (SEAL)
(Surety)

By: _____ By: _____
(Signature) (Signature)

(SEAL AND NOTARIAL ACKNOWLEDGMENT OF SURETY)

END OF SECTION

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SECTION 00420

**CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS
TO BE SUBMITTED WITH BID**

1.00 QUALIFICATIONS

By signing in the area indicated below, the Bidder acknowledges and certifies the following:

- A. The Bidder – at the time of bidding, award, and throughout the period of the contract – shall be licensed under the provisions of Chapter 9, Division 3, of the Business and Professions Code of the State of California, to do the type of work contemplated in the contract documents. In accordance with Public Contract Code Section 20103.5, any Bidder not so licensed shall be subject to all legal penalties imposed by law, including, but not limited to, any appropriate disciplinary action by the Contractor's State License Board.
- B. The Bidder is skilled and regularly engaged in the general class and type of work called for in the contract documents.
- C. The Bidder is competent, knowledgeable, and has special skills required for the nature, extent, and inherent conditions of the work to be performed.
- D. The Bidder acknowledges that there may be certain peculiar and inherent conditions existent in the construction of the particular facilities which may create, during the construction program, unusual or peculiar unsafe conditions hazardous to persons and property. Bidder expressly acknowledges that it is aware of such peculiar risks and that it has the skill and experience to foresee and to adopt protective measures to adequately and safely perform the construction work with respect to such hazards.

2.00 WATER AND WASTEWATER TREATMENT PLANT EXPERIENCE

To be considered for award, Bidder, as a company, shall have substantially completed within the last five (5) years, at least three (3) separate \$5 million (minimum) water or wastewater treatment plant construction projects, each with CHEMICAL HANDLING SYSTEMS.

CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS

1. Project Name: _____
Owner: _____
Summary of Plant Work: _____

Description of Chemical Handling Improvements: _____

Construction Cost: _____
Construction Change Orders, number/total dollars: _____
Owner's Representative: _____
Owner's Telephone No.: (____)_____
2. Project Name: _____
Owner: _____
Summary of Plant Work: _____

Description of Chemical Handling Improvements: _____

Construction Cost: _____
Construction Change Orders, number/total dollars: _____
Owner's Representative: _____
Owner's Telephone No.: (____)_____
3. Project Name: _____
Owner: _____
Summary of Plant Work: _____

Description of Chemical Handling Improvements: _____

Construction Cost: _____
Construction Change Orders, number/total dollars: _____
Owner's Representative: _____
Owner's Telephone No.: (____)_____

CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS

Signed this _____ day of _____, 20____.

Name of Bidder

Contractor's License No.

Expiration Date

Signature of Bidder

Title

*** END OF SECTION ***

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SECTION 00430

PROPOSED SUBCONTRACTORS

Pursuant to California Public Contracting Code, Section 4100 et. seq., the following list gives the name, business address, and portion of work (description of work to be done) for each subcontractor that will be used in the work if the bidder is awarded the Contract. (Additional supporting data may be attached to this page. Each page shall be sequentially numbered and headed "Proposed Subcontractors" and shall be signed.)

Business Name and Address of Subcontractor	Description of Work to be Performed	Contractor's License and DIR No.	% of Total Contract	Status¹
_____	_____			
_____	_____			
_____	_____			
_____	_____			
_____	_____			
_____	_____			
_____	_____			
_____	_____			
_____	_____			
_____	_____			
_____	_____			
_____	_____			
_____	_____			
_____	_____			

Name of Bidder

¹ Status **M = Minority Owned Business Enterprise.**
W = Women Owned Business Enterprise.

*** END OF SECTION ***

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SECTION 00450

SITE VISIT AFFIDAVIT

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

NAME OF PROJECT: Rancho Murieta Community Services District Wastewater Treatment Facility Sodium Hypochlorite Improvements/Chlorine Contact Basin Expansion – Phase 1

State of California

County of _____

_____, being first duly sworn, deposes
(Printed Name of Contractor's Authorized Representative)

he or she is

_____ of _____,
(Title of Representative) (Bidder's Name)

the party making the bid, has visited the Site of the Work as described in the Contract Documents and has examined and familiarized themselves with the existing conditions, as well as all other conditions relating to the construction which will be performed. The submitting of a bid shall be considered an acknowledgement on the part of the Bidder of familiarity with conditions at the site of Work. The Bidder further acknowledges that the site examination has provided adequate and sufficient information related to existing conditions which may affect cost, progress or performance of the Work.

Signed this _____ day of _____, 20____.

Authorized Signature

*** END OF SECTION ***

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SECTION 00480

**NON-COLLUSION AFFIDAVIT TO BE EXECUTED
BY BIDDER AND SUBMITTED WITH BID**

State of California)
) ss.
County of)

_____, being first duly sworn, deposes and say that he or she is _____
_____ of _____ the party making the foregoing bid
that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership,
company, association, organization, business entity, business combination, or corporation; that the
bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or
solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded,
conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone
shall refrain from bidding; that the bidder has not in any manner, directly or indirectly sought by
agreement, communication, or conference with anyone to fix the bid price of the bidder or any other
bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder,
or to secure any advantage against the public body awarding the contract of anyone interested in the
proposed contract; that all statements contained in the bid are true; and, further, that the bidder has
not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents
thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any
corporation, partnership, company association, organization, bid depository, or to any member or
agent thereof to effectuate a collusive or sham bid.

Date

Signature

Name of Bidder

Title

Subscribed and sworn to before me this ____ day of _____, 20____.

Signature of Notary Public in and for the County of _____,
State of California.

*** END OF SECTION ***

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SECTION 00490

**DEPARTMENT OF INDUSTRIAL RELATIONS AND
SB 96 COMPLIANCE AFFIDAVIT**

- No contractor or subcontractor may be listed on a bid proposal for a public works project or be awarded a contract for public work on a public works project unless registered with the Department of Industrial Relations (DIR) pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771]. NOTE: *This section does not apply to work performed on a public works project of \$25,000 or less when the project is for construction, alteration, demolition, installation, or repair work, nor to projects of \$15,000 or less when the project is for maintenance work.* Pursuant to Public Contract Code section 4104, bidders must provide the DIR registration numbers for all subcontractors listed in a bid for a project.
- This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

In accordance with California Labor Code as amended through Senate Bill SB 96, prior to commencement of the Contract, all Contractors are required to register, and maintain active registration throughout the duration of the contract with the California Department of Industrial Relations (DIR). For information regarding registration, please go to:

<http://www.dir.ca.gov/>

I, the Bidder, certify that:

"I am aware of the provisions of Senate Bill SB 96 and subsequent DIR regulations, which require Contractors/Vendors to comply with all labor compliance requirements including but not limited to prevailing wage requirements, Labor Code sections 1725.5, 1771.1(a), 1774-1776, 1777.5, 1813, 1815, Public Works Contractor Registration Program, Electronic Certified Payroll Records to Labor Commissioner, Public Contract Code section 4104, and other requirements described in the DIR website. I will comply with such provisions before commencing the performance of the work of this contract, and maintain compliance throughout the completion of said contract."

Project: Wastewater Treatment Facility Sodium Hypochlorite Improvements/Chlorine
Contact Basin Expansion – Phase 1

_____ Signature	_____ Business Name
_____ Print Name	_____ CSLB License #
_____ Title	_____ Public Works Contractor (PWC) Registration #
_____ E-mail	_____ Labor Classification(s)
_____ Date	_____ Labor Classifications(s), continued

END OF SECTION

SECTION 00500

CONTRACT

THIS AGREEMENT, made this _____ day of _____, 20____ by and between Rancho Murieta Community Services District, Rancho Murieta, California, hereinafter called the "District," and _____ hereinafter called the "Contractor."

WITNESSETH:

WHEREAS, the District has caused to be prepared in accordance with law, specifications, and other contract documents for the work herein described and shown and has approved and adopted these contract documents, specifications and drawings and has caused to be published in the manner and for the time required by law, a notice to bidders inviting sealed proposals for doing the work in accordance with the terms of this contract; and

WHEREAS, the Contractor, in response to the Invitation to Bid, has submitted to the District a sealed proposal accompanied by a proposal guaranty in an amount not less than ten percent (10%) of the bid price for the construction of the proposed work in accordance with the terms of this contract; and

WHEREAS, the District, in manner prescribed by law, has publicly opened, examined and canvassed the proposals submitted, and as a result has determined and declared the Contractor to be the lowest and best regular responsible bidder for contract, and has duly awarded to the Contractor a contract for the work and for the sums named in the proposal.

NOW, THEREFORE, THIS CONTRACT WITNESSETH:

Article I. WORK TO BE DONE

That the Contractor shall provide all necessary machinery, tools, apparatus and other means of construction; shall furnish all materials, superintendence, overhead expenses, all labor and expenses of whatever nature necessary for:

**Wastewater Treatment Facility Sodium Hypochlorite
Improvements/Chlorine Contact Basin Expansion – Phase 1**

for the Rancho Murieta Community Services District, Rancho Murieta, California in conformity with the specifications and drawings and other contract documents hereto attached and according to such instructions as may be given by the Department.

ARTICLE II. CONTRACT PRICES

District hereby promises and agrees with Contractor to employ, and does hereby employ, Contractor to provide the materials and to do the work according to the terms and conditions herein contained and referred to, for the sum of \$_____, subject to additions and deductions as provided therein, and hereby contracts to pay the same at the time, in the manner and upon the conditions herein set forth; and the said parties for themselves, their heirs, executors, administrators, successors and assigns, do hereby agree to the full performance of the covenants herein contained.

ARTICLE III. PARTS OF THE CONTRACT

That the complete contract consists of the following documents, all of which shall be considered as parts of this agreement.

1. Invitation to Bid
2. General Conditions
3. Supplementary Conditions
4. Specifications bearing the title Rancho Murieta Community Services District Wastewater Treatment Facility Sodium Hypochlorite Improvements/Chlorine Contact Basin Expansion – Phase 1
5. Contract Proposal
6. Contract Bonds
7. Contract Drawings

All of the documents above are contained herein.

ARTICLE IV.

By my signature hereunder, as Contractor, I certify that I am aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for workmen's compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.

ARTICLE V.

The statement of prevailing wages appearing in the Equipment Rental Rates and General Prevailing Wage Rates is hereby specifically referred to and by this reference is made part of this contract. It is further expressly agreed by and between the parties hereto that should there be any conflict between the terms of this instrument and the bid or proposal of said Contractor, then this instrument shall control and nothing herein shall be considered as an acceptance of said terms of said proposal conflicting herewith.

ARTICLE VI.

The Contractor agrees to receive and accept the sum of \$_____ subject to additions and deductions as provided herein, as full compensation for furnishing all materials and for doing all the work contemplated and embraced in this agreement; also for all loss or damage, arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen difficulties or obstructions which may arise or be encountered in the prosecution of the work until its acceptance by the District, and for all risks of every description connected with the work, also for all expenses incurred by or in consequence of the suspension or discontinuance of work and for well and faithfully completing the work, and the whole thereof, in the manner and according to the plans and specifications, and the requirements of the Department.

IN WITNESS WHEREOF, the parties to these presents have hereunto set their hands the year and date first above written.

Licensed in accordance with an act providing for the registration of Contractors, License No. _____

Federal Employer Identification No. _____

_____ Contractor/Firm	RANCHO MURIETA COMMUNITY SERVICES DISTRICT
_____ Signature of Contractor	_____ Name/Title
_____ Print Name	ATTEST
_____ Title	_____ Title
_____ Address	COUNTERSIGNED
_____ City, State, and Zip	_____ Name/Title
_____ Phone Number	APPROVED AS TO FORM
	_____ Name/Title (Attorney)

****END OF SECTION****

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SECTION 00610

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS,

That _____ as Contractor,

and _____ as Surety,

are held firmly bound unto _____

hereinafter called "Owner", in the sum of _____

_____ dollars,
for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors,
administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, said Contractor has been awarded and is about to enter into the annexed Contract with
said Owner to perform and furnish all work as specified or indicated in the Contract Documents
entitled

NOW THEREFORE, if said Contractor shall perform all the requirements of said Contract
required to be performed on his part, at the times and in the manner specified therein, then this
obligation shall be null and void, otherwise it shall remain in full force and effect.

PROVIDED, that any alterations in the work to be done or the materials to be furnished, or
changes in the time of completion, which may be made pursuant to the terms of said Contract, shall
not in any way release said Contractor or said Surety thereunder, nor shall any extensions of time
granted under the provisions of said Contract release either said Contractor or said Surety, and
notice of such alterations or extensions of the Contract is hereby waived by said Surety.

SIGNED AND SEALED, this _____ day of _____, 20 ____ .

(SEAL) (SEAL)

(Contractor) (Surety)

By: _____
(Signature) (Address & Telephone Number)

By: _____
(Signature)

(SEAL AND NOTARIAL ACKNOWLEDGMENT OF SURETY)

APPROVED AS TO FORM:

APPROVED AS TO SUFFICIENCY:

NAME/TITLE (ATTORNEY)

NAME/DISTRICT TITLE

DATE:

DATE:

END OF SECTION

SECTION 00620

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS,

That _____ as Contractor,

and _____ as Surety,

are held firmly bound unto _____

hereinafter called "Owner", in the sum of _____

_____ dollars,

for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, said Contractor has been awarded and is about to enter into the annexed Contract with said Owner to perform and furnish all work as specified or indicated in the Contract Documents entitled Rancho Murieta Community Services District Wastewater Treatment Facility Sodium Hypochlorite Improvements/Chlorine Contact Basin Expansion – Phase 1.

NOW, THEREFORE, if said Contractor, his subcontractors, his or its heirs, executors, administrators, successors, or assigns, shall fail to pay for any materials, provisions, provender, equipment or other supplies used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts due under the Unemployment Insurance Code, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of the Contractor and his subcontractors pursuant to Section 13020 of the Unemployment Insurance Code with respect to such labor, all as required by the provisions of Title XV, Chapter 7, Sections 3247-3252 inclusive, of the Civil Code of the State of California and acts amendatory thereof, and sections of other codes of the State of California referred to therein and acts amendatory thereof, and provided that the persons, companies or corporations so furnishing said materials, provisions, provender, equipment or other supplies, appliances or power used in, upon, for or about performance of the work contracted to be executed or performed, or any person, company or corporation renting or hiring implements or machinery or power for or contributing to said work to be done, or any person who performs work or labor upon the same, or any person who supplies both work and materials therefor, shall have complied with the provisions of said laws, then said Surety will pay the same in an amount not exceeding the sum hereinabove set forth and also will pay, in case suit is brought upon this bond, a reasonable attorney's fee, as shall be fixed by the Court. This bond shall insure to the benefit of any and all persons named in Section 3181 of the Civil Code of the State of California so as to give a right of action to them or their assigns in any suit brought upon this bond.

PROVIDED, that any alterations in the work to be done or the materials to be furnished, or changes in the time of completion, which may be made pursuant to the terms of said Contract, shall not in any way release said Contractor or said Surety thereunder, nor shall any extensions of time granted under the provisions of said Contract release either said Contractor or said Surety, and notice of such alterations or extensions of the Contract is hereby waived by said Surety.

SIGNED AND SEALED, this _____ day of _____, 20 ____ .

(SEAL)	(SEAL)
_____	_____
(Contractor)	(Surety)

By: _____	_____
(Signature)	(Address & Telephone Number)

By: _____
(Signature)

(SEAL AND NOTARIAL ACKNOWLEDGMENT OF SURETY)

*** END OF SECTION ***

SECTION 00630

WARRANTY BOND

Whereas, the Board of Directors of the Rancho Murieta Community Services District, State of California, and

_____ (hereinafter designated as "Contractor") have entered into a Contract whereby Contractor agrees to repair any improvements set forth in said Contract identified as Rancho Murieta Community Services District Wastewater Treatment Facility Sodium Hypochlorite Improvements/Chlorine Contact Basin Expansion – Phase 1 and awarded by Resolution to Contractor on _____ 20____, is hereby referred to and made a part hereof; and

Whereas, said Contractor is required under the terms of said Contract to furnish a bond for the Warranty of Improvements of said Contract.

Now, therefore, we, the Contractor and _____, as surety, are held and firmly bound unto the Rancho Murieta Community Services District, hereinafter called "District" in the penal sum of _____ dollars (\$_____) lawful money of the United States, for the payment of which sum well and truly to be made, we bond ourselves, our heirs, successors, executors and administrators, jointly and severally, firmly by these presents.

The condition of this obligation is such that if the above bounded Contractor, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and provisions in the said Contract and any alteration thereof made as therein provided, on his or their part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the District, its officers, agents and employees, as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

As a part of the obligation secured hereby and in addition to the face amount specified therefor, there shall be included costs and reasonable expenses and fees, including reasonable attorney's fees, incurred by District in successfully enforcing such obligation, all to be taxed as costs and included in any judgment rendered.

In witness whereof, this instrument has been duly executed by the Contractor and surety above named, on _____, 20_____.

Name of Contractor

Name of Surety

Address

Address & Telephone

Signature of Contractor

Signature of Surety

APPROVED AS TO FORM:

APPROVED AS TO SUFFICIENCY:

_____, DISTRICT ATTORNEY

TITLE OF DISTRICT POSITION

Attach Notary Form Here

*** END OF SECTION ***

SECTION 00650

WORKERS' COMPENSATION INSURANCE CERTIFICATE

In accordance with California Labor Code Section 1861, prior to commencement of work on the Contract, the Contractor shall sign and file with the District the following certification:

"I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract."

Signature

Name of Contractor

Title

Date

****END OF SECTION****

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SECTION 00700

**STANDARD
GENERAL CONDITIONS
OF THE
CONSTRUCTION CONTRACT**

**RANCHO MURIETA
COMMUNITY SERVICES DISTRICT**

These General Conditions are based in part on

EJCDC C-700 (2002 Copyrighted Edition)

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GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in these General Conditions or in other Contract Documents, the terms listed below have the meanings indicated which are applicable to both the singular and plural thereof. Said terms are generally capitalized or written in italics, but not always. When used in a context consistent with the definition of a listed-defined term, the term shall have a meaning as defined below whether capitalized or italicized or otherwise.

1. *Addenda*--Written or graphic instruments issued prior to the opening of Bids, which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*--The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment*--The form acceptable to Construction Manager which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidder*--The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order*--A document recommended by Construction Manager which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the

Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*-- Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*--The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Construction Manager's written recommendation of final payment.

15. *Contractor*--The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*--See Paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*--The individual or entity named as such in the Agreement.

20. *Field Order*--A written order issued by Engineer which requires minor changes in the Work but

which does not involve a change in the Contract Price or the Contract Times.

21. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

22. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

23. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*--The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*--A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner*--The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*--Polychlorinated biphenyls.

31. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

32. *Progress Schedule*--A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Related Entity* -- An officer, director, partner, employee, agent, consultant, or subcontractor.

37. *Resident Project Representative*--The authorized representative of Construction Manager who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Schedule of Submittals*--A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

40. *Schedule of Values*--A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

41. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

42. *Site*--Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

43. *Specifications*--That part of the Contract Documents consisting of written requirements for

materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

44. *Subcontractor*--An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

45. *Substantial Completion*--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Construction Manager, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be safely and conveniently utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.

46. *Successful Bidder*--The Bidder submitting a responsive Bid to whom Owner makes an award.

47. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

48. *Supplier*--A manufacturer, fabricator, supplier, distributor, material man, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.

49. *Underground Facilities*--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

50. *Unit Price Work*--Work to be paid for on the basis of unit prices.

51. *Work*--The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

52. *Work Change Directive*--A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Construction Manager ordering an addition, deletion, or

revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

53. *Construction Manager*--The individual or entity retained by the Owner to perform construction quality assurance and contract administration functions not involving reviews and interpretations with respect to design intent. The Construction Manager is a representative of the District, either an employee or consultant, employed to act as advisor to the District in construction matters related to the Contract.

1.02 Terminology

A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.

B. *Intent of Certain Terms or Adjectives*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer or Construction Manager. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer or Construction Manager as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer or Construction Manager any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents, or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or

c. has been damaged prior to Construction Manager's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide, Supply*

1. The word "Furnish" or the word "Install" or the word "Perform" or the word "Provide" or the word "Supply," or any combination or similar directive or usage thereof, shall mean FURNISHING AND INCORPORATING IN THE WORK including all necessary labor, materials, equipment, and everything necessary to perform the Work indicated, unless specifically limited in the context used.

F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement.

2.04 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Construction Manager for timely review:

1. a preliminary Progress Schedule; indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Construction Manager and Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Construction Manager, and others as appropriate will be held to review for acceptability to Construction Manager as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Construction Manager if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Construction Manager responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Construction Manager and Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Construction Manager as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.

C. Clarifications and interpretations with respect to the design intent of the Contract Documents shall be issued by Engineer through the Construction Manager, and clarifications and interpretations with respect to administrative matters shall be issued by the Construction Manager as provided in Article 9.

D. The Specifications may vary in form, format and style. Some specification sections are written in varying degrees of streamlined or declarative style and some sections may be relatively narrative by comparison. Omissions of such words and phrases as "the Contractor shall," "in conformity with," "as shown," or "as specified" are intentional in streamlined sections. Omitted words and phrases shall be supplied by inference. Similar types of provisions may appear in various parts of a section or articles within a part depending on the format of the section. The Contractor shall not take advantage of any variation of form, format or style in making claims for extra Work.

E. The cross referencing of specification sections under the subparagraph heading "Related Sections include but are not necessarily limited to:" and elsewhere within each specification section is provided as an aid and convenience to the Contractor. The Contractor shall not rely on the cross referencing provided and shall be responsible to coordinate the entire work under the Contract Documents and provide a complete Project whether or not the cross referencing is provided in each section or whether or not the cross referencing is complete.

3.02 *Reference Standards*

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

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, Engineer or Construction Manager, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer or Construction Manager, or any of their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Construction Manager any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer through Construction Manager before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to Construction Manager in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner, Construction Manager or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor knew or reasonably should have known thereof.

B. Resolving Discrepancies

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

a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to

modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification of matters of design intent issued through the Construction Manager, and Construction Managers written interpretation or clarification of administrative matters.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier or other individual or entity performing or furnishing all of the Work under a direct or indirect contract with Contractor, shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or

2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adoption by Engineer.

B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Copies of data furnished by Owner or Engineer to Contractor or Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise

without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 - AVAILABILITY OF LANDS;
SUBSURFACE AND PHYSICAL CONDITIONS;
HAZARDOUS ENVIRONMENTAL CONDITIONS;
REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

1. Where easement lines are shown on the Contract Drawings they shall be considered as shown in their final location unless stipulated otherwise in the Supplementary Conditions.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally

recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Construction Manager in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. Construction Manager's and Engineer's Review: After receipt of written notice as required by Paragraph 4.03.A, Construction Manager will promptly review the pertinent condition with Engineer as appropriate, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor and Engineer) of Construction Manager's findings and conclusions.

C. Possible Price and Times Adjustments

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner, Engineer and Construction Manager, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 Underground Facilities

A. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

a. reviewing and checking all such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

3. Pursuant to Government Code Section 4216-4216.9, the Contractor shall notify the appropriate regional notification center of all excavations as required under Government Code sections 4216 to 4216.9. The Contractor shall contact Underground Service Alert at 1-800-642-2444 for the location of subsurface installations. Contractor shall furnish to the Construction Manager written documentation of its contact(s) with Underground Service Alert within two (2) days after such contact(s).

4. At least two (2) days before performing any excavation work, the Contractor shall request the utility owners to mark or otherwise indicate the location of their service. Contractor shall furnish to the Construction Manager written documentation of its contact(s) with utility owners requesting them to mark or otherwise indicate the location of their respective facilities within three (3) days after such contact(s).

5. It shall be the Contractor's responsibility to determine the exact location and depth of all utilities, including service connections, which have been marked by the respective owners and which Contractor believes may affect or be affected by Contractor's operations. If no pay item is provided in the Contract for this work, full compensation for such work shall be considered as included in the prices bid for other items of work.

B. Not Shown or Indicated

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Construction Manager. Construction Manager will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Construction Manager concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05. In accordance with Government Code Section 4215 the Contractor shall not be assessed liquidated damages for delay in completion of the project, when such delay is caused by the failure of the Owner or utility company to provide for

the removal or relocation of facilities for which they are the responsible party

3. When the General Requirements, Specifications, or Construction Drawings indicate that a utility is to be relocated, altered or constructed by others, the District will conduct all negotiations with the utility company and the work will be done at no cost to the Contractor.

4. Temporary or permanent service, relocation or alteration of utilities desired by the Contractor for its own convenience shall be the Contractor's responsibility and it shall make arrangements and bear all costs.

5. Except where the owner of a damaged utility has advised that it intends to repair the damage through its own forces or forces that it will retain or has retained, Contractor shall, within 24 hours of receipt from the Owner of notice to commence correction of damage, notify the Construction Manager in writing if Contractor intends to repair the damage. During nights and weekends when work is not in progress, Owner may give such notice by telephone or by facsimile transmission to the Contractor's facsimile number and such notice will be immediately effective. The Contractor's failure to provide timely written notification that it intends to repair the damage shall be deemed its agreement that the Owner may repair the damage at Contractor's expense without further notice and without prejudice to any other remedy available to Owner. In such event, the Contractor may observe the Work if this can be done without in any way delaying the progress thereof, but may not contest any element of the expense of repair or the lack of further notice. This provision is in addition to any other remedy, including the remedy provided in 13.09, Owner May Correct Defective Work

4.05 Reference Points

A. Owner shall provide engineering surveys to establish reference points for construction which in Construction Manager's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Construction Manager whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by licensed land surveyor registered in the state of California.

4.06 Hazardous Environmental Condition at Site

A. *Reports and Drawings*: Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the general accuracy of the “technical data” contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such “technical data” is identified in the Supplementary Conditions. Except for such reliance on such “technical data,” Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor’s purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any “technical data” or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Construction Manager (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Construction Manager concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits

related thereto and delivered to Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner’s own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, Engineer and Construction Manager, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual’s or entity’s own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Engineer and Construction Manager, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to

indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

5.04 *Contractor's Liability Insurance*

A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insured (subject to any customary exclusion regarding professional liability) Owner, Engineer and Construction Manager, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Contract Documents or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.

a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

8. With respect to all insurance required by this paragraph 5.04., Contractor agrees to waive all rights of

subrogation against Owner, Engineer and Construction Manager, and each additional insured identified in the Supplemental Conditions.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, Engineer and Construction Manager, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, collapse, explosion, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, (other than caused by flood) and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, Engineer and Construction Manager with 30 days written notice to each other additional insured.

B. Contractor shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, Engineer and Construction Manager, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, Engineer and Construction Manager, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and

subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, Engineer and Construction Manager, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, Engineer and Construction Manager, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, Engineer or Construction Manager, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.

B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion

of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

1. All insurance required by the Contract Documents, or by laws or regulations shall remain in full force and effect on all phases of the Work, whether or not the Work is occupied or utilized by Owner, until all Work included in the agreement has been completed and final payment has been made.

2. Nothing contained in the insurance requirements shall be construed as limiting the extent of Contractor's responsibility for payment of damages resulting from Contractor's, subcontractors' or suppliers' operations under the Contract. Contractor agrees that Contractor alone shall be completely responsible for procuring and maintaining full insurance coverage as provided herein or as may be otherwise required by the Contract Documents. Any approval by Owner or Construction Manager shall not operate to the contrary.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. Means or methods of work suggested by the Owner, the Construction Manager, or the Engineer to the Contractor, but not specified or required, if adopted or followed by the Contractor in whole or in part, shall be used at the risk and responsibility of the Contractor. The Owner, Construction Manager, or the Engineer assume no responsibility therefor, and in no way will be held liable for any defects in the Work which may result from or be caused by use of such plan or method of Work.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice

to Owner and Construction Manager except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

6.02 Labor; Working Hours

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

B. In the absence of any Federal, state or local laws, regulations or covenants, the Contractor may conduct its performance of the Work at the Contractor's sole discretion, except that the cost of any overtime pay or other expense incurred by the Owner for Resident Project Representative, Owner's Representative and construction observation services, occasioned by the conduct of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day, shall be reimbursed to the Owner by the Contractor. Contractor shall provide to Construction Manager 72-hour written notice of intent to work outside of regular working hours .

C. Prevailing Wage

1. In accordance with Section 1770 of the Labor Code, the District has ascertained and does hereby specify that the prevailing wage rates shall be those provided in Article 00100-22.00, WAGE RATES. The said rates shall include all employer payments that are required by Section 1773.1 of the Labor Code. The District will furnish to the Contractor, upon request, a copy of such prevailing rates. It shall be the duty of the Contractor to post a copy of such prevailing wages at the job site.

2. For each worker paid less than the stipulated rate in the execution of the Contract by the Contractor, or any subcontractor under it, in violation of the provisions of the Labor Code, and in particular, Section 1770 to Section 1780, inclusive, the Contractor shall be subject to the provisions and penalties of Section 1775 of the Labor Code. In addition to said penalty, and pursuant to said Section 1775, the difference between such stipulated prevailing wage rates and the amounts paid to each worker for each calendar day, or portion thereof, for which each worker was paid less than the stipulated prevailing rate shall be paid to each worker by the Contractor.

3. The wage rates set forth are the minimum that may be paid by the Contractor. Nothing herein contained shall be construed as preventing the Contractor from paying more than the minimum set forth.

4. No extra compensation whatever shall be allowed by the District due to the inability of the Contractor to hire labor at the minimum rate nor for any necessity for payment by the Contractor for subsistence, travel time, overtime, or other added compensation, all of which possibilities are elements to be considered and ascertained to the Contractor's own satisfaction in preparing the bid.

5. If it becomes necessary to employ a craft other than those listed in the prevailing rates, the Contractor shall notify the District immediately and the District will obtain the additional prevailing rate from the Director of the Department of Industrial Relations and the rate thus determined shall be applicable as a minimum at the time of initial employment.

6. The Contractor shall pay travel and subsistence payments to workers needed to execute the work as such travel and subsistence payments are defined in the applicable collective bargaining agreement filed with the Department of Industrial Relations pursuant to Labor Code Section 1773.8.

7. District and Contractor stipulate that Labor Code Section 1775 will be complied with.

8. The District will consider the type of work performed by classification traditionally employed to perform said work in Sacramento County when determining appropriate craft, classification or type of worker under Section 1733.2 of the California Labor Code.

9. Not Used.

10. Certified Payrolls - In accordance with Section 1776 of the Labor Code, each Contractor and subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time, and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by the Contractor or the subcontractor in connection with the project.

11. The payroll records shall be certified and shall be available for inspection at all reasonable hours at the principal office of the Contractor on the following basis:

12. A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or its authorized representative on request.

13. A certified copy of all payroll records shall be made available for inspection or furnished upon request to a representative of the District, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations.

14. A certified copy of all payroll records shall be made available upon request by the public in accordance with Section 1776 of the Labor Code.

15. The Contractor is responsible for its and its subcontractors' compliance with the provisions of Section 1776 of the Labor Code.

16. Overtime Requirements - The Contractor shall forfeit, as a penalty to the District, the penalty as provided in Section 1813 of the Labor Code for each worker employed in the execution of the Contract by the Contractor, or any subcontractor under the Contractor, for each day during which such worker is required or permitted to work more than eight (8) hours in any one day and forty (40) hours in any one week, in violation of the provisions of the Labor Code, and in particular, Section 1810 to Section 1815 thereof, inclusive, except that work performed by employees of Contractors in excess of eight (8) hours a day and forty (40) hours during one week, shall be permitted upon compensation for all hours worked in excess of eight (8) hours per day, at not less than one and a half (1.5) times the basic rate of pay as provided for in Section 1815 of the Labor Code.

17. Apprentice and Trainee - Attention is directed to the provisions in Section 1777.5 of the Labor Code and in accordance with the regulations of the California Apprenticeship Council concerning the employment of apprentices by the Contractor or any subcontractor under the Contractor.

18. Section 1777.5 requires the Contractor or subcontractors employing tradespersons in any apprenticeable occupation to apply to the joint apprenticeship committee nearest the site of the project that administers the apprenticeship program in that trade for a certificate of approval. The Contractor and subcontractors are required to submit contract award information to the applicable joint apprenticeship committee. As provided for in Section 1777.5 of the Labor Code, the Contractor is required to make contributions to funds established for the administration of apprenticeship programs.

19. It shall be the responsibility of the Contractor to abide by the provisions of Section 1777.5 of the Labor

Code and to require all subcontractors employed by or contracting with the Contractor to abide by said provisions. The Contractor shall furnish the District any and all evidence of compliance with this code section when requested by the District.

20. For failure to comply with Section 1777.5 of the Labor Code, the Contractor shall be subject to the penalties in Section 1777.7 of the Labor Code. The provisions of this paragraph apply only to the extent not preempted by Federal law.

21. Workers' Compensation Insurance - The Contractor is required to secure the payment of compensation to its employees in accordance with the provisions of Sections 1860 and 3700 of the Labor Code and Paragraph 00820-2.40, Workers' Compensation Insurance.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

1. Where the Work requires equipment be furnished, due to the lack of standardization of equipment as produced by the various manufacturers, it may become necessary to make minor modifications in the structures, buildings, piping, mechanical work, electrical work, accessories, controls, or other work, to accommodate the particular equipment offered. Contractor's bid price for any equipment offered shall include the cost of making any necessary changes subject to the approval of Construction Manager.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer or Construction Manager, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

1. Materials and equipment, if furnished by the Owner, will be made available as designated in the General Requirements. The cost of unloading, hauling and handling, and placing Owner-furnished materials and equipment shall be considered as included in the price bid for the Contract item involving such Owner-furnished material.

2. Contractor shall inspect and assure itself of the amount and soundness of such materials and equipment.

3. The Contractor will be held responsible for all materials and equipment furnished to it and received by it, and shall pay all demurrage and storage charges. District-furnished materials and equipment lost or damaged from any cause whatsoever shall be replaced by the Contractor. The Contractor will be liable to the Owner for the cost of replacing Owner-furnished material and equipment and such costs may be deducted from any moneys due or to become due the Contractor.

D. All items of standard equipment shall be the latest model at the time of bid, unless otherwise specified.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Construction Manager for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. "Or-Equal" Items: If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole,

3) it has a proven record of performance and availability of responsive service; and

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times, and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items

a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Construction Manager from anyone other than Contractor.

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and

as Engineer may decide is appropriate under the circumstances.

d. Contractor shall make written application to Construction Manager for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;

b) whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified, and

b) available engineering, sales, maintenance, repair, and replacement services;

4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change,

B. Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. Engineer's Evaluation: Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. Special Guarantee: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. Engineer's Cost Reimbursement: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. Contractor's Expense: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 Concerning Subcontractors, Suppliers, and Others

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner, Engineer, and Construction Manager for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner, Engineer or Construction Manager and any such Subcontractor, Supplier or other individual or entity, nor

2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Construction Manager and Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner, Construction Manager and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Construction Manager and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Construction Manager and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner, Construction Manager nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

A. Limitation on Use of Site and Other Areas

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Construction Manager and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. Removal of Debris During Performance of the Work: During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. Cleaning: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. Loading Structures: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda,

Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Construction Manager for reference, and shall be current at the time of Contractor's submission of Application for Payment as a condition precedent for Construction Manager's recommendation of payment. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Construction Manager for Owner. Contractor shall include accurate locations for buried and imbedded items.

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;
2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

1. At least two (2) days before performing any excavation work or other work that could damage existing improvements within, or adjacent to, the Work area, the Contractor shall notify the owners of properties adjacent to the Work area of intended commencement of such Work and request that such owners mark or otherwise indicate the location of underground improvements of which they are aware or other improvements not readily apparent from visual inspection of the adjacent property, such as survey points and utility service installations not owned by the appropriate utility. The Contractor shall

also give two (2) days notice to occupants or owners of adjacent property to permit them to salvage or relocate plants, trees, fences, sprinklers, and other improvements within the right-of-way that are designated for removal or would be destroyed because of the Work. Contractor shall furnish to the Construction Manager written documentation of its contact(s) with property owners (1) requesting them to mark or otherwise indicate the location of their respective facilities, and (2) notifying them to salvage or relocate landscaping or improvements within or adjacent to the Work area within two (2) days after such contact(s).

2. It shall be the Contractor's responsibility to determine the exact location (including depth for underground improvements) and to document the existing condition of all existing improvements which are not designated for removal (e.g., curbs, sidewalks, survey points, fences, walls, signs, utility installations, pavements, structures, etc.) which the Contractor believes may affect or be affected by Contractor's operations.

3. In the event that existing improvements are found that have not been identified in the Contract Documents or indicated by the respective property owner, or are found to exist in a substantially different location than so indicated, the Contractor shall (1) immediately notify the Construction Manager thereof in writing, and (2) take steps to avoid damaging such improvements, including ascertaining their exact location if not yet known.

C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner, Construction Manager or Engineer, or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

1. The Contractor shall immediately notify the Construction Manager and the property owner of any damage to any existing improvements that have not been designated to be removed. The Contractor shall be responsible for the cost of repairing or restoring all existing improvements which are not designated for removal (e.g., curbs, sidewalks, survey points, fences, walls, signs, utility installations, pavements, structures, etc.) and are damaged or removed as a result of its operations. Repairs and replacements shall be at least

equal to existing improvements and shall match them in finish and dimension.

2. The Contractor shall protect from damage all landscaping (e.g., trees, lawns, shrubbery, etc.) adjacent to the Work area or within the Work area that have not been designated to be removed. The Contractor shall immediately notify the Construction Manager and the property owner of any damage to any such landscaping which is not designated for removal. The Contractor shall be responsible for the cost of restoring or replacing such landscaping in as nearly the original conditions and location as it is reasonably possible. Lawns shall be re-seeded and covered with suitable mulch.

3. Except where an owner of damaged improvements or landscaping has advised that he or she intends to repair the damage himself or through forces that he or she will retain or has retained, Contractor shall, within 24 hours of receipt from the Owner of notice to commence correction of damage, notify the Construction Manager in writing if Contractor intends to repair the damage. During nights and weekends when work is not in progress, Owner may give such notice by telephone or by facsimile transmission to the Contractor's facsimile number designated and such notice will be immediately effective. The Contractor's failure to provide timely written notification that it intends to repair the damage shall be deemed its agreement that the Owner may repair the damage at Contractor's expense without further notice and without prejudice to any other remedy available to District. In such event, the Contractor may observe the Work if this can be done without in any way delaying the progress thereof, but may not contest any element of the expense of repair or the lack of further notice. This provision is in addition to any other remedy, including the remedy provided in 13.09, Owner May Correct Defective Work

D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Construction Manager has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

E. The Contractor shall establish, implement, and maintain a Written injury prevention program as required by Labor Code Section 6401.7. This written program shall be submitted to the Construction Manager within five (5) days of Notice to Proceed. The Contractor's injury prevention program will not be reviewed for approval. Before proceeding with any construction work, the Contractor shall take the necessary action to comply with all provisions for safety and accident prevention. The Contractor shall develop and maintain for the duration of this Contract, a safety program that will effectively incorporate and implement all required safety provisions.

The Contractor shall appoint an employee as safety supervisor who is qualified and authorized to supervise and enforce compliance with the safety program. The Contractor, as a part of its safety program, shall maintain at its office or other well-known place at the Site, safety equipment applicable to the Work as prescribed by the aforementioned authorities, all items necessary for giving first aid to the injured, and shall establish the procedure for the immediate removal to a hospital or a doctor's care of persons who may be injured on the jobsite.

1. In accordance with the provisions of Section 6705 of the Labor Code, the Contractor shall submit, in advance of excavation 5 feet or more in depth, detailed plans showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from hazard of caving ground during such excavation. If such plans vary from the shoring system standards set forth in the Construction Safety Orders in Title 8, California Code of Regulations, the plans shall be prepared and signed by a registered civil or structural engineer. Shoring, bracing, sloping, or other protective system shall not be less effective than required by the California Construction Safety orders. The Contractor shall designate in writing to the Construction Manager the "competent person" with the authority and responsibilities designated in the Construction Safety Orders.

2. If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Construction Manager and the District. In addition, the Contractor must promptly report in writing to the Construction Manager all accidents whatsoever arising out of, or in connection with, the performance of the Work whether on, or adjacent to, the Site, giving full details and statements of witnesses. The Contractor shall make all reports as are, or may be, required by any authority having jurisdiction, and permit all safety inspections of the work being performed under this Contract.

3. If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Construction Manager, giving full details of the claim.

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard

communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Construction Manager prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

B. If Contractor fails to take appropriate action in an emergency, the Owner also reserves the right to perform any portion of the work that threatens the safety or health of the public or Owner, and the safety of the work or any property or equipment. In the event the Owner performs work in an emergency, an appropriate Change Order shall be issued unilaterally deducting from the payments then or thereafter due the Contractor the cost for performing such Work, including compensation for the Engineer's, the Construction Manager's, and District's additional services made necessary by such emergency

6.17 *Shop Drawings and Samples*

A. Contractor shall submit required Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. Shop Drawings

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

c. Shop Drawings submitted as herein provided by Contractor and reviewed by Engineer for conformance with the design concept shall be executed in conformity with the Contract Documents unless otherwise required by Owner.

d. When Shop Drawings are submitted for the purpose of showing the installation in greater detail, their review shall not excuse Contractor from requirements shown on the drawings and Specifications.

e. For-Information-Only submittals upon which the Engineer is not expected to conduct review or take responsive action may be so identified in the Contract Documents.

2. *Samples*: Contractor shall also submit required Samples to Engineer for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals.

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. Submittal Procedures

1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the

requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawing's or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation; otherwise Contractor will not be relieved of the responsibility of executing the Work in accordance with the Contract Documents, even though such Shop Drawings or Samples have been otherwise reviewed.

a. If a Shop Drawing or Sample, as submitted, indicates a variation from the Contract Requirements as set forth in the Contract Documents and Engineer finds same to be in the interest of Owner and to be so minor as not to involve a change in the Contract Price or time for performance, Engineer may approve the Shop Drawings or Samples; provided however, such departure is slight in nature and does not affect the design concept of the Work.

4. Contractor shall submit all Shop Drawings and Samples sufficiently in advance of construction requirements to allow ample time for checking, correcting, resubmitting and rechecking and to avoid any delay in progress of the Work.

5. Shop Drawings and Sample submittals not conforming to requirements of this paragraph 6.17D and Section 01340 will be returned to Contractor without action for resubmittal and the resulting delay shall be entirely the responsibility of Contractor.

D. Engineer's Review

1. Engineer will provide timely review of required Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

4. Engineer's check and review of Shop Drawings and Samples, Standard Specifications and descriptive literature submitted by Contractor will be only for general conformance with design concept, except as otherwise provided, and shall not be construed as:

a. permitting any departure from the Contract Requirements;

b. relieving Contractor of the responsibility for any error in details, dimensions or otherwise that may exist in such submittals;

c. constituting a blanket approval of dimensions, quantities, or details of the material or equipment shown; or

d. approving departures from additional details or instructions previously furnished by Engineer. Such check or review shall not relieve Contractor of the full responsibility of meeting all of the requirements of the Contract Documents.

E. Resubmittal Procedures

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed

pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Construction Manager and Engineer, and their Related Entities, shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Construction Manager and Engineer;

2. recommendation by Construction Manager or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Construction Manager or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Construction Manager and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them

from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Construction Manager and Engineer and their respective officers, directors, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the permanent Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to permanent systems, materials or equipment incorporated into the Work are specifically required of Contractor by the Contract

Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 - OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, a reason-

able opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of Construction Manager and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Construction Manager in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and

disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.

C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Construction Manager or Engineer*

A. In case of termination of the employment of either Construction Manager or Engineer, Owner shall appoint a Construction Manager or engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Construction Manager or Engineer.

8.03 *Furnish Data*

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

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 *Insurance*

A. Owner's responsibilities, if any, in respect of purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility in respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 – CONSTRUCTION MANAGER'S AND ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Construction Manager and Engineer will be Owner's representatives during the construction period. The duties and responsibilities and the limitations of authority of Construction Manager and Engineer as Owner's representatives during construction are set forth in the Contract Documents and will not be changed without written consent of Owner, Construction Manager and Engineer.

9.02 *Visits to Site*

A. Engineer may make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the

progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will endeavor to guard Owner against defective Work.

B. Construction Manager will make visits to the Site at intervals appropriate to the various stages of construction as Construction Manager deems necessary in order to observe the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Construction Manager, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Construction Manager will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Construction Manager's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Construction Manager will keep Owner informed of the progress of the Work, and will endeavor to guard Owner against defective Work.

C. Engineer's and Construction Manager's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Construction Manager's Project Representative*

A. If Owner and Construction Manager agree, Construction Manager will furnish a Resident Project Representative to assist Construction Manager in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Construction

Manager's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

B. Construction Manager's Resident Project Representative shall not authorize any deviation from the Contract Documents or substitutions of materials or equipment.

9.04 *Authorized Variations in Work*

A. Construction Manager or Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Construction Manager will have authority to reject Work which Construction Manager or Engineer believes to be defective, or that Construction Manager or Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Construction Manager will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

B. The acceptance at any time of materials or equipment by or on behalf of Owner shall not be a bar to future rejection if they are subsequently found to be defective, inferior in quality, or not equal to the material or equipment specified, or are not as represented to Construction Manager, Engineer or Owner.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Construction Manager's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Construction Manager will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Construction Manager will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Construction Manager's written decision thereon will be final and binding (except as modified by Construction Manager to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

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

A. Engineer will be the initial interpreter of the requirements of the Contract Documents with respect to matters of design intent. Construction Manager will be the initial interpreter of the requirements of the Contract Documents with respect to administrative matters and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Construction Manager in writing within 30 days of the event giving rise to the question.

B. Construction Manager or Engineer through Construction Manager will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Construction Manager's or Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Construction Manager's or Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Construction Manager and Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Construction Manager's and Engineer's Authority and Responsibilities*

A. Neither Construction Manager's and Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Construction Manager or Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Construction Manager or Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Construction Manager or Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Construction Manager and Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Construction Manager and Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Construction Manager and Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Construction Manager's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to, the Resident Project Representative, if any, and assistants, if any.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work

by a Change Order or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

1. Change Proposal Request

a. When Owner requests Contractor to present a proposal to accomplish a change in the Work, the request will be made in the form of a Change Proposal Request (CPR) prepared by Construction Manager. The CPR will describe the change and request Contractor to propose a cost and Contract Price and/or Contract Time change. Contractor will propose cost and/or time changes, if any, sign the CPR and return it to Construction Manager. If requested by Owner or Construction Manager, Contractor shall provide an itemized breakdown of the cost of the change. Construction Manager will make recommendations to Owner concerning acceptance. If the CPR is approved by Owner, the CPR will be included in a Change Order. Contractor is not authorized to proceed with a change contained in a CPR until the Change Order is properly signed and issued.

b. When the Contractor desires to propose changes to the Work, it may initiate a CPR in the same form as provided in Paragraph 10.01A.1.a. and submit the CPR to the Construction Manager for the Engineer's review and recommendation.

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Construction Manager covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Construction Manager or by Engineer through Construction Manager pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any bond to be given to a surety, the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

A. *Construction Manager's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Construction Manager for decision. A decision by Construction Manager shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Construction Manager and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Construction Manager and the other party to the Contract within 60 days after the start of such event (unless Construction Manager allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall

be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Construction Manager and the claimant within 30 days after receipt of the claimant's last submittal (unless Construction Manager allows additional time).

C. *Construction Manager's Action:* Construction Manager will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part,
2. approve the Claim, or
3. notify the parties that the Construction Manager is unable to resolve the Claim if, in the Construction Manager's sole discretion, it would be inappropriate for the Construction Manager to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Construction Manager does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Construction Manager's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work, or the reasonable cost that would have been incurred in the case of deleted Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the

costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, training, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above. For Change Order pricing, the Labor Surcharge (social security contributions, unemployment excise, and payroll taxes) shall be 27 percent of the sum of the wages, vacation, and fringe benefits (workers' compensation, training, health and retirement benefits, sick leave, bonuses, and holiday pay).

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Construction Manager, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories,

surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Construction Manager, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain. For Change Order pricing, bonds and insurance shall be 1 percent of the Change Order value for both additive and credit changes that are above the original Contract value and 0 percent of the Change Order value for both additive and credit changes that are below the original Contract value.

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be

determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Construction Manager an itemized cost breakdown together with supporting data.

11.02 Allowances

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Construction Manager.

B. Cash Allowances

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. Contingency Allowance

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Construction Manager to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 Unit Price Work

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for

each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Construction Manager subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item. Work described in the Contract Documents, or reasonably inferred as required for a functionally complete installation, but not identified in the listing of unit price items shall be considered incidental to unit price work listed and the cost of incidental work included as a part of the unit price.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the total cost of a particular item of Unit Price Work amounts to 10 percent or more of the Contract Price at time of Notice of Award and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and if there is no corresponding adjustment with respect to any other item of Work; and if Contractor believes that Contractor has incurred additional expense as a result thereof; or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, either Owner or Contractor may make a claim for an adjustment in the Contract Price in accordance with Article 11 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT PRICE;
CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Construction Manager and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum including overhead and profit not necessarily in accordance with Paragraph 12.01.C.2, and shall include the cost of any secondary impacts that are foreseeable at the time of pricing the cost of extra Work; or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (either by estimate before the work is performed or force account) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 12.01.C.2.a is that the Subcontractor who

actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the reasonable cost that would have been incurred to perform the Work plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Construction Manager and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

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

C. No extension of the Contract Time will be allowed for additional Work or for claimed delay unless the additional Work contemplated or claimed delay is shown to be on the critical path of the Project's schedule of construction or Contractor can show by Critical Path Method analysis how the additional Work or claimed delay adversely affects the critical path.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated

by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Construction Manager, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be in accordance with Paragraph 12.02 C., and shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Construction Manager, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. Owner, Construction Manager, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give Construction Manager timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Construction Manager's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Construction Manager.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Construction Manager, it

must, if requested by Construction Manager, be uncovered for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Construction Manager timely notice of Contractor's intention to cover the same and Construction Manager has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Construction Manager, it must, if requested by Construction Manager, be uncovered for Construction Manager's observation and replaced at Contractor's expense.

B. If Construction Manager considers it necessary or advisable that covered Work be observed by Construction Manager or inspected or tested by others, Contractor, at Construction Manager's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Construction Manager may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); or Owner shall be entitled to accept defective Work in accordance paragraph 13.08 in which case Contractor shall still be responsible for all costs associated with exposing, observing, and testing the defective Work. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract

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

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Construction Manager, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or
2. correct such defective Work; or
3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency

where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If (prior to Construction Manager's recommendation of final payment), instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Construction Manager as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Construction Manager's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Construction Manager to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, Construction Manager and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Construction Manager. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. Applications for Payments

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Construction Manager for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

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

3. Retention - The Owner will deduct from each progress payment and retain as part security, ten (10) percent of the amount earned until the final payment.

4. Pursuant to Public Contract Code Section 22300, for moneys earned by the Contractor and withheld by the Owner to ensure the performance of the Contract, the Contractor, may, at their option, choose to substitute securities meeting the requirements of said Section 22300. In the event the Contractor wishes to choose this option, the Contractor shall enter into an escrow agreement with the Owner and the escrow agent, a qualified bank to be acceptable to the Owner, in the form of the agreement included in the project specifications. The costs of such escrow shall be paid by the Contractor. The securities to be deposited in said escrow account shall be equivalent, in

fair market value, to the amount to be withheld as performance retention. The securities shall be held in accordance with the provisions of Public Contract Code Section 22300, and the implementing agreement.

5. Contractor shall have the obligation of ensuring that such securities deposited are sufficient so as to maintain, in total fair market value, an amount equal to the cash amount of the sums to be withheld under the Contract. If, upon written notice from the Owner, or from the appropriate escrow agent, indicating that the fair market value of the securities has dropped below the dollar amount of moneys to be withheld by the Owner to ensure performance, Contractor shall, within five days of the date of such notice, post additional securities as necessary to ensure that the total fair market value of all such securities held by the Owner, or in escrow, is equivalent to the amount of money to be withheld by the Owner under the Contract.

6. Any Contractor wishing to exercise this option shall give notice in writing to Owner, and shall thereafter execute an escrow agreement in the form of the form included with these Contract Documents

7. Materials, as used herein, shall be considered to be those items that are fabricated and manufactured goods and equipment. Only those materials for which the Contractor can transfer clear title to the District will be qualified for partial payment. The Contractor may request payment of seventy-five (75) percent of the actual net cost of these materials, not to exceed fifty (50) percent of the total adjusted line item extension as found in the bid schedule.

8. To receive partial payment for materials and equipment delivered to the Site, but not incorporated in the Work, it shall be necessary for the Contractor to submit to the Construction Manager a list of such materials, at least seven (7) days prior to submitting the monthly estimate of amount earned for work completed. At the Construction Manager's sole discretion, the Construction Manager will approve items for which partial payment is to be made subject to the following:

a. Only equipment or materials that have received favorable review of shop drawings will qualify.

b. Eligible equipment or materials must be delivered and properly stored, protected, and maintained in a manner favorably reviewed by the Construction Manager, at the job site or at a bonded warehouse.

c. The Contractor's actual net cost for the materials must be supported by invoices of suppliers, or other documentation requested by the Construction Manager.

d. Materials or equipment delivered to the Site less than thirty (30) days prior to their scheduled incorporation in the Work shall not qualify.

e. Final payment shall be made only for materials actually incorporated in the Work. Upon acceptance of the Work, all materials remaining for which advance payments had been made shall revert to the Contractor, unless otherwise agreed, and partial payments made for these items shall be deducted from the final payment for the Work.

f. Partial payments for materials and equipment on hand shall not be deemed to be final payment for the material nor relieve the Contractor of its obligations under the Contract.

g. Partial payments for materials and equipment on hand shall be subject to retention in accordance with the Contract Documents

9. After receipt of the last progress payment, but prior to acceptance of the Work by the District, the Contractor shall send a letter to the Construction Manager. The letter, pursuant to California Public Contract Code Section 7 100, shall state that acceptance of the final payment described below shall operate as and shall be, a release to the District, the Construction Manager, the Designer, and their duly authorized agents, from all claim of and/or liability to the Contract arising by virtue of the Contract related to those amounts. Disputed Contract claims in stated amounts previously filed as provided in Paragraph 00700-7.03b, Claims, may be specifically excluded by the Contractor from the operation of the release.

B. Review of Applications

1. Construction Manager will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Construction Manager's recommendation of any payment requested in an Application for Payment will constitute a representation by Construction Manager to Owner, based on Construction Manager's observations on the Site of the executed Work as an experienced and qualified design professional and on Construction Manager's review of the Application for Payment and the accompanying data and schedules, that to the best of Construction Manager's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Construction Manager's responsibility to observe the Work.

3. By recommending any such payment Construction Manager will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Construction Manager in the Contract Documents; or

b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Construction Manager's review of Contractor's Work for the purposes of recommending payments nor Construction Manager's recommendation of any payment, including final payment, will impose responsibility on Construction Manager:

a. to supervise, direct, or control the Work, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

- c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
- d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
- e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Construction Manager may refuse to recommend the whole or any part of any payment if, in Construction Manager's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Construction Manager may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Construction Manager's opinion to protect Owner from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Construction Manager has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due

1. Ten days after presentation of the Application for Payment to Owner with Construction Manager's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor. Payment will be made by the Owner to the Contractor in accordance with Owner's normal accounts payable procedure.

D. Reduction in Payment

1. Owner may refuse to make payment of the full amount recommended by Construction Manager because:

- a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

c. there are other items entitling Owner to a set-off against the amount recommended; or

d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Construction Manager, Owner will give Contractor immediate written notice (with a copy to Construction Manager) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.

3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.03 Contractor's Warranty of Title

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 Substantial Completion

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Construction Manager in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Construction Manager issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, Owner, Contractor, and Construction Manager shall make an inspection of the Work to determine the status of completion. If Construction Manager does not consider the Work substantially complete, Construction Manager will notify Contractor in writing giving the reasons therefor.

C. If Construction Manager considers the Work substantially complete, Construction Manager will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There

shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Construction Manager as to any provisions of the certificate or attached list. If, after considering such objections, Construction Manager concludes that the Work is not substantially complete, Construction Manager will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Construction Manager considers the Work substantially complete, Construction Manager will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Construction Manager believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Construction Manager will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Construction Manager in writing prior to Construction Manager's issuing the definitive certificate of Substantial Completion, Construction Manager's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner

and Engineer that such part of the Work is substantially complete and request Construction Manager to issue a certificate of Substantial Completion for that part of the Work.

2. Contractor at any time may notify Owner and Construction Manager in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Construction Manager to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Construction Manager shall make an inspection of that part of the Work to determine its status of completion. If Construction Manager does not consider that part of the Work to be substantially complete, Construction Manager will notify Owner and Contractor in writing giving the reasons therefor. If Construction Manager considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

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

14.07 *Final Payment*

A. Application for Final Payment

1. After Contractor has, in the opinion of Construction Manager, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

- a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;
- b. consent of the surety, if any, to final payment;
- c. a list of all Claims against Owner that Contractor believes are unsettled; and
- d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. Construction Manager's Review of Application and Acceptance

1. If, on the basis of Construction Manager's observation of the Work during construction and final inspection, and Construction Manager's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Construction Manager is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Construction Manager will, within ten days after receipt of the final Application for Payment, indicate in writing Construction Manager's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Construction Manager will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Construction Manager will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due

1. Forty-five days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Construction Manager, less any sum Owner is entitled to set off against Construction Manager's recommendation, including but not limited to liquidated damages, will become due and , will be paid by Owner to Contractor.

14.08 Final Completion Delayed

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Construction Manager so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Construction Manager, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Construction Manager with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 Waiver of Claims

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 Owner May Suspend Work

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more

than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's disregard of the authority of Construction Manager or Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02A. occur, Owner will provide written notice to Contractor and Surety to arrange a conference with Contractor and Surety to address Contractor's failure to perform the Work. Conference shall be held not later than 15 days, after receipt of notice.

1. If the Owner, the Contractor, and the Surety do not agree to allow the Contractor to proceed to perform the Construction Contract, the Owner may, to the extent permitted by Laws and Regulations, declare a Contractor Default and formally terminate the Contractor's right to complete the Contract. Contractor Default shall not be declared earlier than 20 days after the Contractor and Surety have received notice of conference to address Contractor's failure to perform the Work.

2. If Contractor's services are terminated, Surety shall be obligated to take over and perform the Work. If Surety does not commence performance thereof within 15 consecutive calendar days after date of an additional written notice demanding Surety's performance of its obligations, then Owner, without process or action at law, may take over any portion of the Work and complete it as described below.

a. If Owner completes the Work, Owner may exclude Contractor and Surety from the site and

take possession of the Work and of all tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by Contractor and Surety (without liability to Contractor and Surety for trespass or conversion), incorporate in the Work all materials and equipment stored at the site or for which Owner has paid Contractor or Surety but which are stored elsewhere, and finish the Work as Owner may deem expedient.

3. Whether Owner or Surety completes the Work, Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses and damages sustained by Owner arising out of or resulting from completing the Work, such excess will be paid to Contractor. If such claims, costs, losses and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and when so approved by Engineer incorporated in a Change Order, provided that when exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

4. Neither Owner, Engineer, nor any of their respective consultants, agents, officers, directors or employees shall be in any way liable or accountable to Contractor or Surety for the method by which the completion of the said Work, or any portion thereof, may be accomplished or for the price paid therefor.

5. Owner, notwithstanding the method used in completing the Contract, shall not forfeit the right to recover damages from Contractor or Surety for Contractor's failure to timely complete the entire Contract. Contractor shall not be entitled to any claim for damages on account of the method used by Owner in completing the Contract.

6. Maintenance of the Work shall continue to be Contractor's and Surety's responsibilities as provided for in the bond requirements of the Contract Documents or any special guarantees provided for under the Contract Documents or any other obligations otherwise prescribed by law.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages

exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor, Construction Manager and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Construction Manager fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Construction Manager, and provided Owner or Construction Manager do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Construction Manager has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Construction Manager, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 - DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Construction Manager for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The

date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or

2. agrees with the other party to submit the Claim to another dispute resolution process, or

3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 - MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

B. No action or failure to act by the District, the Engineer, or the Construction Manager shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state of California.

17.06 *Headings*

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

17.07 *Penalty for Collusion*

A. If, at any time, it is found that the person, firm, or corporation to whom the Contract has been awarded has, in presenting any bid or bids, colluded with any other party or parties, then the Contract shall be null and void, and the Contractor and its sureties shall be liable for loss or damage which the District may suffer thereby, and the District may advertise for new bids for said Work.

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SECTION 00805

SUPPLEMENTARY CONDITIONS

1.01 SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend and supplement Section 00700, GENERAL CONDITIONS, and other provisions of the contract documents as indicated below. All provisions of the General Conditions that are amended or supplemented remain in full force and effect as so amended or supplemented. All provisions of the General Conditions which are not so amended or supplemented remain in full force and effect.

1.02 DEFINED TERMS

The terms used in these Supplementary Conditions which are defined in the General Conditions have the meaning assigned to them in the General Conditions.

1.03 AMENDMENTS AND SUPPLEMENTS

The following are instructions that amend or supplement specific paragraphs in the General Conditions and other contract documents:

A. Paragraph 00700-1.02.C:

Replace with the definition found in Section 1-1.07B Glossary of the Caltrans Standard Specifications

B. Paragraph 00700-3.03.B.2:

Add the following paragraph:

Where conflicts exist among the Contract Documents and/or any reference specifications, such conflicts shall be clarified according to the following order, the first ranked taking precedence over the lower ranked:

1. Amendments, Change Orders or other modifications to the Contract Documents, as executed by the District in accordance with the requirements of the Contract Documents.
2. Agreement
3. Supplementary Conditions
4. General Conditions
5. Division 01 Documents
6. Plans and Technical Specifications
7. Notice Inviting Bids and Information to Bidders
8. Contract Payment Bond
9. Performance Bond

10. Warranty Bond
11. Any provisions required by law or valid regulations to be inserted in this contract, whether actually inserted or not
12. Appendices (photographs, data contained in reports, and other information).

Additional rules of interpretation:

1. Written numbers over figures, unless obviously incorrect.
2. Figured dimensions over scaled dimensions.
3. Large-scale drawings over small-scale drawings.
4. Any conflict between a bill or list of materials shown in the Contract Documents and the actual quantities required to complete the Work required by Contract Documents, will be resolved in favor of the actual quantities, date (i.e., the most recent document), and if the dates are the same or not determinable, then in favor of Specifications.

C. Paragraph 00700-4.02A

Add the following:

The Design Engineer has used the following report in preparing the Contract Documents:

Draft Geotechnical Report, RMCSO Sodium Hypochlorite Design, Rancho Murieta, California, prepared by Crawford & Associates, Inc., July 2024.

D. Paragraph 00700-4.05B:

Add the following paragraph:

Monument Preservation:

1. Contractor shall comply with the Professional Land Surveyors' Act – Business & Professions Code, Section 8771(b) regarding referencing, preserving, and reconstructing monuments, whether or not the monuments are shown on the plans.
2. Before beginning any construction on the Project, the following tasks must be accomplished by or under the direction of a licensed land surveyor licensed in the State of California:
 - a. Conduct records research to identify horizontal and vertical control monuments, prepare and submit a map to the District of the monuments within the Project site. The map will identify if a monument is in a well, covered, or obliterated.
 - b. Locate and reference monuments. A preconstruction corner record or record of survey of the references shall be filed with the County Surveyor. The District shall receive a copy of the submitted corner or record of survey documents.

3. Before the certificate of completion for the Project is issued by the District, the following tasks must be accomplished by or under the direction of a licensed land surveyor licensed in the State of California:
 - a. Monuments shall be reset in the surface of the new construction in a monument box by California Concrete Pipe, Frame No. A-578 and Cover No. A-580.
 - b. Monuments wells shall be raised to the new surface elevation.
 - c. For section corners, quarter section corners, or center quarter section corners located in unimproved areas, the monuments shall be reset by placing heavily galvanized iron pipe or galvanized iron stake not less than 2-inches in diameter, minimum 3 ft long and 1 ft below the surface.
 - d. File either a post-construction corner record or a record of survey with the County Surveyor for the reset monuments. The District shall receive a copy of the submitted corner record or record of survey documents.

E. Paragraph 00700-5.04B:

The entities listed below are “additional insureds as their interest may appear” including their respective officers, directors, agents, and employees.

Construction Manager: TBD
Design Engineer: Dewberry Engineers Inc.

The insured and the additional insured shall be listed in the insurance coverage by specific name and not by genre.

F. Paragraph 00700-6.11.A.4:

Add the following paragraph:

All Contractor activities including site ingress/egress shall be coordinated with the District. Contractor operations shall not interfere with District activities. Site access shall be secured by Contractor personnel after typical hours of operation, 7:30 a.m. to 5:00 p.m., Monday through Friday, unless scheduled 72 hours in advance with the Construction Manager.

G. Paragraph 00700-12.01.D:

Add the following paragraph:

The Contractor shall be responsible to reimburse the District for any unforeseen costs incurred, including labor and materials, relating to any disruption of District operations or

services due to Contractor's activities or negligence. Unforeseen costs may include, but are not limited to:

1. Labor, materials, and administrative civil liabilities associated with sanitary sewer overflows/regulatory violations due to Contractor activities or negligence.
2. Labor, including overtime hours, and materials associated with District forces preparing for a scheduled outage that is canceled subsequently by the Contractor.
3. Labor, including overtime hours, and materials associated with District activities necessitated by outages or impairment of municipal services extending beyond the scheduled duration caused by the Contractor.

Reimbursement to the District shall be accomplished through a 'back-charge' and a resultant reduction in contract price. Documentation of District costs will be furnished to the Contractor.

The District may consider a Value Engineering Change Proposal (VECP) in accordance with Paragraph 4-1.07 Value Engineering, of the Caltrans Standard Specifications.

H. Paragraph 00700-12.03F:

Add the following paragraph:

Time extensions will not be granted for rain, wind, flood, or other natural phenomena of normal intensity for the locality where Work is performed. For purpose of determining extent of delay attributable to unusual weather phenomena, a determination shall be made by comparing the weather for the month involved with the average of the preceding 10-year climatic range during the same month based on U.S. Weather Bureau statistics for the locality where the Work is performed. If precipitation for the month involved is greater than the 10-year average for the same month, a time extension may be considered by the District.

****END OF SECTION****

**RANCHO MURIETA COMMUNITY SERVICES DISTRICT
WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
CHLORINE CONTACT BASIN EXPANSION – PHASE 1**

Division 1 – General Requirements

Section 01010	Location and Summary of Work
Section 01015	Contract Time
Section 01045	Modifications to Existing Structures, Piping, and Equipment
Section 01050	Field Engineering
Section 01060	Safety and Health
Section 01065	Water Pollution Control
Section 01070	Environmental Stewardship
Section 01200	Project Meetings
Section 01300	Submittals
Section 01310	Construction Schedule and Reports
Section 01640	Supplier’s/Manufacturer’s Services during Construction Commissioning and Training of City’s Personnel
Section 01660	Installation, Testing, and Commissioning
Section 01700	Contract Closeout
Section 01730	Operating and Maintenance Information

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SECTION 01010

LOCATION AND SUMMARY OF WORK

PART 1 - GENERAL

1.01 GENERAL

This section consists of a description of the items of work included in the base bid and the location of the work.

1.02 PROJECT LOCATION

Work associated with this Project shall take place within the Rancho Murieta Community Services District Wastewater Treatment Facility (WWTF).

1.03 COOPERATION

The Contractor shall conduct work in a manner that will not impair the essential function of treating wastewater and producing recycled water for distribution to offsite irrigation sites.

Contractor staging within the Project site shall be limited to the areas shown on the plans and shall not disrupt the circulation of District vehicles and equipment within the Project site. Contractor ingress/egress to the site shall be coordinated and scheduled with the District. The Contractor shall cooperate fully with other contractors involved in the construction of improvements for the District and the operation of the WWTF.

1.04 WORK INCLUDED AS BASE BID ITEMS

The work under the base bid items of this contract consists of the following project elements:

1. Mobilization/Demobilization

Mobilization shall consist of the preparatory work and operations, including but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to the project site; for the establishment of the Contractor's offices, buildings, security fencing, and other facilities necessary for work on the project; water pollution control; and for all other work and operations which must be performed or costs incurred prior to beginning work on the various contract items on the project site.

Demobilization shall include, upon substantial completion of the contracted work, the removal of all signs, construction trailers, storage trailers and bins, temporary fencing, garbage, construction debris, equipment, utility services not scheduled to remain, portable toilet facilities, and all excess construction material not included and paid for

within other bid items. Work shall also include the repair, restoration and/or replacement of facilities damaged by the Contractor and/or subcontractors and suppliers, including driveways, parking areas, streets, pipelines, and landscaping, and the submittal of Record Drawings. Work area shall be policed clean and restored to original condition or better as further shown on the plans.

Payment for Mobilization/Demobilization shall not exceed 75% of the bid amount upon completion of the mobilization process with the remainder to be paid at completion of demobilization for the Project.

2. Prepare and Implement Water Pollution Control Plan

Work under this item includes preparing, permitting, and implementing the Water Pollution Control Plan (WPCP). Work includes all tools, equipment, materials, and labor necessary to implement, maintain, and repair the WPCP and BMPs. This includes, but is not limited to, testing and/or reporting that may be necessary to maintain compliance. The Contractor is required to have a registered QSP on staff or contracted who shall be named in the WPCP and certifications provided prior to the start of construction.

The Contractor shall install BMPs, maintain BMPs, perform inspections, remove BMPs, and prepare documentation applicable to the work. At a minimum, inspections shall be done weekly and 24 hours prior to, during, and after each rain event, and every 24 hours during extended rain events. The Contractor is solely responsible for preparing and maintaining inspection and monitoring records. Copies shall be made available to the District upon request. The Contractor shall immediately correct or replace a BMP deemed ineffective by the Contractor or District at no additional cost to the District. If measures taken by the Contractor are inadequate to effectively control water pollution, the District can direct the Contractor to revise operations and/or WPCP efforts.

The contract price for Prepare and Implement Water Pollution Control Plan shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for accomplishing all the work as specified herein.

3. Sodium Hypochlorite Tanks Removal and Salvage

Work under this item includes labor, materials, equipment, permitting costs, and incidentals needed to drain, disposal of residual chemical, disconnect, remove, and salvage the existing sodium hypochlorite tanks. Work also includes the disconnect, removal, and salvage of tank instrumentation as directed by the District. Tanks shall be transported to a location on the RMCSD WWTF property as directed by the District.

The contract price for Sodium Hypochlorite Tanks Removal and Salvage shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for accomplishing all the work as specified herein.

4. Alum Tanks Removal

Work under this item includes labor, materials, tools, delivery costs, permitting costs, disposal fees, and incidentals needed to drain, disposal of residual chemical, disconnect, remove, and properly dispose of the existing alum tanks as shown on the plans to a facility properly licensed to accept the chemical tanks and chemical residue. All documentation related to the disposal shall be provided to the District.

The contract price for Alum Tanks Removal shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for accomplishing all the work as specified herein.

5. Demolition of Chemical Tanks Containment Structure

Work under this item includes labor, materials, tools, disposal fees, and incidentals needed to demolish footings, foundations, containment walls, internal walls, piping, metalwork, ladders, instrumentation, appurtenances, and electrical conduit/wiring as shown at the existing chemical tank containment structure.

The contract price for Demolition of Chemical Tanks Containment Structure shall include full compensation for furnishing all labor, materials, tools, equipment, delivery costs, disposal, and incidentals, and for accomplishing all the work including successful testing as specified herein.

6. Removal/Disposal of Chemical Piping

Work under this item shall include all labor, materials, tools, delivery costs, permitting costs, disposal fees and equipment required to remove the chemical piping within the chemical piping trenches as shown on the plans, haul off-site, and dispose of in a permitted location. Work shall also include removal of pipe supports within the chemical piping trenches as shown on the plans and cleaning of residuals from chemical piping trenches.

The contract price for Removal/Disposal of Chemical Piping shall include full compensation for furnishing all labor, materials, tools, equipment, delivery costs, disposal, and incidentals and for accomplishing all the work as specified herein.

7. Construction of Chemical Tank Containment Structure

Work under this item includes labor, materials, tools, equipment, and incidentals to construct the chemical tank containment structure including subgrade preparation, concrete foundation, containment walls, pre-fabricated trench drains, tank pads, fiberglass ladders/access platform, stairs, metal canopy, and drain line/valves/process piping/emergency eyewash stations as shown.

The contract price for Construction of Chemical Tank Containment Structure shall include full compensation for furnishing all labor, materials, tools, equipment, and

incidentals, and for accomplishing all the work including successful testing as specified herein.

8. Furnish and Install Sodium Hypochlorite Tanks

Work under this item includes acquisition, delivery, labor, materials, equipment, and incidentals needed to furnish, install, and place into service the new sodium hypochlorite tanks and connection of all piping and control equipment necessary for the tanks to provide sodium hypochlorite solution to the metering and dosing system.

The contract price for Furnish and Install Sodium Hypochlorite Tanks shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for accomplishing all the work including successful testing as specified herein.

9. Furnish and Install Alum Tanks

Work under this item includes acquisition, delivery, labor, materials, equipment, and incidentals needed to furnish, install, and place into service the new alum tanks and connection of all piping and control equipment necessary for the tanks to provide alum solution to the metering and dosing system.

The contract price for Furnish and Install Alum Tanks shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for accomplishing all the work including successful testing as specified herein.

10. Furnish and Install Chemical Piping

Work under this item includes acquisition, labor, materials, equipment, delivery costs, and incidentals needed to construct and connect the chemical piping from the chemical storage tanks to the metering pumps and from the metering pumps to the dosing points including pipe supports, valves, and appurtenances as shown on the plans.

The contract price for Furnish and Install Chemical Piping shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for accomplishing all the work including successful testing as specified herein.

11. Reconstruct Plant Drain/Site Piping Improvements

Work under this item includes acquisition, labor, materials, equipment, delivery costs, and incidentals needed to reconstruct and connect the plant drain and site piping including drains for new instrumentation as shown on the plans including trenching, placing of trench materials, backfilling and compaction, connections to manholes/ponds, and pavement restoration.

The contract price for Reconstruct Plant Drain/Site Piping Improvements shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for accomplishing all the work including successful testing as specified herein.

12. Control Building Modifications

Work under this item includes labor, materials, equipment, and incidentals needed to modify the Control Building including removal of abandoned chemical systems (piping, equipment, instrumentation), demolition of chlorine gas handling/storage/metering system including chlorine ton cylinder unloading rail and supports, and restoration of walls, floors, and doors damaged during demolition work as shown on the plans.

The contract price for Control Building Modifications shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for accomplishing all the work including successful testing as specified herein.

13. Chemical Metering Pumps Modifications

Work under this item includes acquisition, labor, materials, equipment, delivery costs, and incidentals to disconnect/relocate/reassemble alum metering pumps, furnish and install third sodium hypochlorite metering skid, modify existing sodium hypochlorite metering skids for automatic operations, and electrical/mechanical/instrumentation connections for alum/sodium hypochlorite metering pumps.

The contract price for Chemical Metering Pumps Modifications shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for accomplishing all the work including successful testing as specified herein.

14. Electrical/Instrumentation Improvements

Work under this item includes installation, activation, and testing of all instrumentation, electrical wiring, conduit, receptacles, alarm systems, computer interconnect wiring, and specified control systems; coordinating any needed shutdowns of service and cut-over to the existing facilities; SCADA interface; and connections to all new equipment and facilities as shown on the plans. The construction of electrical/instrumentation/control system improvements will be accomplished by Prodigy Electric. A scope of work is included in Attachment 1. SCADA integration work will be accomplished by Tesco. A scope of work is included in Attachment 2.

The contract price for Electrical/Instrumentation Improvements shall include full compensation including designated subcontractor costs and contractor costs (inclusive of markup of subcontractor costs) for furnishing all labor, materials, tools, equipment, and incidentals, and for accomplishing all the work including successful testing as shown and specified herein.

15. All Sheeting, Shoring, and Bracing

Work under this item shall include the design, fabrication, installation, maintenance, and removal of all necessary sheeting, shoring, and bracing, or equivalent method, for the protection of life and limb in trenches and open excavation.

The contract price for All Sheeting, Shoring, and Bracing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for accomplishing all the work as specified herein.

****END OF SECTION****

SECTION 01015

CONTRACT TIME

PART 1 - GENERAL

1.01 COMPLETION DATE SCHEDULE

Time for final completion: 210 calendar days.

1.02 SCHEDULE

The following schedule contains specific dates which shall be adhered to and are the last acceptable date unless modified in writing between the District and the Contractor. Specific dates, as used herein, shall mean Working days after the date of the notice to proceed. For the period of time that any portion of the project remains unfinished after the time fixed for completion by these specific dates, with the exception of final completion, the Contractor shall pay to the District the amount of liquidated damages set forth in Section 00500, AGREEMENT. As required by Section 01310, CONSTRUCTION SCHEDULES AND REPORTS, the Contractor shall furnish to the District an acceptable construction schedule to complete the various portions of the project within the time allowed by the specific dates. The Contractor's construction schedule shall reflect the entire contract time defined in this section. Substantial completion as delineated below is defined in Section 00700, GENERAL CONDITIONS.

Specific Activity	Calendar Days from Receipt of Notice to Proceed
Completion of Chemical Storage Tank Facility, Ready to Accept Chemical Deliveries	150
Completion of Instrumentation/Control System Improvements to allow for Chemical Dosing	180 or May 1, whichever occurs first
Substantial Completion	200
Final Completion	210

****END OF SECTION****

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SECTION 01045

MODIFICATIONS TO EXISTING STRUCTURES, PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, material, equipment and incidentals required to modify, alter and/or convert existing structures as shown or specified and as required for the installation of new mechanical or electrical equipment, piping and appurtenances. Existing piping and equipment shall be removed and dismantled as necessary for the performance of structural and piping alterations in accordance with the requirements herein specified.

1.02 GENERAL

The Contractor shall cut, repair, reuse, excavate, demolish or otherwise remove parts of the existing structures, piping or appurtenances as indicated on the plans, herein specified, or as necessary to permit completion of the work under this contract. The Contractor shall dispose of surplus materials resulting from the above work as specified in Section 02100, SITE PREPARATION.

The Contractor shall dismantle and remove all existing equipment, piping and other appurtenances required for the completion of the work. Where called for or required, the Contractor shall cut existing conduits for the purpose of making connections thereto.

When removing materials, the Contractor shall take all precautions and use all necessary barriers and other protective devices so as not to damage the structures beyond the limits necessary for the new work, nor to damage the structures or contents by falling or flying debris.

****END OF SECTION****

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SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.01 CONSTRUCTION STAKING

A. General

The Contractor shall protect in place all District or County benchmarks or monuments. Any damaged or destroyed benchmarks or monuments shall be replaced by a California licensed surveyor at the Contractor's expense.

Reference bench marks and base lines on the plans. From the information provided, the Contractor shall develop and make such additional surveys as are needed for construction, such as control lines, slope stakes, batter boards, stakes for pipe locations and other working points, lines, and elevations. Survey work shall be performed under the supervision of a licensed land surveyor or registered civil engineer in the State of California. Prior to starting construction, the Contractor shall submit to the District in accordance with Section 01300, SUBMITTALS, the frequency, information, and format of survey stakes and other construction control to be used for the Project.

B. Datum

The plane of reference for elevations used in the plans and specifications shall be mean sea level (MSL). Elevations below the plane of reference are designated as "minus" (-) elevations.

C. Horizontal and Vertical Control

From the base line and temporary bench mark described herein and the existing structures, the Contractor shall complete the layout of the work and shall be responsible for all measurements that may be required for execution of the work to the location and limit marks prescribed in the specifications or on the plans, subject to such modifications as the District may require to meet changed conditions or as a result of necessary modifications to the contract work.

D. Contractor's Layout

The Contractor shall furnish at his own expense, such stakes, equipment, tools, materials, and all labor as required in laying out any parts of the work from the base line and bench marks shown on the plans. It shall be the responsibility of the Contractor to maintain and preserve all base line stakes and other marks until authorized to remove them; and, if such stakes or other marks are destroyed by the Contractor, or through his negligence, prior to

their authorized removal, they may be replaced at the direction of the District and the expense of replacement shall be borne by the Contractor and will be deducted from any amounts due or to become due to the Contractor.

The District may require that work be suspended at any time when location and limit marks established by the Contractor are not reasonably adequate to permit convenient checking of the work.

****END OF SECTION****

SECTION 01060

SAFETY AND HEALTH

1.01 **GENERAL**

Construction of the Wastewater Treatment Facility Sodium Hypochlorite Improvements/ Chlorine Contact Basin Expansion – Phase 1 Project will require work within the District wastewater treatment site. The Contractor certifies that he is experienced and qualified to anticipate and meet the safety and health requirements of this project. The Contractor shall require his personnel to observe proper hygienic and safety precautions.

Solvents, gasoline, hydrogen sulfide gas, and other hazardous materials may enter the District wastewater treatment plant from force mains with incoming sewage, and, therefore, certain areas are hazardous to open flame, sparks, or unventilated occupancy. The Contractor shall take measures to assure his personnel observe proper safety precautions when working in these areas.

2.01 **SAFETY AND HEALTH REGULATIONS**

The Contractor shall comply with Safety and Health Regulations for Construction, promulgated by the Secretary of Labor under Section 107 of the Contract Work Hours and Safety Standards Acts, as set forth in Title 29, Code of Federal Regulations (CFR). Copies of these regulations may be obtained from Labor Building, 14th and Constitution Avenue NW, Washington, DC 20013.

The Contractor shall also comply with the provisions of the Federal and State of California Occupational Safety and Health Act (OSHA), as amended.

****END OF SECTION****

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SECTION 01065

WATER POLLUTION CONTROL

PART 1 - GENERAL

1.01 REQUIREMENTS

The Contractor shall be responsible for all costs associated with Water Pollution Control (WPC), and the proper use and applications of the facilities to comply with the applicable storm water requirements of the District, Sacramento County, the State of California, and the United States. This item shall be included in the bid under water pollution control. The District does not pay for equipment, labor, permit fees or any other costs associated with WPC beyond those included in the associated bid item. The District may correct the deficiency and deduct the cost of correcting the deficiency from payment if the Contractor fails to correct the deficiency by the agreed date or before the onset of precipitation.

1.02 SCOPE

This section includes general specifications for preventing, controlling, and abating water pollution in streams, waterways, and other bodies of water.

1.03 GENERAL

The Contractor shall comply with the State Water Resources Control Board (SWRCB) Order No. 2013-0001-DWQ, NPDES General Permit No. CAS000004 (MS4 General Permit), and Order No. 2009-0009- DWQ NPDES General Permit No. CAS0000024 (Construction General Permit), as amended by NPDES permit 2012-0006-DWQ, for projects in excess of 1 acre in disturbance area.

A Water Pollution Control Plan (WPCP) can be either a SWPPP or an erosion and sediment control plan (ESCP). In general projects that are larger than 5 acres or projects between 1 acre and 5 acres that are not exempt, the Contractor must apply for a NOI under the Construction General Permit (CGP) and a SWPPP is required. Projects that are between 1 and 5 acres that are exempt or projects that are less than one acre, the Contractor shall prepare an ESCP.

Projects that disturb one acre or more of soil or disturb less than one acre but are part of a larger common plan or development or sale are subject to the CGP in addition to the construction site storm water runoff control ordinance.

The Contractor shall prepare and submit a WPCP for the District's review and written approval. WPCP will not be approved unless it contains appropriate site-specific construction site BMPs that meet the minimum requirements of the District. Any revisions

to the erosion and sediment control plan shall be reviewed and approved by the District prior to implementation by the Contractor.

If the Project requires a SWPPP, the Contractor shall apply for a permit under the CGP. The District will file a NOI for the Project. The Contractor shall submit all necessary documents and complete the required form on the State Water Resources Control Board, Storm Water Multiple Application and Report Tracking System (SMARTS):

<https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp>

After completing the application on SMARTS, the Contractor shall notify the District to certify the application. Note, the application requires the QSD to enter their name and QSD number. The District shall not be responsible for delays resulting from incomplete application process.

The SWPPP developed pursuant to the CGP may substitute for the ESCP for projects where a SWPPP is developed. SWPPP or ESCP shall be prepared by a California certified QSD. Implementation shall occur under the supervision of a California-certified QSP. Any modification of the SWPPP or ESCP prior to or during construction shall be reviewed and approved by the QSD in responsible charge. The WPC manager must be a California certified Qualified SWPPP Practitioner (QSP) certified through the California SWRCB. The Contractor shall assign one WPC manager to implement the WPCP for the project.

A. Summary

Information on forms, reports, and other documents can be found in the following manuals:

1. CalTrans Storm Water Handbooks available at:
<http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm>
2. California Stormwater Quality Association (CASQA) Stormwater Best Management Practice (BMP) Handbooks available at: <http://www.cabmphandbooks.com/>

Do not start job site activities until:

1. The WPCP is approved.
2. WPCP review requirements have been fulfilled. If the RWQCB requires time for review, allow 21 business days for the review.

If the Contractor operates a Contractor-support facility, protect stormwater systems or receiving waters from the discharge of potential pollutants by using water pollution control practices.

Contractor-support facilities include:

1. Staging areas

2. Storage yards for equipment and materials
3. Mobile operations
4. Batch plants for PCC and HMA
5. Crushing plants for rock and aggregate
6. Other facilities installed for the Contractor's convenience, such as haul roads

Discharges from manufacturing facilities, such as batch plants and crushing plants, must comply with the general waste discharge requirements for Order No. 97-03-DWQ, NPDES General Permit No. CAS000001, issued by the SWRCB for "Discharge of Storm Water Associated with Industrial Activities Excluding Construction Activities" and referred to herein as "General Industrial Permit."

If the Contractor operates a crushing plant to produce rock or aggregate, obtain coverage under the General Industrial Permit. The Contractor must be covered under the General Industrial Permit for crushing plants located:

1. Outside of the job site
2. Within the job site that serve one or more contracts

If the Contractor obtains or disposes of material at a non-commercially operated borrow or disposal site, prevent water pollution due to erosion at the site during and after completion of the Contractor's activities. Upon completion of the Contractor's work, leave the site in a condition such that water will not collect or stand therein.

The District does not pay for water pollution control practices at Contractor-support facilities and non-commercially operated borrow or disposal sites.

B. Submittals

The WPC submittals shall conform to the requirements set forth in Section 13-1.01C, SUBMITTALS, of the Caltrans Standard Specifications. The Contractor shall be responsible for all costs associated with the preparation and delivery of WPC submittals to comply with these specifications, the Standard Specifications, and with all applicable storm water requirements of the District, Sacramento County, the State of California, and United States.

C. Quality Control and Assurance

The WPC quality control and assurance (QA/QC) shall conform to the requirements set forth in Section 13-1.01D, QUALITY CONTROL AND ASSURANCE, of the Caltrans Standard Specifications, the CASQA Handbook, except as modified herein, SWRCB Order No. 2013-0001-DWQ and Order No. 2009-0009- DWQ, as applicable. The Contractor shall

be responsible for all costs associated with the implementation of the QA/QC of WPC submittals to comply with these Provisions, the Standard Specifications, and with all applicable storm water requirements of the District, Sacramento County, the State of California, and United States.

PART 2 - PRODUCTS

2.01 MATERIALS

The WPC materials shall conform to the requirements set forth in Section 13-1.02, MATERIALS, of the Caltrans Standard Specifications, except as modified herein, and the SWRCB NPDES Permit 2013-0001-DWQ and Order No. 2009-0009- DWQ, as applicable.

PART 3 - EXECUTION

3.01 CONSTRUCTION

The WPC construction shall conform to the requirements set forth in Section 13-1.03, CONSTRUCTION, of the Caltrans Standard Specifications. The Contractor shall:

1. Install facilities and devices used for water pollution control practices before performing work activities.
2. Install soil stabilization materials for water pollution control practices in all work areas that are inactive or before storm events.
3. Repair or replace water pollution control practices within 24 hours of discovering any damage, unless a longer period is approved.

The District will not pay for the cleanup, repair, removal, disposal, or replacements of water pollution control practices due to improper installation or the Contractor's negligence.

The Contractor may request changes to the water pollution control work or the District may order changes to water pollution control work. Changes may include additional or new water pollution control practices. Additional water pollution control work may be paid for as extra work in accordance with Section 00700, GENERAL CONDITIONS.

The Contractor shall retain a printed copy of the approved WPCP at the job site and make available during site visits at the request of the District, County or State.

The Contractor shall monitor the National Weather Service's forecast on a daily basis. Monitoring and inspection shall be conducted in conformance with Section 13-1.03B and 13-1.03C of the Caltrans Standard Specifications, except as modified herein, and the SWRCB

NPDES Permit 2013-0001-DWQ and Order No. 2009-0009- DWQ, as applicable. All inspection documentation shall be maintained at the site and made available by the Contractor at the request of the District, County or State.

Whenever the Contractor or the District identifies a deficiency in the implementation of the approved WPCP, correct the deficiency:

1. Immediately, unless a later date is approved
2. Before precipitation occurs

The District may correct the deficiency and deduct the cost of correcting the deficiency from payment if the Contractor fails to correct the deficiency by the agreed date or before the onset of precipitation.

3.02 **JOB SITE MANAGEMENT**

The Contractor shall perform appropriate job site management, including spill prevention and control, material management, waste management, non-stormwater management, and dewatering activities. The Contractor shall implement effective handling, storage, usage, and disposal practices to control material pollution and manage waste and non-stormwater at the job site before they come in contact with storm drain systems and receiving waters.

Job site management shall conform to the requirements set forth in Section 13-4, JOB SITE MANAGEMENT, of the Caltrans Standard Specifications and the CASQA Handbook. Linear sediment barriers must comply with Section 13-10, TEMPORARY LINEAR SEDIMENT BARRIERS of the Caltrans Standard Specifications.

The Contractor shall be maintain and provide all submittals in accordance with Section 13-4.01B Submittals of the Caltrans Standard Specifications. The Contractor shall maintain all records on site, and provide a copy at the request of the District, County or State.

Stockpiling materials; storing pile-driving equipment and liquid waste containers; washing vehicles and equipment in outside areas; and fueling and maintaining vehicles and equipment activities must be performed at safe distance, such that no illicit discharge may occur, from concentrated flows of stormwater, drainage courses, and inlets, unless otherwise authorized by the District.

The Contractor shall be responsible for all costs associated with the performing job site management, and the proper use and applications of the facilities to comply with the applicable storm water requirements of the District, Sacramento County, the State of California, and the United States. This item shall be included in the bid under water pollution control. The District does not pay for job site management.

3.03 **TEMPORARY SOIL STABILIZATION**

The use, submittals, materials and construction of temporary soil stabilization shall conform to the requirements set forth in Section 13-5, TEMPORARY SOIL STABILIZATION, of the Caltrans Standard Specifications and the CASQA Handbook. The Contractor shall be responsible for all costs associated with performing job site management to comply these Provisions, the Standard Specifications, and with all applicable storm water requirements of the District, Sacramento County, the State of California, and United States.

The District will designate the areas to receive soil stabilization materials by directing the placement of stakes or other suitable markers in increments of 1 acre or less.

The Contractor shall be responsible for all costs associated with the installation, maintenance, relocation, or removal of temporary stabilization measures, and the proper use and applications of the facilities to comply with the applicable storm water requirements of the District, Sacramento County, the State of California, and the United States. This item shall be included in the bid under water pollution control. The District does not pay for installing, relocating, maintaining, or removing temporary soil stabilization.

3.04 **TEMPORARY SEDIMENT CONTROL**

The use, submittals, materials and construction of temporary sediment controls, excluding temporary linear sediment barriers, shall conform to the requirements set forth in Section 13-6, TEMPORARY SEDIMENT CONTROL, of the Caltrans Standard Specifications. Install, relocate, and remove control measures as needed to comply with all applicable regulations.

The Contractor shall be responsible for all costs associated with the installation, maintenance, relocation, or removal of temporary sediment control measures, and the proper use and applications of the facilities to comply with the applicable storm water requirements of the District, Sacramento County, the State of California, and the United States. This item shall be included in the bid under water pollution control. The District does not pay for installing, relocating, maintaining, or removing temporary sediment controls.

3.05 **TEMPORARY TRACKING CONTROL**

The use, submittals, materials and construction of temporary linear sediment barriers shall conform to the requirements set forth in Section 13-7, TEMPORARY TRACKING CONTROL, of the Caltrans Standard Specifications and the CASQA Handbook. Install, relocate and remove facilities as needed to comply with all applicable regulations.

The Contractor shall retain and submit records of street sweeping activities, including sweeping times, sweeping locations, and the quantity of disposed sweeping waste. Records shall be maintained on-site and made available to the District, County or State upon request.

The Contractor shall be responsible for all costs associated with the installation, maintenance, relocation, or removal of temporary tracking control measures, and the proper use and applications of the facilities to comply with the applicable storm water requirements of the District, Sacramento County, the State of California, and the United States. This item shall be included in the bid under water pollution control. The District does not pay for installing, relocating, maintaining, or removing temporary tracking controls.

3.06 **TEMPORARY CONCRETE WASHOUTS**

The use, submittals, materials and construction of temporary linear sediment barriers shall conform to the requirements set forth in Section 13-9, TEMPORARY CONCRETE WASHOUTS, of the Caltrans Standard Specifications and the CASQA Handbook.

Install, relocate or remove portable temporary concrete washout or bins as needed for concrete work. Remove and dispose of concrete waste within two business days after a concrete washout becomes filled. Dispose of concrete waste material from a concrete washout at a plant licensed to receive solid concrete waste, liquid concrete waste, or both. Secure portable temporary concrete washout or bin to prevent spilling of concrete waste material whenever it is being relocated or transported within the job site. Whenever any spilled material is observed, clean up the spilled material and place it back into the concrete washout unit. The District does not pay for installing, relocating or removing a portable temporary concrete washout or bin.

The Contractor shall be responsible for all costs associated with the installation, maintenance, relocation, or removal of temporary concrete washouts, and the proper use and applications of the facilities to comply with the applicable storm water requirements of the District, Sacramento County, the State of California, and the United States. This item shall be included in the bid under water pollution control. The District does not pay for installing, relocating, maintaining, or removing temporary concrete washouts.

3.07 **TEMPORARY LINEAR SEDIMENT BARRIERS**

The use, submittals, materials and construction of temporary linear sediment barriers shall conform to the requirements set forth in Section 13-10, TEMPORARY LINEAR SEDIMENT BARRIERS, of the Caltrans Standard Specifications and the CASQA Handbook. Install, relocate and remove facilities as needed to comply with all applicable regulations.

The Contractor shall be responsible for all costs associated with the installation, maintenance, relocation, or removal of temporary linear sediment barriers, and the proper use and applications of the facilities to comply with the applicable storm water requirements of the District, Sacramento County, the State of California, and the United States. This item shall be included in the bid under water pollution control. The District does not pay for installing, relocating, maintaining, or removing temporary linear sediment barriers.

****END OF SECTION****

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SECTION 01070

ENVIRONMENTAL STEWARDSHIP

PART 1 - GENERAL

1.01 **SCOPE**

This section includes general specifications for the Contractor for environmental compliance and environmental resource management during construction.

1.02 **REGULATOR REQUIREMENTS**

A. **Air Quality**

Section 14-9, AIR QUALITY, of the Caltrans Standard Specifications includes specifications relating to air quality.

B. **Air Pollution Control**

Comply with air pollution control rules, regulations, ordinances, and statutes that apply to work performed under the Contract, including air pollution control rules, regulations, ordinances, and statutes provided in Govt Code § 11017 (Pub Cont Code § 10231). Do not burn material to be disposed of.

1.03 **ENVIRONMENTALLY SENSITIVE AREAS (ESAs)**

No ESAs have been identified within the boundaries of the project sites. Care must be taken that the Contractor avoid any disturbance or adverse impacts to ESAs. Should any disturbance or other impacts by the Contractor occur, notify the District immediately.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 NOISE AND VIBRATION

A Construction Noise Management Plan shall be prepared and shall include proper posting of construction schedules, appointment of a noise disturbance coordinator, and methods for assisting in noise reduction measures.

A. Noise Reduction Measures

Noise reduction measures include, but are not limited to, the following:

1. Equipment and trucks used for project construction shall utilize the best available noise control techniques which include, but are not limited to, improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds.
2. Impact tools (e.g., jackhammers, pavement breakers, pile drivers, and rock drills) used for project construction shall be hydraulically or electrically powered to avoid noise associated with compressed air exhaust from pneumatically powered tools. If the use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used. External jackets on the tools themselves shall be used if such jackets are commercially available. Quieter procedures shall be used, such as drills rather than impact equipment, whenever such procedures are available and consistent with construction procedures.
3. Stationary noise sources shall be located as far from adjacent properties as possible, and they shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or other similar noise reduction construction method approved by the District that provides equivalent noise reduction.
4. Do not operate construction equipment or run the equipment engines from 6:00 p.m. to 7:00 a.m., or on Saturdays or Sundays, except where authorized by the District or to operate equipment within the project limits during these hours to:
 - a. Service traffic control facilities
 - b. Service construction equipment

If authorized to work during these times, do not exceed 86 dBA LMax at 50 feet from the job site activities.

5. Restrict construction activities and delivery of materials to the hours of 7 AM to 7 PM on Monday through Friday, and 8 AM to 6 PM on Saturdays. No construction shall be permitted outside of these hours or on Sundays or federal holidays, without a specific exemption issued by the District.

3.02 **CONSTRUCTION RELATED EXHAUST EMISSIONS**

To reduce impacts for construction-related exhaust emissions, the Contractor shall utilize off-road construction fleets that can achieve fleet average emissions equal to or cleaner than Tier II emission standards, as set forth in Section 2423 of the California Code of Regulations and Part 89 of Title 40 Code of Federal Regulations. Achievement can be accomplished through any combination of uncontrolled engines and engines complying with Tier II and above engine standards.

****END OF SECTION****

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SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 PRECONSTRUCTION MEETING

A preconstruction meeting will be held within ten working days of Award of the Contract. The purpose of the meeting will be to discuss the various requirements of the specifications and the Contractor's responsibilities with regard to process control, schedule, submittals, traffic control, and safety. The Contractor shall not commence construction work until after the preconstruction meeting and issuance of a Notice to Proceed.

1.02 MONTHLY STATUS MEETINGS

Regular monthly construction progress meetings shall be held throughout the construction period from the time the Contractor begins work until the acceptance of the work by the District. The District, Superintendent, and Design Engineer will attend the meeting either in person or virtually. The Contractor shall be represented by his designated construction manager and superintendent, and representative of any major subcontractor whose work will be discussed at the meeting.

The purpose of the meeting shall be as follows:

- A. Review of progress of the work during the preceding month and the job to date for compliance with the approved construction schedule as described in Section 01310, CONSTRUCTION SCHEDULE AND REPORTS.
- B. Discuss work and coordination of activities that will be required for the completion of all work scheduled for the following month.
- C. Discuss additional measures required to bring the progress of the work into compliance with the approved schedule if required to satisfy the provisions of the contract.
- D. Review status of submittals, change orders, directives, and equipment delivery dates.
- E. Any additional items of concern to the District.

1.03 WEEKLY MEETINGS

The Contractor's superintendent shall meet with the District at the beginning of each week to discuss the activities scheduled for the following week and the compliance of the work with the schedule established at the previous monthly status meeting.

1.04 **ADDITIONAL MEETINGS**

Additional meetings with the District, Design Engineer, and the Contractor will be called by the District to resolve disputes on various items of work on the project, including, but not limited to, progress payments, design omissions or conflicts, and changes in work and/or schedule.

****END OF SECTION****

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 GENERAL

Where required by the specifications, the Contractor shall submit descriptive information that will enable determination of whether the Contractor's proposed materials, equipment, or methods of work are in general conformance to the design concept and in compliance with the plans and specifications. The information to be submitted shall consist of drawings, specifications, descriptive data, certificates, samples, test results and such other information, all as specifically required in the specifications. In some instances, specified submittal information describes some, but not all, features of the material equipment, or method of work. Features not requiring submittals shall be as specified.

As described in Section 00700, GENERAL CONDITIONS, submittal review shall be only for general conformance with the design concept and general compliance with the information given in the contract documents. It shall not include review of quantities, dimensions, weights or gages, fabrication processes, construction safety precautions, all of which are the sole responsibility of the Contractor. Review of a specific item shall not indicate acceptance of an assembly of which the item is a component. The Design Engineer shall not be required to review and shall not be responsible for any deviations from the contract documents not clearly noted by the Contractor, nor shall the Design Engineer be required to review partial submissions or those for which submissions for correlated items have not been received.

1.02 CONTRACTOR'S RESPONSIBILITIES

The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment, or method of work shall be described in the submittal. The Contractor shall verify that all features of all products conform to the requirements of the specifications and plans. The Contractor shall insure that there is no conflict with other submittals and shall notify the District in each case where his submittal may affect the work of the District or others. The Contractor shall insure coordination of submittals among the related crafts and subcontractors.

Immediately following Award of the Contract, the Contractor shall review the plans and specifications and shall prepare a list of all submittals anticipated on the project and shall submit this list to the Design Engineer. Items not on the list but requiring review shall be added to the list as requested by the Design Engineer at any time during the construction.

1.03 TRANSMITTAL PROCEDURE

A. General

Submittals regarding material and equipment shall be accompanied by a transmittal form. A separate form shall be used for each specific item, class of material, equipment, and for items specified in separate, discrete sections. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.

A unique number, sequentially assigned, shall be noted on the transmittal form accompanying each item submitted. Submittal numbers shall have the following format: "XXX-YYYYY-ZZ"; where "XXX" is the sequential number assigned by the Contractor, "YYYYY" is the specification section number covered by the submittal, and "ZZ" is the sequential number of the submittal ("01" for the first submittal, "02" for the second submittal, etc.). Resubmittals shall have the same submittal number format; where "XXX" is the originally assigned submittal number.

Submittal 25-11350-02, for example, would be the second submittal (first re-submittal) of submittal 25 covering Section 11350.

B. Deviation from Contract

If the Contractor proposes to provide material, equipment, or method of work that deviates from the contract documents, he/she shall indicate so on the transmittal form accompanying the submittal copies. Deviations from the contract documents may result in a "credit" to the District.

C. Submittal Completeness

Submittals that do not contain all the information required to be submitted, including deviations, are not acceptable and will be returned without review.

D. Requests for Substitution

The Contractor may offer material or equipment of equal or better quality and performance in substitution for those specified. The District will consider offers for substitution only from the Contractor and will not acknowledge or consider such offers from suppliers, distributors, manufacturers, or subcontractors. The Contractor's offers of substitution shall be made in writing to the District and shall include sufficient data to enable the Design Engineer to assess the acceptability of the material or equipment for the particular application and requirements.

If the offered substitution necessitates changes to or coordination with other portions of the work, the data submitted shall include drawings and details showing such changes. Contractor agrees to perform these changes as part of the substitution of material or equipment at no additional cost to District. Within 10 calendar days after receipt of the offer of substitution, the Design Engineer will review the material submitted by the Contractor and advise the District

and Contractor of objections, if any, to the proposed substitution or if further information is required. Upon notification by the District, the Contractor shall either provide material or equipment that complies with project specifications or furnish requested additional information. While the District might not take any objections to the proposed substitution, such action shall not relieve the Contractor from responsibility for the efficiency, sufficiency, quality and performance of the substitute material or equipment, in the same manner and degree as the material and equipment specified by name. Any cost differential associated with a substitution shall be reflected in the offer and the contract documents shall be modified by a change order.

1.04 REVIEW PROCEDURE

When the contract documents require a submittal, the Contractor shall submit copies of the specified information as follows unless otherwise specified:

- A. One reproducible original of all the submitted information
- B. Six copies of all the submitted information.
- C. Submittals shall be delivered or mailed to:

Dave Richard, PE
Principal Engineer
Dewberry Engineers Inc,
11060 White Rock Road, Suite 200
Rancho Cordova, CA 95670
drichard@dewberry.com

Unless otherwise specified, within 10 calendar days after receipt of the submittal, the submittal shall be reviewed and three copies of the marked-up reproducible original shall be returned to the Contractor. The reproducible original shall be retained by the District. The returned submittal shall indicate one of the following actions:

1. If the review indicates that the material, equipment, or work method is in general conformance with the design concept and complies with the drawings and specifications, submittal copies will be marked "NO EXCEPTIONS TAKEN." In this event, the Contractor may begin to implement the work method or incorporate the material or equipment covered by the submittal.
2. If the review indicates limited corrections are required, copies will be marked "MAKE CORRECTIONS NOTED." The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in accordance with the noted corrections. Where submittal information will be incorporated in operation and maintenance information, a corrected copy shall be provided.
3. If the review reveals that the submittal is insufficient or contains incorrect data, copies will be marked "REVISE AND RESUBMIT." Except at his own risk, the Contractor shall not

undertake work covered by this submittal until it has been revised, resubmitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

4. If the review indicates that the material, equipment, or work method is not in general conformance with the design concept or in compliance with the drawings and specifications, copies of the submittal will be marked "REJECTED". Submittals with deviations that have not been identified clearly may be rejected. Except at his own risk, the Contractor shall not undertake the work covered by such submittals until a new submittal is made and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED".

Following the initial review, two "resubmittals" will be allowed by the District prior to a "back charge" for engineering review and administration costs being incurred by the Contractor. The "back charge" will be deducted from any amounts due the Contractor.

1.05 **EFFECT OF REVIEW OF CONTRACTOR'S SUBMITTALS**

Review of drawings, methods of work, or information regarding materials or equipment the Contractor proposes to provide shall not relieve the Contractor of his responsibility for errors therein and shall not be regarded as an assumption of risks or liability by the District, or by any officer or employee thereof, or by any engineering firm conducting such review on behalf of the District, and the Contractor shall have no claim under the contract on account of the failure, or partial failure, of the method of work, material, or equipment so reviewed. A mark of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" shall mean that the District has no objection to the Contractor, upon his own responsibility, using the plan or method of work proposed, or providing the materials or equipment proposed.

****END OF SECTION****

SECTION 01310

CONSTRUCTION SCHEDULES AND REPORTS

PART 1 – GENERAL

1.01 REQUIREMENTS

The Construction Schedule for this Project will also be referred to as the Critical Path Method (CPM) schedule.

The Contractor shall provide an electronic copy on CD media for the Baseline Schedule and all monthly updates to accompany hard copies of the schedule and tabular reports.

The Contractor shall provide with its schedule a procedural outline of the system shutdowns and proposed tie-in procedures, which shall be subject to the favorable review of the District.

Construction schedules shall be submitted in Primavera Project Planner format.

1.02 RESPONSIBLE SCHEDULING PERSON

Within five days from award of the Contract, the Contractor shall submit to the District the name of the person responsible for the preparation, maintenance, updating and revision of all schedules. This person must have authority to act on behalf of the Contractor, have at least five years verifiable experience in the preparation and updating of complex construction schedules for projects of similar type, size and complexity. They must be proficient in the use of Primavera Project Planner. In the event the Contractor does not have an employee with this required scheduling experience and expertise, as determined by the District, the Contractor will be required to employ a qualified CPM consultant who regularly performs these services and who in the opinion of the District possesses the qualifications required to perform CPM Scheduling for this Project. The District reserves the right to remove the scheduler from the Project if found to be incompetent.

1.03 PRELIMINARY PROGRESS SCHEDULE

- A. Within five days after receipt of Notice to Proceed or Preconstruction Conference, whichever occurs first, the Contractor shall submit in accordance with Section 01300, SUBMITTALS, five copies of a Preliminary Progress Schedule in the form of an arrow or precedence diagram covering the following project phases and activities:
1. Procurement and Submittals, including shop drawings and fabrication and delivery of key and long lead time procurement items.

- a. The Contractor's submittal information shall show intended submittal dates and shall include, as a minimum, the maximum allowable review period as specified.
 - b. The information shall provide sufficient durations for administration, fabrication and transportation to produce realistic delivery dates for the procurement items.
2. Submittal of requests for shutdowns and anticipated shutdown periods.
 3. All activities planned for the first 90 days in the execution of the Work.
 4. The approach to scheduling the remaining activities or phases of the Work shall be represented by at least one summary activity for each major phase or activity. The total duration of the summary activities shall equal the Contract Time.
 5. Approximate duration for each summary activity representing the Contractor's best estimate for the work the summary activity represents.
- B. The Preliminary Progress Schedule shall describe the activities to be accomplished and their dependency subject to all requirements under these Construction Schedule provisions, as appropriate. The Preliminary Progress Schedule will be used temporarily to record and monitor the progress of the Work until the Baseline Schedule, specified hereinafter, has been completely developed and favorably reviewed. Recorded data on the Preliminary Progress Schedule shall be incorporated into the Baseline Schedule during the first schedule update.
- C. The District shall review the schedule and provide any comments, provide favorable review of the schedule, or request a meeting to review the schedule with the Contractor within fourteen days of receipt of the schedule. If requested, the Contractor shall participate in a review and evaluation of the schedule with the District. Any revisions necessary as a result of this review shall be resubmitted for review by the District within five days.

1.04 **BASELINE SCHEDULE**

A. **Baseline Schedule Submittal**

The CPM Baseline Schedule submitted under this Specification shall show completion of the project within the required contract completion date and any milestone(s) or seasonal timeline requirements. The Contractor shall submit an acceptable Baseline CPM Schedule to the District within thirty days after the receipt of the Notice to Proceed. Subsequent revisions to said CPM schedule shall be submitted as set forth hereinafter. The Contractor shall produce and provide five complete Baseline CPM Schedules on 22-inch by 34-inch sheets. The network logic diagram shall be clear and legible. Critical activities shall be indicated in red color on both schedules. The schedule is to recognize all legal Holidays observed by the District during construction. These would include the following Holidays: New Year's Day, Martin Luther King Jr. Day, President's Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, the day after Thanksgiving and Christmas Day.

The District shall review the schedule and provide any comments to the schedule, provide favorable review of the schedule, or request a meeting to review the schedule with the Contractor within fourteen days of receipt of the schedule. If requested, the Contractor shall participate in a review of the Baseline CPM Schedule with the District. Any revisions necessary as a result of this review shall be resubmitted for review by the Engineer within ten days. When completed, the reviewed schedule shall then be the schedule to be used by the Contractor for planning, organizing, and directing the Work, and for reporting progress. If the Contractor thereafter desires to make significant changes in its method of operating and scheduling, the Contractor shall notify the District in writing stating the reasons for the change.

Acceptance of the Baseline Schedule by the District is a condition precedent to making progress payments under Article 14, Payments to Contractor, of Section 00700, GENERAL CONDITIONS, after the first ninety calendar days after Notice to Proceed.

To the extent that the favorably reviewed initial Baseline CPM Schedule, or revisions thereto, indicate anything not jointly agreed upon, it shall be deemed to be not favorably reviewed by the District. Any omission of work from the detailed Baseline CPM Schedule, otherwise required for Contract compliance, will not excuse the Contractor from completing such work within any applicable completion date.

B. Network Logic Diagram

The diagrams shall show elements of the project in detail and an entire project summary. Diagrams shall show the order and interdependence of all activities and sequence in which the work is to be accomplished as planned by the Contractor and its subcontractors. The basic concept of a network analysis diagram shall be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of following activities. Network logic diagrams shall be time-scaled and based upon the early start of all activities.

The graphic network diagram shall include for each activity, the description, activity number, the estimated duration in workdays, and all activity relationship lines. The network diagram shall be drawn for the early start and early finish of all activities.

C. Tabular Reports

The following information shall be furnished as a minimum for each activity;

1. Preceding and succeeding activities
2. Activity description and number
3. Estimated duration of activities
4. Earliest start date (by calendar date)
5. Earliest finish date (by calendar date)
6. Actual start date (by calendar date)
7. Actual finish date (by calendar date)
8. Latest start date (by calendar date)

9. Latest finish date (by calendar date)
10. Float
11. Percentage of activity completed
12. Activity constraints

The schedule reports shall include a calendar in workdays, a report sorted by early start, a report sorted by total float, a report sorted by activity listing all constraints and a logic table report sorted by work item which indicates the complete preceding and succeeding logic ties.

D. Durations

Durations shall be in working days and shall not exceed ten workdays, except for submittal and delivery items. Where the duration of continuous work exceeds ten workdays, work items in the Construction Schedule shall be subdivided by location, approximate stationing or other sub-element of the work. For example, constructing a concrete structure should be broken down into forming tasks, pouring tasks, rebar tasks, stripping tasks, curing times, patching/finishing tasks, etc.

E. Network Activities

Detailed network activities shall include:

1. The submittal and approval of samples and equipment, fabrication of special material and equipment and their installation and testing.
2. The critical path shall be shown on all reports and on the graphic network logic diagram. The activities, which constitute the critical path, shall be identified. Critical path shall be calculated using P3 without using P3's resource leveling function.
3. Progress milestone events or other significant stages of completion, as defined in Section 01010, LOCATION AND SUMMARY OF WORK. System shutdown and tie-in dates must be specifically and conspicuously identified and included on the schedule.
4. The lead-time required for testing, inspection and other procedures required prior to acceptance of the work.
5. The activity numbers shall be grouped by work area, trade and subcontractor to provide logical summary activities.
6. All activities of the District and the District that affect progress and required contract dates for completion of all parts of the work. The selection and number of activities shall be subject to favorable review by the District.

F. Float

“Total Float” or “Float” shall be defined as the difference between the early finish and late finish dates for an activity.

On the CPM schedule, the Contractor shall delineate the specified contract duration and identify the planned completion of the Work as the final finish milestone. The time period between these two dates, if any, shall be considered Contract float. Float shall be calculated using P3 without using P3's resource leveling function.

Float in any activity, milestone completion date, or contract completion date shall be considered a resource available to both the District and the Contractor. Neither the District nor the Contractor has ownership of the float. Float is for the benefit of the Project. Acceptance of the Contractor's Baseline CPM Schedule, monthly updates or revised schedule, when based on less time than the maximum time allowed for milestone(s) or Contract completion does not serve to change any contract duration, nor serve as a waiver of the Contractor's nor the District's right to utilize the full amount of time specified in the Contract, unless so modified in a Contract Change Order.

1.05 WEATHER CONDITIONS

Seasonal weather conditions shall be considered in the planning and scheduling of work influenced by high or low ambient temperatures or precipitation to ensure the completion of the Work within the Contract Time.

1.06 UPDATES

A. Submittal Period

The Contractor shall submit at monthly intervals a report of the actual construction progress. Each monthly report shall cover a period of approximately thirty days. The monthly reports shall be submitted within five days of the end of the reporting period, which shall be as agreed upon by the District and Contractor.

The Contractor shall produce and provide five complete sets each of the schedule on 22-inch by 34-inch sheets. The schedule shall be clear and legible. Critical activities shall be indicated in red color. Progress bars shall be conspicuously identified by color other than red, black or white.

Progress payments may be withheld if monthly schedule updates are not provided in a timely manner, as determined by the District, as provided for in Section 00700, GENERAL CONDITIONS.

B. All Monthly Updates

All monthly updates shall include as a minimum:

1. Tabulation reports for the following sorts:
 - a. Preceding and succeeding activities
 - b. Activity description and number

- c. Estimated duration of activities
 - d. Earliest start date (by calendar date)
 - e. Earliest finish date (by calendar date)
 - f. Actual start date (by calendar date)
 - g. Actual finish date (by calendar date)
 - h. Latest start date (by calendar date)
 - i. Latest finish date (by calendar date)
 - j. Float
 - k. Percentage of activity completed
 - l. Activity constraints
2. Narrative and Tabular Report - The report shall show the activities or portions of activities actually started or completed during the reporting period. The report shall state the percentage of the work actually completed and scheduled, the remaining duration, and the progress along the critical path in terms of days ahead or behind the allowable dates as of the report date. Any changes made by the Contractor to the schedule, including activity numbers, durations, constraints and activity descriptions, shall be listed in a detailed report which describes the reason for each.

C. Delayed Schedule Updates

If, in the opinion of the District, the project is behind schedule, the monthly report shall include a revised network logic diagram and/or tabular reports showing the Contractor's proposed revised schedule. The schedule shall be revised under the conditions defined in Part 1.06E, Schedule Revisions. An analysis of the effect that the delay has on progress along other paths shall also be included in the report. The Contractor shall also submit a narrative report with each updated analysis which shall include but not be limited to, a description of current and anticipated problem areas, delaying factors and their impact, and an explanation of corrective actions taken or proposed.

D. Schedule Review

Once each month, on a date mutually agreed upon, but no later than ten days after the submittal of the monthly update specified herein, a jobsite meeting will be held to review the Construction Schedule, job progress and the monthly update, or the District will provide written comments on the monthly update.

E. Schedule Revisions

The conditions under which the District will require revisions of the Construction Schedule include the following:

1. When delay in completion of any work item or sequence of work items results in an estimated extension of project completion by either fifteen working days or by five percent of the remaining duration of time to complete the Contract, whichever is less.

2. When delays in submittals or deliveries make replanning or rescheduling of the work necessary.
3. When the schedule does not represent actual prosecution and progress of the work.
4. When there is any change to the sequence of activities, the completion date for major portions of the work, or changes occur which affect the critical path.
5. When Contract modification necessitates schedule revision.

The revised Construction Schedule for any condition listed above shall show:

1. How the Contractor intends to return to schedule.
2. How the Contractor intends to avoid falling behind schedule on future activities.

The District may require the Contractor to add to its plant, equipment, or construction forces as well as increase the working hours if operations fall behind schedule at any time during the construction period.

1.04 **WEEKLY ACTIVITIES PLAN**

On the last working day of every week the Contractor shall submit to the District five (5) Contractor's Plan of Activities for the next three (3) weeks and with the prior week as-built. The Plan of Activities shall describe the activity and location of the activity and include the Activity number as provided in the Construction Schedule.

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SECTION 01640

**SUPPLIERS/MANUFACTURER'S SERVICES DURING CONSTRUCTION,
COMMISSIONING, AND TRAINING OF DISTRICT'S PERSONNEL**

PART 1 - GENERAL

1.01 DESCRIPTION

This section specifies the services of the supplier's and manufacturer's representatives which the Contractor shall supply during construction, commissioning, and training of the District's personnel for chemical system storage, metering, and dosing operations as required in the respective sections.

1.02 DEFINITIONS

A. Labor Days

One labor day equals one person for 8 hours straight time, exclusive of Saturday, Sunday, or holidays.

1.03 PROCEDURE IN PROVIDING SERVICES

A. General

The Contractor shall include and pay all costs for all appropriate manufacturer's services, including, but not limited to, those specified herein. Where a minimum amount of time is stated in the Project Specifications for manufacturer's services, any additional time required to perform the specified services shall be at no additional cost to the District.

B. Fulfillment of Specified Minimum Services

Only those suppliers' and manufacturer's services receiving prior approval by the District shall act to fulfill the specified minimum labor day requirements for such supplier and manufacturer's services. All requests to the District for prior approval shall 1) be in writing; 2) be submitted not less than 14 calendar days prior to the providing of the subject services; 3) state the service to be provided and all required supporting information; 4) state the technical representative's qualifications; and 5) state the reason(s) why the timing of the service is appropriated. Requests made to the District less than 14 calendar days prior to the providing of suppliers' and manufacturer's services may not receive consideration and response prior to the times the services are provided. The Contractor is advised that, nonetheless, in such cases the requested services may be disapproved because of non-fulfillment of the specified minimum labor day requirements. All responses to the Contractor, approving or disapproving requests for prior approval, shall be in writing. Visits of suppliers and manufacturers and their representatives to the jobsite or training

classroom without prior approval as provided herein will not act to fulfill the specified minimum labor day requirements.

1.04 **CONSTRUCTION**

Competent and experienced technical representatives thoroughly familiar with the equipment supplied with a minimum experience of five years performing comparable services shall represent the manufacturers of all equipment and systems as may be necessary to resolve assembly or installation problems at the worksite which are attributable to, or associated with, the equipment furnished.

Where a manufacturer's certificate is called for in the Project Specifications, the manufacturers' representative shall provide a certificate stating that the equipment or system has been installed in accordance with the manufacturer's recommendation and has been inspected by a manufacturer's authorized representative, that it has been serviced with the proper initial lubricants, that applicable safety equipment has been properly installed and that the proper electrical and mechanical connections have been made.

Where functional testing (startup) is called for in the Project Specifications, as defined in Section 01660, **INSTALLATION, TESTING, AND COMMISSIONING**, the manufacturer's representative shall assist with the initial functional (or run) test, which shall include checking for proper rotation, alignment, speed, excessive vibration, and noisy operation. Initial equipment and system adjustment and calibrations shall be performed in the presence of, and with the assistance of the representative. The above mentioned manufacturers' certificate shall include the statement that proper adjustments have been made, and that the equipment or system is ready for commissioning.

1.05 **COMMISSIONING**

Where manufacturer's services during commissioning are called for in the Project Specifications as defined in Section 01660, **INSTALLATION, TESTING, AND COMMISSIONING**, or when technical assistance is necessary due to any malfunction of the equipment or system furnished, the manufacturers' representative shall provide such services. He shall also conduct and/or assist with final performance and demonstration testing, as required by the Project Specifications. These services shall continue until such times as the applicable equipment or system has been successfully performance tested and has been accepted by the District for full-time operation.

1.06 **TRAINING OF DISTRICT PERSONNEL**

It is the intent of this paragraph to establish the minimum requirements and procedures applicable to training to be provided by the Contractor, any subcontractors or suppliers/manufacturers to fulfill the requirements of this contract and all addenda thereto. The objective of all contract specified training is to provide the District's Operational and Maintenance Personnel with sufficient information and skills training on the theory, design, site specific operation and maintenance practices (including items such as routine

monitoring with normal and abnormal parameters, troubleshooting techniques, and preventative and corrective maintenance requirements) to insure that equipment and systems can be efficiently and effectively operated and maintained by the trainees upon completion of the training.

Training specified under this contract shall be a combination of classroom field and "hands on" training necessary to achieve the preceding objective, as approved by the District. The District, at his request, may require training to be provided for all groups prior to the startup of equipment and systems (pre-startup training) and after said equipment has been in operation for a period of time (Post-Startup Training). If pre and post startup training sessions are required by the District, the specified training hours will be divided as necessary to achieve this objective, with no additional cost or expenses due under this contract. In all cases where post startup training is required, it will be scheduled prior to expiration of the warranty period on the subject equipment or system.

The District will provide the Contractor, his subcontractor or suppliers/manufacturers appropriate training facilities unless otherwise indicated herein. The District will also provide information on the types of disciplines to be trained, number of groups of each discipline, number of trainees in each group and any criteria or constraints on the length of individual sessions. The District, subsequent to approval of the Contractor's training submittal, will schedule all sessions and provide for attendance of designated personnel. A minimum of 10 working days advance notice will be given to the Contractor prior to the scheduled date(s) of training sessions. Sessions will be scheduled independently of other construction or startup activities, based upon the availability of trainees and other requirements of the District. The sessions will be scheduled and conducted during the District's regularly scheduled day shift hours.

The Contractor shall insure that all equipment and systems are accessible and available for field and "hands on" training in order to permit the delivery of scheduled training sessions.

1.07 **SUBMITTALS (TRAINING MATERIALS)**

Three copies of the following information will be submitted, as a minimum requirement, by the Contractor, his subcontractors or designated vendors, to assist the District in determining the quality and applicability of training to be provided. Materials will be furnished in such form and format as deemed acceptable by the District. Submission materials will be reviewed and training will be scheduled only subsequent to approval by the District. The submittal shall contain, but not be limited to, the following:

- A. A separate, detailed outline of the material to be covered in the training session for each separate discipline to be trained. The outline shall contain sufficient detail, including the length in minutes or hours of each major topic and a cross reference to the applicable pages or sections of the training manual to permit evaluation of the proposed session. The outline shall also indicate the type or location of training, i.e., "hands on" field or classroom and audio-visual or other training aids to be used. All audio-visual or training aids shall be submitted for review with other materials, where practical. If a training aid, such as a valve

or pump cutaway, is to be used, sufficient information on the aid and its use may be included in lieu of the aid itself.

- B. Sufficient background on the instructor(s) for each session to permit evaluation of the proposed instructor's qualifications and capability of training the target trainee discipline. Instructors shall be competent and experienced technical representatives thoroughly familiar with the equipment supplied with a minimum experience of 5 years performing equipment training services.

- C. A trainee manual, that includes the appropriate information for the target trainee group, on the equipment or system. This shall include, but not be limited to, a description of components, operation and maintenance practices and procedures, (including preventive maintenance) spare parts, assembly and disassembly procedures, tools and auxiliary equipment, lubrication techniques - including types and amounts, trouble-shooting techniques, normal and abnormal operating parameters, safety precautions, calibration and testing procedures, including equipment required. An approved copy of the trainee manual will be provided by the Contractor, his subcontractor or designated suppliers/manufacturers to each trainee at the scheduled session.

The preceding materials will be submitted to the District at the earliest practical time, but in no event less than 45 days prior to schedule delivery of said training. Approval of a submittal will permit training to be scheduled as previously defined.

When it is deemed appropriate by the District, the use of a qualified field service technician to perform actual corrective or preventative maintenance techniques, troubleshooting or operational or maintenance problems or other specified services, in conjunction with the District's designated personnel, may be substituted for a specified training session. The substitution will be allowable only if a detailed outline of services to be provided is submitted and approved in advance by the District.

All training sessions will be monitored and evaluated by the District or his designated representative, and any session or portion(s) thereof deemed unsatisfactory will be repeated, at no cost to the District, until they are acceptable. Upon satisfactory completion of a trainee program, the Contractor will be so notified in writing. No payment will be made to the Contractor, his subcontractor or designated suppliers/manufacturers, for training under this contract until the specified training sessions have been satisfactorily completed.

All costs including preparation time, audio-visual materials, trainee manuals and any direct and indirect expenses of instructors, including those related to pre-and post-startup training, are incorporated in the contract price. The Contractor will be directly liable for all costs incurred to provide training specified under this contract, except those related directly to the District's personnel costs.

****END OF SECTION****

SECTION 01660

INSTALLATION, TESTING, AND COMMISSIONING

PART 1 – GENERAL

1.01 DESCRIPTION

This section specifies the installation, testing, and commissioning for all mechanical, electrical, and instrumentation systems.

1.02 QUALITY ASSURANCE

A. Installation

All mechanical, electrical, and instrumentation equipment provided under this contract shall be installed in conformity with the details shown and specified and with the manufacturer's requirements. Should a manufacturer's installation recommendations conflict with specific requirements of these contract documents, the Contractor shall bring the matter to the attention of the District. Any additional costs incurred arising out of changes in the contract documents authorized by the District to accommodate manufacturer's installation recommendations will be considered extra work in accordance with Section 00700, GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT. Any costs incurred by the Contractor through failure to timely notify the District of a difference between contract document and manufacturer's installation requirements shall be borne by the Contractor.

B. Testing

1. General Requirements: All equipment and partially complete or fully completed portions of the work included in this contract shall be tested and inspected to demonstrate compliance with the contract requirements. Unless otherwise specified, all costs of testing, including temporary facilities and connections, shall be borne by the Contractor. For the purpose of this section, equipment shall mean any mechanical, electrical, instrumentation, or other device with one or more moving parts or devices requiring an electrical, pneumatic or hydraulic connection.
2. Approval for Testing: No tests specified herein shall be conducted until the item to be tested has been inspected and approval given by the District for the application of such test.
3. Scope: Tests and inspection shall include:
 - a. The delivery acceptance test and inspections.
 - b. The installed tests and inspections including Pre-operation Checkout and Operational Testing.
 - c. The commissioning of completed sections of the project by District's personnel.

4. **Testing Standards:** Tests and inspections, unless otherwise specified or accepted, shall be in accordance with the recognized standards of the industry. The Contractor shall ensure that scheduling and performance of all tests are coordinated with involved subcontractors and suppliers.
5. **Testing Forms:** The form of evidence of satisfactory fulfillment of delivery acceptance test and inspection requirements shall be, at the discretion of the District, either by tests and inspections carried out by approved persons or organizations. The Contractor shall provide and use forms which include all test information, including specified operational parameters. The forms used shall be acceptable in content to the District.
6. **Master Test Log Book:** Prior to commencing testing and inspection, the Contractor shall submit to the District the proposed format for the master test log book. The master test log book shall be maintained by the Contractor which shall cover all tests including piping, equipment, electrical, and instrumentation. The master test log book shall be provided with loose leaf pages which shall be copied weekly after updating for transmittal to the District. At the completion of the project, the complete master test log book shall be submitted to the District.
7. **Delivery Acceptance Tests and Inspections:** The delivery acceptance tests and inspections and any remedial work to correct deficiencies shall be at the Contractor's expense for any equipment specified herein and shall include the following:
 - a. Test of items at the place of manufacture during and/or on completion of manufacture, comprising hydraulic pressure tests, electric and instrumentation subsystems tests, performance and operating tests and inspections in accordance with the relevant standards of the industry and more particularly as detailed in individual sections of these specifications to satisfy the District that the items tested and inspected comply with the requirements of the contract documents.
 - b. Inspection of all items delivered at the site or to any authorized place of storage in order that the District may be satisfied that such items are of the specified quality and workmanship and are in good order and condition at the time of delivery. The Contractor shall be prepared to remove all coverings, containers or crates to permit the District to conduct his inspection. Should the District find, in his opinion, indication of damage or deficient quality of workmanship, the Contractor shall remedy such deficiencies and provide the necessary documentation or conduct such tests deemed necessary by the District to demonstrate compliance.
8. **Installed Tests and Inspections:** All equipment shall be tested by the Contractor to the satisfaction of the District before any facility is placed in operation. Tests shall be as specified herein and shall be made to determine whether the equipment has been properly assembled, aligned, adjusted and connected. Any changes, adjustments or replacements required to make the equipment operate as specified shall be carried out by the Contractor as part of the work.
9. **Procedures:** Prior to receipt of any progress payments in excess of 60% of the Contractor's lump sum bid for the work, the Contractor shall submit to the District, in quintuplicate,

details of the installed tests and inspection procedures he proposes to adopt for testing and start-up of all equipment to be operated singly and together, except when such procedures have been addressed in the Project Specifications. The procedures shall be divided into two distinct stages: preoperation checkout and operation testing. Testing procedures shall be designed to duplicate, as nearly as possible, all conditions of operation and shall be carefully selected to ensure that the equipment is not damaged. Once the testing procedures have been reviewed by the District, the Contractor shall produce checkout, alignment, adjustment and calibration signoff forms for each item of equipment to be used in the field by the Contractor and the District jointly to ensure that each item of electrical, mechanical, and instrumentation equipment has been properly installed and tested. The Contractor is advised that failure to observe these precautions may place the acceptability of the subject equipment in question.

10. Preoperation Checkout: The installed tests and inspection procedures shall incorporate all requirements of these specifications and shall proceed in a logical, step wise sequence to ensure that all equipment has been properly serviced, aligned, connected, calibrated and adjusted prior to operation.
11. Operational Testing: Once all affected equipment has been subjected to the required preoperational checkout procedures and the District has witnessed and has not found deficiencies in that portion of the work, individual systems may be started and operated under simulated operating conditions to determine as nearly as possible whether the equipment and systems meet the requirements of these specifications. Potable water shall be employed for the testing of all liquid systems except gaseous, oil or chemical systems unless specified otherwise. Test media for these systems shall either be the intended fluid or a compatible substitute. The equipment shall be operated a sufficient period of time to determine machine operating characteristics, including temperatures and vibration; to observe performance characteristics; and to permit initial adjustment of operating controls. When testing requires the availability of auxiliary systems such as electrical power, compressed air, control air, or instrumentation which have not yet been placed in service, the Contractor shall provide acceptable substitute sources, capable of meeting the requirements of the machine, device or system, at no additional cost to the District. Disposal methods for test media shall be subject to review and acceptance of the District.
12. Repeated Tests: If under test, any portion of the work should fail to fulfill the contract requirements and is adjusted, altered, renewed or replaced, together with all other portions of the work as are affected thereby, shall, if so required by the District, be repeated within reasonable time and in accordance with the specified conditions. The Contractor shall pay to the District all reasonable expenses incurred by the District as a result of repeating such tests.

Once simulated operation has been completed, all machines shall be rechecked for proper alignment, realigned, if necessary, and doweled in place. All equipment shall be checked for loose connections, unusual movement or other indications of improper operating characteristics. Any deficiencies shall be corrected to the satisfaction of the District. All machines or devices which exhibit unusual or unacceptable operating characteristics shall be disassembled and inspected. They shall then be repaired or removed from the site and replaced at no cost to the District.

13. Tolerances: Test results shall be within the tolerances set forth in the detailed specification sections of this contract document. If no tolerances have been specified, test results shall conform to tolerances established by recognized industry practice. Where, in the case of an otherwise satisfactory installed test, any doubt, dispute, or difference should arise between the District and the Contractor regarding the test results or the methods or equipment used in the performance of such test, then the District may order the test to be repeated. If the repeat test, using such modified methods or equipment as the District may require, substantially confirms the previous test, then all costs in connection with the repeat test will be paid by the District, otherwise the costs shall be borne by the Contractor. Where the results of any installed test fail to comply with the contract requirements for such test, then such remedial efforts and repeat tests as may be necessary to achieve the contract requirements shall be made by the Contractor at his expense.
14. Contractor Supplied Materials: Unless otherwise specified, the Contractor shall provide at no expense to the District, all power, fuel, compressed air supplies, labor and all other necessary items and work required to complete all tests and inspection specified herein. The Contractor shall provide, at no expense to the District, temporary heating, ventilating and air conditioning for any area requiring it in the case where permanent facilities are not complete and operable at the time of installed tests and inspections. Temporary facilities shall be maintained until permanent systems are in service.
15. Commissioning: After completion of the operation testing and certification by the District that the systems did meet all performance requirements, commissioning will begin. The commissioning period for each system or system components shall be seven days except where specified otherwise. The Contractor shall remove all temporary piping or bulkheads that may have been in use during the operational testing. The District's operations and maintenance personnel will be responsible for operation of the system or portion of the system being operated during this period of time. The system or portion thereof shall be fully operational, accepting all normal flow called for in design and performing all functions as designed. The Contractor and the equipment manufacturer's technical representative shall be available at all times during the commissioning period to provide immediate assistance in case of failure of any portion of the system being tested. At the end of the commissioning period and when all corrections required by the District to assure a reliable and completely operational facility are complete, the District shall issue a certificate of substantial completion. During the commissioning period, the District shall be responsible for all normal operational costs and the Contractor shall bear the costs of all necessary repairs or replacements, including labor and materials, required to keep the portion of the system being commissioned, operational.
16. Training: During the operational testing phase of equipment, the Contractor shall make available experienced factory trained representatives of the manufacturers of all the various pieces of equipment, to train the District's personnel in the operation and maintenance thereof. The time required for this training shall be as specified herein for the specific piece of equipment. The Contractor shall notify the District of the time of the training at least 14 days prior to the time of training. Additional requirements are specified in Section 01640,

SUPPLIER'S/MANUFACTURER'S SERVICES DURING CONSTRUCTION,
COMMISSIONING, AND TRAINING OF DISTRICT'S PERSONNEL.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Installation

Materials employed in the installation shall conform to the requirements of these contract documents and the recommendations of the equipment manufacturers.

B. Testing

1. Gages, Meters, Recorders, and Monitors: Gages, meters, recorders, and monitors shall be provided by the Contractor to supplement or augment the instrumentation system provided under this contract to properly demonstrate that all equipment fully satisfies the requirements of the contract documents. All devices employed for the purpose of measuring the performance of the facility's equipment and systems shall be specifically selected to be consistent with the variables to be monitored. All instruments shall be recently calibrated and the Contractor shall be prepared at all times to demonstrate, through recalibration, the accuracy of all instruments employed for testing purposes. Calibration procedures shall be in accordance with applicable standards of ASTM, ISA, and IEEE. The adequacy of all gages, meters, recorders and monitors shall be subject to review of the District.
2. Records: The Contractor shall provide signoff forms for all installed and operational testing to be accomplished under this contract. The signoff forms shall be produced in quadruplicate on pressure sensitive paper. Signoff forms shall be provided for each item of mechanical, electrical, and instrumentation equipment provided or installed under this contract and shall contain provisions for recording relevant performance data for original testing and not less than three retests. Separate sections shall be provided to record values for the preoperation checkout, initials of representatives of the equipment manufacturers, the Contractor, and the District.
3. Master File: The Contractor shall maintain a master file of all equipment signoff sheets, which shall be available for inspection by the District. Upon completion of testing, the Contractor shall furnish the District with the original and two copies of the signoff sheet for each equipment item.

PART 3 – EXECUTION

3.01 METHODS

A. Installation

All equipment and apparatus used in testing shall be installed by specialists properly skilled in the trades and professions required to assure first class workmanship. Where required by detailed specifications, the Contractor shall cause the installation of specific equipment testing items to be accomplished under the supervision of factory trained installation specialists furnished by the equipment manufacturers. The Contractor shall be prepared to document the skills and training of all workmen engaged in the installation of all testing equipment furnished either by the Contractor or the District.

B. Testing

Testing shall proceed on the step-by-step basis in accordance with the Contractor's written testing procedures. The Contractor's testing work shall be accomplished by a skilled team of specialists under the direction of a coordinator whose sole responsibility shall be the orderly, systematic testing of all equipment, systems, structures, and the complete facility as a unit. Each individual step in the procedures shall be witnessed by a representative of the District. During the system operational testing period, all equipment and systems in operation shall be operated to the greatest extent practicable, at conditions which represent the full range of operating parameters as defined by this contract document.

****END OF SECTION****

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 CLEANING OF SITE

The Contractor shall not allow the site of the work to become littered with trash and waste material but shall maintain the site in its normal neat and orderly condition throughout the construction period.

On or before the completion of the work including punch list acceptance by the District, the Contractor shall remove rubbish of all kinds from the jobsite and any of the grounds which he has occupied and leave them in first-class condition to the satisfaction of the District. Pavement shall be swept and/or flushed to remove any spilled soil or aggregate base material after placement of both temporary and final pavement. Pipes, drainage inlets, streets and sewers used by the Contractor or contaminated by his operations shall be cleaned thoroughly to the satisfaction of the District.

PART 2 - RECORD DRAWINGS

2.01 GENERAL

The Contractor shall maintain one set of record drawings at the site at all times as a true, complete and accurate record of the work. The drawings shall consist of one set of full-size prints of the contract drawings marked up to reflect all changes that have been made during the course of the work and other supplementary information. The record drawings shall be updated weekly and be available for inspection by the District at all times. Progress payments may be withheld if the drawings are not kept current as provided for in the Section 00700, GENERAL CONDITIONS.

Record drawings shall be stored during the contract period in the Contractor's field office apart from the documents used for construction in suitable files or racks. The record drawings shall be maintained in a clean, dry legible condition and in good order until delivered to the District at the completion of the work. Record drawings shall not be used for construction purposes.

The contract record drawings and supplementary information shall record all deviations in construction, especially pipe and conduit locations and deviations caused by change orders, field clarifications, requests for clarification and addenda. Revisions shall be indicated in a neat and legible manner. Each document shall be clearly labeled "RECORD DOCUMENT."

2.02 INFORMATION TO BE RETAINED ON THE RECORD DRAWINGS

As a minimum, the following kinds of information shall be entered on the record drawings:

- A. Locations of work buried under or outside each building, such as plumbing, piping, and electrical lines and conduits.
- B. Locations of all items, not necessarily concealed, which vary from the plans.
- C. Deviations from the sizes, locations and other features of installations shown in the plans.
- D. Locations of underground work, points of connection with existing utilities, changes in direction, valves, manholes, catch basins, capped stubouts, invert elevations, etc.

2.03 ADDITIONAL CONTRACT RECORD INFORMATION

In addition to the marked up set of plans, the Contractor shall also maintain a contract record file of additional drawings and information necessary for clarification. These include, but are not limited to:

- A. Field instructions (directives and field orders) issued by the District.
- B. Contract change orders.

****END OF SECTION****

SECTION 01730

OPERATING AND MAINTENANCE INFORMATION

PART 1 - GENERAL

1.01 SCOPE

Operating and maintenance information is required for all equipment unless specifically indicated or approved by the District. Operating and maintenance information shall consist of the names and addresses of the manufacturer, the nearest representative of the manufacturer, and the nearest supplier of the manufacturer's equipment and parts. In addition, one or more of the following items of information will be provided when specified:

- A. An itemized list of all data provided.
- B. Lubrication Information: This shall consist of the manufacturer's recommendations regarding the lubricants by brand name and type to be used and the lubrication schedule to be followed.
- C. Control Diagrams: Diagrams shall show internal and connection wiring.
- D. Start-Up Procedures: These instructions consist of equipment manufacturer's recommendations for installation, adjustment, calibration, and troubleshooting.
- E. Operating Procedures: These instructions consist of the equipment manufacturer's recommended step-by-step procedures for starting, operating, and stopping the equipment under specified modes of operation.
- F. Preventive Maintenance Procedures: These instructions consist of the equipment manufacturer's recommended steps and schedules for maintaining the equipment.
- G. Overhaul Instructions: These instructions consist of the manufacturer's directions for the disassembly, repair and reassembly of the equipment and any safety precautions that must be observed while performing the work.
- H. Parts List: This list consists of the generic title and identification number of each component part of the equipment.
- I. Spare Parts List: This list consists of the manufacturer's recommendations of number of parts which should be stored by the District and any special storage precautions which may be required.

- J. Exploded View: Exploded or cut views of equipment shall be provided if available as a standard item of the manufacturer's information. When exploded or cut views are not available, plan and section views shall be provided with detailed callouts.
- K. A copy of each warranty, bond and/or service contract issued together with instructions regarding the procedures to be followed in the event of equipment failure and a list of any circumstances that may affect the validity of the warranties, bonds or service contracts.
- L. Nameplate data for all equipment supplied, including make, model and serial numbers, type and motor data together with designation and location of equipment.
- M. Specific Information: Where items of information not included in the above list are required, they will be provided as described in the specification for the equipment.

1.02 **TRANSMITTAL PROCEDURE**

Six copies of the specified operating and maintenance information shall be provided in accordance with Section 01300, SUBMITTALS. For ease of identification, each manufacturer's brochure and manual shall be appropriately labeled with the equipment name and equipment number as it appears in the contract documents. The information shall be organized in the binders in numerical order by the equipment numbers assigned in the contract documents. The binders shall be provided with a table of contents and tab sheets to permit easy location of desired information. Binders shall be of the post type with durable covers.

If manufacturer's standard brochures and manuals are used to describe operating and maintenance procedures, such brochures and manuals shall be modified to reflect only the model or series of equipment used on this project. Extraneous material shall be crossed out neatly or otherwise annotated or eliminated.

1.03 **PAYMENT**

Acceptable operating and maintenance information shall be delivered to the District before the Contractor will be paid for more than 80% of the purchase value of that equipment. Purchase value shall be the net price for the equipment as given on the invoice. Acceptable operating and maintenance information for the project must be delivered to the District prior to the project being 75% complete. Progress payments for work in excess of 75% completion will not be made until the specified acceptable operating and maintenance information has been delivered to the District.

1.04 **FIELD CHANGES**

Following the acceptable installation and operation of an equipment item, the item's instructions and procedures shall be modified and supplemented by the Contractor to reflect any field changes or information requiring field data.

****END OF SECTION****

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**RANCHO MURIETA COMMUNITY SERVICES DISTRICT
WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
CHLORINE CONTACT BASIN EXPANSION – PHASE 1**

Division 2 – Site Work

Section 02100	Site Preparation
Section 02160	Excavation Support Systems
Section 02210	Excavation, Backfilling, and Compaction for Utilities
Section 02220	Excavation, Backfilling, and Compaction for Structures

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SECTION 02100

SITE PREPARATION

PART 1 - GENERAL

1.01 SCOPE

This section specifies site preparation which consists of clearing, grubbing, demolition, and disposal of materials.

1.02 REFERENCES

The publications referred to hereinafter form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

State of California, Department of Transportation (CALTRANS) Publications

CALTRANS *Standard Specifications, State of California Business and Transportation Agency, Department of Transportation, 2023.*

1. Caltrans Standard Specifications: Whenever this specification is referenced, the following is understood.
 - a. All references to statistical testing are deleted.
 - b. Whenever a discrepancy occurs between the Standard Specifications and this specification, it is understood that this specification governs.
 - c. All references to measurement and payment are deleted.

1.03 JOB CONDITIONS

A. Existing Conditions

Chemical storage tanks will be replaced at the Rancho Murieta Community Services District (District) Wastewater Treatment Facility (WWTF), adjacent to multiple treatment units and wastewater ponds. The Contractor shall determine the actual condition of the site as it affects this portion of work.

B. Photographs

Prior to disturbing any area of the project site, the Contractor shall take sufficient photographs and video footage of each area that will be disturbed during construction, documenting pre-construction conditions. The same views shall be re-photographed upon completion of construction activities on any section of the project, and submitted with Contractor's application for payment for work on the section. Pre-construction photography shall document the pre-construction condition of existing landscaped areas, trees and plants, fences, pavement, sidewalks, drives, and in general, any area that will be disturbed before commencing work. Photographs shall be prepared and submitted to the District. A copy of each videotape shall be provided to the District, along with a log describing the address, date, and viewing orientation of each tape segment. Acceptable photographs and videotapes shall be submitted prior to disturbing any area of the project.

C. Protection

Site preparation shall not damage structures, landscaping or vegetation adjacent to the site. The Contractor shall repair, or replace any damaged property. To the maximum extent practicable, dust generated during construction activities shall be minimized as specified in Section 10 of the Standard Specifications. Submit a dust control plan to the District for approval in accordance with Section 01300, SUBMITTALS. The dust control plan shall meet the requirements of APCD Rules 8011-8081 to limit visible dust emissions to 20% opacity or less.

During the performance of the Work required by these Specifications or any operations appurtenant thereto, whether on right-of-way provided by the District or elsewhere, furnish all labor, equipment, materials, and means required, and carry out proper and efficient measures wherever and as often as necessary to reduce the dust nuisance, and to prevent dust or dirt which has originated from construction operations from damaging landscaping, existing streets, cultivated fields, vineyards, and dwellings, or causing a nuisance to persons. Water sprinkling shall not be used for dust control when it creates mud or flooding within the WWTF. Paved areas adjacent to open cut excavation work shall be cleaned at the end of each work shift and as necessary throughout the work day to control dust. The Contractor will be held liable for any damage resulting from dust originating from his operations under these specifications on District right-of-way or elsewhere.

The cost of sprinkling, street cleaning, or of other methods of controlling dust shall be included in the prices bid in the schedule for the other items of work. Water used for dust control shall be potable water.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 GENERAL

The Contractor shall notify the District when site preparation is complete. Further work shall not be started until the conditions defined herein are satisfied.

3.02 PERFORMANCE

A. Clearing and Grubbing

Unless otherwise specified, the Contractor shall remove obstructions such as brush, trees, logs, stumps, roots, heavy sod, vegetation, rock, stones larger than 6 inches in any dimension, broken or old concrete and pavement, debris, piping and structures where the completion of the work require their removal except those trees indicated on the plans to be left intact. In general, the depth of stripping shall be 4-6 in. over the majority of the site except where noted. Material that is removed and is not to be incorporated in the work shall be disposed of off the site.

B. Leveling/Smoothing

After grubbing operations are completed, the clearing and grubbing area shall be leveled/smoothed so that the surface is left without obvious holes (from tree and root removals), ridges or mounds. The project area after the leveling/smoothing operations are completed shall not have any exposed objectionable or deleterious materials and the surface slopes shall not have mounds or depressions in excess of 1 ft when measured with a 20 ft long straight edge.

C. Demolition and Removal

1. Pavement: When portions of asphalt pavements and concrete pads are to be removed and later construction is to be connected, edges shall be sawcut, on a neat line at right angles to the curb face.
2. Salvage: District has the right to salvage any items scheduled for removal. The Contractor shall notify District four weeks prior to any salvage or demolition work to determine the disposition of items to be removed. District will mark items to be salvaged. Such items shall be properly disconnected, removed from their foundations, cleaned, and stored at a location on the site as indicated by the District.

D. Protection

The Contractor shall provide protection devices, including barricades, fencing, warning signs, lights and other items necessary to ensure the security of, and safety within, the project site during this phase of the work.

E. Cleanup

Remove and transport debris, rubbish, and excess material from the site in a manner that will prevent spillage on streets or adjacent areas. Clean up spillage from streets and adjacent areas. Comply with Federal, State, and local hauling disposal regulations. Cleanup shall be an ongoing activity throughout the contract period.

F. Disposal of Materials

All materials removed from clearing and grubbing including trees and roots shall become the property of the Contractor unless designated by the District and shall be removed from the project site. Contractor shall make his own arrangements for disposing of materials outside the project site and he shall pay all costs involved. Arrangements shall include, but not be limited to, entering into agreements with property owners and obtaining necessary permits, licenses and environmental clearances.

****END OF SECTION****

SECTION 02160

EXCAVATION SUPPORT SYSTEMS

PART 1 - GENERAL

1.01 SCOPE

Construction of portions of the project will require the design and installation of adequate shoring by the Contractor. This section specifies requirements for sheeting, shoring, and bracing of trenches and excavations greater than 5 ft in depth.

1.02 QUALITY ASSURANCE

A. References

The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

CAL OSHA

*State of California Construction Safety Orders
California State Labor Code*

B. Design Requirements

The Contractor shall design sheeting, shoring, and bracing in accordance with Article 6 of CAL OSHA and the California State Labor Code. The standards of design referred to in the Labor Code shall be those of CAL OSHA. The shoring procedure designed by the Contractor shall be suitable for the site subsurface conditions and project operational constraints. Shoring, bracing, and underpinning systems shall be designed by a professional engineer registered in the State of California. Shoring shall be designed to resist earth pressures exerted by the retained soil plus any applicable surcharge loading, such as construction equipment and stockpiles.

Horizontal strutting below the barrel of a pipe and the use of pipe as a support are not acceptable.

1.03 SUBMITTALS

The Contractor shall submit to the District information required by Section 6705 of the California State Labor Code including specific soil parameters assumed in shoring design and anticipated deflections. The Contractor shall also submit information in accordance with Section 01300, SUBMITTALS to substantiate compliance with this specification.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

3.01 GENERAL

The construction of sheeting, shoring, and bracing shall not disturb the state of soil adjacent to the trench and below the excavation bottom.

3.02 SEQUENCE

Trench excavation shall not be started until the design for trench support has been accepted by the District. Shoring shall be removed as excavations are backfilled.

****END OF SECTION****

SECTION 02210

EXCAVATION, BACKFILLING, AND COMPACTION FOR UTILITIES

PART 1 - GENERAL

1.01 **SCOPE**

This section includes requirements for excavating, preparation of pipe-laying surface, pipe bedding, backfilling and compaction for all the exterior underground piping systems furnished and installed under this contract.

1.02 **QUALITY ASSURANCE**

A. **References**

The publications referred to hereinafter form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

American Society for Testing and Materials (ASTM) Publications

ASTM D1556	<i>Density of Soil in Place by the Sand-Cone Method</i>
ASTM D1557	<i>Moisture Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb. (4.54-kg) Rammer and 18 Inch (457-mm) Drop</i>
ASTM D2487	<i>Classification of Soils for Engineering Purposes</i>
ASTM D2922	<i>Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)</i>
ASTM D3017	<i>Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)</i>
ASTM D4253	<i>Maximum Index Density of Soils Using Vibratory Table</i>

State of California, Department of Transportation (CALTRANS) Publications

CALTRANS	<i>Manual of Traffic Control</i>
CALTRANS	<i>Standard Specifications, State of California Business and Transportation Agency, Department of Transportation, 2023.</i>

1. Caltrans Standard Specifications: Whenever this specification is referenced, the following is understood.
 - a. All references to statistical testing are deleted.
 - b. Whenever a discrepancy occurs between the Standard Specifications and this specification, it is understood that this specification governs.
 - c. All references to measurement and payment are deleted.

B. Tests

The District will take samples and perform moisture content, compaction, and density tests during placement of backfill materials to check compliance with these specifications. The Contractor shall remove surface material at locations designated by the District and provide such assistance as necessary for sampling and testing. The District may direct the Contractor to construct inspection trenches in compacted or consolidated backfill to determine that the Contractor has complied with these specifications.

Tests will be made by the District in accordance with the following:

Moisture content	ASTM D3017
Density in-place	ASTM D1556 or ASTM D2922
Moisture-density relationships	ASTM D1557

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification for materials.

If tests conducted by the Contractor or the District indicate that the material does not meet specification requirements, material placement will be terminated until corrective measures are taken. Material which does not conform to the specification requirements and is placed in the work shall be removed and replaced at the Contractor's sole expense. Sampling and testing performed by the Contractor shall be done at the Contractor's sole expense.

1.04 DEFINITIONS

A. Backfill

Material used in refilling a trench or other excavation above the pipe or utility.

B. Compaction

The process of mechanically stabilizing a material by increasing its density at a controlled moisture condition. "Degree of Compaction" is expressed as a percentage of the maximum

density obtained by the test procedure described in ASTM D1557 for general soil types abbreviated in this specification as "90% ASTM D1557 maximum density".

C. Granular Pipe Bedding

A dense, well-graded aggregate mixture of sand, gravel, or crushed stone (mixed individually, in combination with each other, or with on-site soil) placed on a subgrade to provide a suitable foundation for pipe. Granular bedding material may also consist of poorly graded sands or gravels where fast draining soil characteristics are desired.

D. Unyielding Material

Rock, rib, ridge, rock protrusion, or solid with cobbles in the trench bottom requiring a covering of finer grain material or special bedding to avoid bridging in the pipe or conduit.

E. Unstable Material

Material in the trench bottom which lacks firmness (for cohesive soils) or denseness (for non-cohesive soils) to maintain alignment and prevent joints from separating in the pipe, conduit, or appurtenant structure during backfilling. This may be material otherwise identified as satisfactory which has been disturbed or saturated.

F. Lift

A layer or course of soil placed on top of unprepared subgrade or a previously prepared or placed 8 in loose soil in a fill or backfill.

G. Rock

Rock is defined as any material which cannot be excavated with a track mounted 235 Caterpillar backhoe with a narrow bucket, and teeth, and requires the use of special buckets, rock teeth, jack-hammering, blasting and/or other special methods of excavation.

H. Unsatisfactory Material

Soil or other material identified as having insufficient strength or stability to carry intended loads on trench backfills without excessive consolidation or loss of stability. Also backfill material which contains refuse, frozen material, large rocks, debris and other deleterious material which could damage the pipe or cause the backfill not to compact or is deemed hazardous. As a minimum, materials classified as PT, OH, or OL by ASTM D2487 are unsatisfactory.

I. Intermediate Backfill

Backfill from the pipe springline to 12 in. above the pipe or utility.

J. Crushed Rock

Manufactured crushed stone with at least 3 angular faces.

K. Bedding

Material used in refilling the trench from the trench bottom to the pipe springline.

L. Rock Ballast

Crushed stone or gravel, durable and free from slaking or decomposition under action of alternate wetting or drying.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Bedding Material

Bedding material shall be a select granular material free from organic matter and of such size and gradation that the specified compaction can be readily attained. As a minimum, materials shall have a sand equivalent value of not less than 20 and shall conform to the following gradation:

<u>U.S. standard sieve size</u>	<u>Percent by weight passing</u>
3/4 inch	100
No. 4	35-100
No. 30	20-100
No. 40	20-100

The coefficient of uniformity shall be 3 or greater. The material may be clean natural sand or gravel, select trench excavation or a mixture thereof. Material shall not pass a No. 200 sieve.

B. Intermediate Backfill

Intermediate backfill shall conform to specifications for bedding material for this contract.

C. Backfill Material

Backfill material shall be unclassified material which is free from peat, wood, roots, bark, debris, garbage, rubbish or other deleterious material. The maximum size of stone shall not exceed 3 in. Backfill material shall be non-expansive in nature with a plasticity index less than 8, a liquid limit less than 30, and an organic content less than 3.5 percent. If the material excavated from the site meets these requirements, it may be classified as backfill material.

D. Crushed Rock

Crushed rock shall conform to the following gradation:

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
1 1/2 in.	87 - 100 %
3/4 in.	45 - 90
No. 4	20 - 50
No. 30	6 - 29
No. 200	0 - 12

Crushed rock material shall be composed of hard, durable, sound pieces having a specific gravity of not less than 2.60.

E. Drain Rock

Natural gravel, crushed gravel, or crushed rock, free from dirt, clay balls, roots, and organic material and conforming to Section 68 of the *Standard Specifications*, Class 2 and the following washed sieve gradation as determined by ASTM C117 and ASTM C136.

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
1 in.	100 %
3/4 in.	90 - 100
3/8 in.	40 - 100
No. 4	25 - 40
No. 8	18 - 33
No. 30	5 - 15
No. 50	0 - 7
No. 200	0 - 3

F. Buried Warning and Identification Tape

Polyethylene plastic and metallic core or metallic-faced, acid-and alkali-resistant, polyethylene plastic warning tape shall be manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 in. minimum width, color coded for the intended utility with a warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing is to be permanent, unaffected by moisture or soil.

1. Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements indicated above. Minimum thickness of the tape shall be 0.003 in. Tape shall have a minimum strength of 1,500 psi lengthwise and 1,250 psi crosswise with a maximum 350% elongation.

2. Detectable Warning Tape for Non-Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements indicated above. Minimum thickness of the tape shall be 0.004 in. Tape shall have a minimum strength of 1,500 psi lengthwise and 1,250 psi crosswise. The tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when the tape is buried up to 3 ft deep. Encase the metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

PART 3 - EXECUTION

3.01 GENERAL

A. Control of Water

The Contractor shall keep excavations free from water during construction. The static water level shall be drawn down a minimum of 3 ft below the bottom of excavations to maintain the undisturbed state of natural soils and allow the placement of any stable fill to the specified density. Disposal of water shall not damage property or create a public nuisance. The Contractor shall have on hand pumping equipment and machinery in good working condition for emergencies and shall have workers available for its operation. Dewatering systems shall operate continuously until backfill has been completed to 1 ft above the normal static groundwater level. The location of the Contractor's dewatering discharge shall be approved by the District.

Groundwater shall be controlled to prevent softening of the bottom of excavations, or formation of "quick" conditions. Dewatering systems shall not remove natural soils.

Release of groundwater to its static level shall be controlled to prevent disturbance of the natural foundation soils or compacted fill and to prevent flotation or movement of structures of pipelines.

B. Overexcavation

Except where specified for excavations 10 ft or deeper, when the undisturbed condition of natural soils is inadequate for support of the planned construction, the District will direct the Contractor to overexcavate to adequate supporting soils. The excavated space shall be filled to the specified elevation with drain rock. The quantity and placement of such material will be paid for as follows:

1. Overexcavation and refilling up to 12 in. below the specified trench bottom elevation shall be solely the Contractor's responsibility and expense.
2. Overexcavation and refilling in excess of 12 in. below the specified trench bottom elevation will be considered extra work.

Overexcavation for trenches 10 ft or deeper is specified as follows:

1. Overexcavate 12 in. below the design elevation and construct a rock ballast base foundation. The rock ballast should be wrapped in filter fabric (Mirafi 140N or equivalent) placed below the subgrade.
2. The filter fabric shall cover the entire width of the excavation and its seams shall be fixed to the excavation walls before placement of the rock ballast material. Once the rock ballast is placed, the filter fabric seams shall be detached from the walls of the excavation and wrapped around the rock ballast, with an overlap of 1 ft. Filter fabric for consecutive sections of rock ballast placed longitudinally along the excavation shall also overlap a minimum of 1 ft.

C. **Trenching**

Make trench sides as nearly vertical as practicable except where sloping of sides is allowed by the District. When allowed, sides of trenches shall not be sloped between the bottom of the trench and the elevation of the top of the pipe. Grade bottom of trenches accurately to provide uniform bearing and support for each section of pipe or conduits on undisturbed soil, or bedding material as indicated or specified at every point along its entire length except for portions where it is necessary to excavate for bell holes and for making proper joints. Dig bell holes and depressions for joints after bedding has been graded and compacted. Dimension of bell holes shall be as required for properly making the particular type of joint to ensure that the bell does not bear on the bottom of the excavation. Trench dimensions shall be as indicated.

D. **Shoring and Sheeting**

Shore and sheet excavations over 5 ft in depth in accordance with Section 02160, EXCAVATION SUPPORT SYSTEMS.

E. **Location of Excavated Materials**

During trench excavation, place the excavated material only within the approved working area. Do not obstruct any roadways, streets, driveways, or WWTF operations unless specified otherwise by the District. Conform to all Federal, State, and local codes governing the safe loading of all trenches with excavated material including air and water quality regulations established by the San Joaquin Valley Air Pollution Control District and the State Water Resources Control Board Central Valley Region.

F. **Maintenance of Roadways**

All earthwork operations shall be performed in a manner which does not disrupt the continuous flow of traffic within the WWTF. Surface slopes caused by earthwork operations shall not create mounds or depressions in excess of 1 ft when measured with a 20 ft long straight edge.

G. Finish Grading

Finished surfaces shall be smooth, compacted and free from irregularities. The degree of finish shall be that normally obtainable with a blade-grader.

Finished grade shall be as specified by the contours plus or minus 0.10 ft except where a local change in elevation is required to match sidewalks, curbs, manholes and catch basins, or to ensure proper drainage.

3.02 BEDDING

Bedding shall be of the materials and depths as indicated per Paragraph 2.01A, Bedding Materials. Place bedding in 6 in. maximum loose lifts and compact per Paragraph 3.05, Compaction. Provide uniform and continuous support for each section of utility except at bell holes or depressions necessary for making proper joints. When groundwater is encountered, well graded crushed rock shall be used for pipe bedding and backfill.

3.03 BURIED WARNING AND IDENTIFICATION TAPE

Install tape above all buried pipes and conduits in accordance with manufacturer's recommendations except as modified herein. Bury tape 12 in. below finished grade; under pavements and slabs, bury tape 6 in. below top of subgrade.

3.04 BACKFILLING

Backfill materials shall be approved by the District. Construct backfill as indicated and specified in this section. Place backfill in 8 in. maximum loose lifts unless otherwise specified. Bring up evenly on each side and along the full length of the pipe. Ensure that no damage is done to structures or their protective coatings. Compact each loose lift as specified below before placing the next lift. Do not backfill in freezing weather or where the material in the trench is already frozen or is muddy, except as authorized. Where settlements greater than the tolerance allowed herein for grading occur in trenches and pits due to improper compaction, excavate to the depth necessary to rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation. Coordinate backfilling with testing of utilities. Provide buried warning and identification tape installed in accordance with the manufacturer's recommendations.

3.05 COMPACTION

A. General

Compact each layer of lift of material specified so that the in-place density tested is not less than the percentage of maximum density identified herein. Use hand-operated, plate-type, vibratory, or other suitable hand tampers in areas not accessible to larger rollers or compactors. Avoid damaging pipes and protective pipe coatings. Compaction of materials by ponding and jetting is prohibited unless specifically pre-approved by the District.

B. Compaction of Pipe and Conduit Bedding and Intermediate Backfill

Except as noted otherwise on the plans compact to 95% of ASTM D1557 maximum density.

C. Compaction of Backfill

Except as noted otherwise on the plans compact backfill material to 95% of ASTM D1557 maximum density.

D. Pipelines and Conduits In Paved Areas

Compact the upper 2.5 ft of pavement section or 6 in. of trench backfill, whichever is greater, to 95% of ASTM D1557 maximum density.

3.06 SPECIAL EARTHWORK BACKFILL INSTALLATION REQUIREMENTS

A. Manholes and Other Appurtenances

Provide at least 12 in. clear from outer surfaces to the embankment or shoring. Excavation shall be in accordance with Section 02220, EXCAVATION, BACKFILLING, AND COMPACTION FOR STRUCTURES. When directed, remove unstable soil that is incapable of supporting the structure to an overdepth of a minimum of 1 ft and refill with rock ballast to the proper elevation at the District's direction.

B. Paved Areas

Place backfill in 8 in. maximum loose lifts. Compact all backfill to 95% of ASTM D1557 maximum density. Backfill to permit the rolling and compacting of the completed excavation with the adjoining material, providing the specified density necessary to enable paving of the area immediately after backfilling has been completed.

C. Obstructions

Remove all obstructions encountered within the trench area or adjacent thereto. The District may, if requested by the Contractor, make minor changes in trench alignment to avoid major obstructions, provided such alignment changes can be made without adversely affecting the intended function of the facility. The Contractor shall pay any additional costs resulting from such minor alignment changes.

D. Pavement, Curb, and Sidewalk Removal

Cut all bituminous and concrete pavements, regardless of the thickness, and all curbs and sidewalks, prior to excavation of the trenches with an approved pavement saw. Hydrohammers will be prohibited. Pavement shall be sawed completely through on neat lines parallel and equidistant from the trench centerline and a minimum of 6 in. wider on each side of the actual trench width. Pavement and concrete materials removed shall be hauled from the site and not used for trench backfill.

E. Open Trench

The Contractor shall not leave trenches open during hours when the Contractor is not actively working. All trenches shall be backfilled at the end of the day or up to 200 ft may be left shored and plated.

3.07 FIELD SAMPLING AND TESTING (DISTRICT)

Test bedding and backfill for moisture-density relations in accordance with ASTM D1557 and D4253 as specified herein. Perform at least one of each of the required tests for each material used sufficiently in advance of construction so as not to delay work. Provide additional tests as specified above for each change of source. Perform density and moisture tests in randomly selected locations and in accordance with ASTM D1556, ASTM D2992, and ASTM D3017 as follows:

A. Bedding and Backfill in Trenches

At least one test per 300 lf in each 8 in - 12 in lift.

B. Appurtenance Structures

One test per 100 ft² for fraction thereof in each lift. A minimum of one test shall be performed per structure.

Where ASTM D2922 and ASTM D3017 are used to test field compaction densities, verify the result of the tests by performing at least one test per day using ASTM D1556 at a location already tested in accordance with ASTM D2922. Perform at least one additional test using ASTM D1556 for every ten tests performed with a nuclear device, also at locations checked in accordance with ASTM D2922.

****END OF SECTION****

SECTION 02220

EXCAVATION, BACKFILLING, AND COMPACTION FOR STRUCTURES

PART 1 - GENERAL

1.01 **SCOPE**

This section includes requirements for excavation, foundation subgrade preparation, structural foundation earthwork material placement, backfilling, and compaction for all structures constructed under this contract.

1.02 **QUALITY ASSURANCE**

A. **References**

The publications referred to hereinafter form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

American Society for Testing and Materials (ASTM) Publications

ASTM C117	<i>Material Finer Than 75-Micrometer (No. 200) Sieve in Mineral Aggregates by Washing</i>
ASTM C136	<i>Sieve Analysis of Fine and Coarse Aggregates</i>
ASTM D75	<i>Practices for Sampling Aggregates</i>
ASTM D1556	<i>Density of Soil in Place by the Sand-Cone Method</i>
ASTM D1557	<i>Moisture Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb. (4.54-kg) Rammer and 18-in. (457-mm) Drop</i>
ASTM D2487	<i>Classification of Soils for Engineering Purposes</i>
ASTM D2922	<i>Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)</i>
ASTM D3017	<i>Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)</i>
ASTM D4318	<i>Liquid Limit, Plastic Limit, and Plasticity Index of Soils</i>

State of California, Department of Transportation (CALTRANS) Publications

CALTRANS

*Standard Specifications, State of California Business and
Transportation Agency, Department of Transportation, 2023.*

1. Caltrans Standard Specifications: Whenever this specification is referenced, the following is understood.
 - a. All references to statistical testing are deleted.
 - b. Whenever a discrepancy occurs between the Standard Specifications and this specification, it is understood that this specification governs.
 - c. All references to measurement and payment are deleted.

B. Tests

The District will take samples and perform moisture content, gradation, compaction, and density tests during placement of backfill materials to check compliance with these specifications. The Contractor shall remove surface material at locations designated by the District and provide such assistance as necessary for sampling and testing. The District may direct the Contractor to construct inspection trenches in compacted or consolidated backfill to determine that the Contractor has complied with these specifications.

Tests will be made by the District in accordance with the following:

<u>Test</u>	<u>Standard Procedure</u>
Moisture content	ASTM D3017
Density in-place	ASTM D1556 or ASTM D2922
Moisture-density relationships	ASTM D1557
Gradation	ASTM C136
Plasticity	ASTM D4318
Organic content	ASTM D1557

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted.

- A. Dewatering discharge location.
- B. Test results, certifications, and source for all earthwork materials (engineered fill, drain rock, crushed rock, sand).
- C. All imported materials specified in this section are subject to the following requirements:

All tests necessary for the Contractor to locate an acceptable source of imported material shall be made by the Contractor. Certification that the material conforms to the specification requirements along with copies of the test results from a qualified commercial testing laboratory shall be submitted to the District for approval at least 30 days before the material is required for use. All material samples shall be furnished by the Contractor at the Contractor's sole expense. Samples shall be representative and be clearly marked to show the source of the material and the intended use on the project. Sampling of the material source shall be done by the Contractor in accordance with ASTM D75. Notify the District at least 24 hours prior to sampling. The District may, at his option, observe the sampling procedures. Tentative acceptance of the material source shall be based on an inspection of the source by the District and/or the certified test results submitted by the Contractor to the District at the District's discretion. No imported materials shall be delivered to the site until the proposed source and materials tests have been tentatively accepted in writing by the District. Final acceptance will be based on tests made on samples of material taken from the completed and compacted course. All testing for final acceptance shall be performed by the District.

Gradation tests by the Contractor shall be made on samples taken at the place of production prior to shipment. Samples of the finished product for gradation testing shall be taken from each 1,500 tons of prepared materials or more often as determined by the District, if variation in gradation is occurring, or if the material appears to depart from the specifications. Test results shall be forwarded to the District within 48 hours after sampling.

If tests conducted by the Contractor or the District indicate that the material does not meet specification requirements, material placement will be terminated until corrective measures are taken. Material which does not conform to the specification requirements and is placed in the work shall be removed and replaced at the Contractor's sole expense. Sampling and testing performed by the Contractor shall be done at the Contractor's sole expense.

1.04 **DEFINITIONS**

A. **Structure Backfill**

Material used in refilling a cut or other excavation (i.e., material used to refill space between excavation and foundation/below grade walls).

B. **Compaction**

The process of mechanically stabilizing a material by increasing its density at a controlled moisture condition. "Degree of Compaction" is expressed as a percentage of the maximum density obtained by the test procedure described in ASTM D1557 for general soil types abbreviated in this specification for example, as "90% ASTM D1557 maximum density."

C. **Excavation**

The removal of soil or rock to obtain a specified depth or elevation.

D. Fill

Specified material placed at a specified degree of compaction to obtain an indicated grade or elevation.

E. Lift

Layer (or course) of soil placed on top of a previously prepared or placed soil or subgrade.

F. Rock

Rock is defined as any material which cannot be excavated with a track mounted 235 Caterpillar backhoe with a narrow bucket, and teeth, and requires the use of special buckets, rock teeth, jack-hammering, blasting and/or other special methods of excavation.

G. Subgrade

The bottom layer of material (sometimes in-situ soil or rock) graded or otherwise prepared for supporting the addition of base material, fill material, or structural foundations.

H. Unsatisfactory Material

Existing, in-place soil or other material which can be identified as having insufficient strength characteristics or stability to carry intended loads without excessive consolidation or loss of stability. As a minimum, materials classified as PT, OH, or OL by ASTM D2487 are unsatisfactory.

I. Optimum Moisture Content

Optimum moisture content shall be determined in accordance with ASTM D1557. Field moisture content shall be determined on the basis of the fraction of material passing the 3/4 in. sieve.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Sand

Natural sand or sand produced from crushed gravel or crushed rock, maximum size 1/4 in., 95% shall pass a No. 4 sieve, free from clay and organic material, with a maximum of 8% passing the No. 200 sieve.

B. Drain Rock

Natural gravel, crushed gravel, or crushed rock, free from dirt, clay balls, roots, and organic material and conforming to Section 68 of the *Standard Specifications*, Class 2 and the following washed sieve gradation as determined by ASTM C117 and ASTM C136.

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
1 in.	100 %
3/4 in.	90 - 100
3/8 in.	40 - 100
No. 4	25 - 40
No. 8	18 - 33
No. 30	5 - 15
No. 50	0 - 7
No. 200	0 - 3

C. Engineered Fill

Select excavated native, import or borrow material free from roots, organic matter, trash, debris, rocks larger than 3 in., and other deleterious materials and meeting the following minimum requirements:

Plasticity index:	≤ 15%
Percent passing No. 4 sieve:	35-100%
Percent passing No. 30 sieve:	20-100%
Percent passing No. 200 sieve:	10-45%
Organic content (by weight):	2%
R-value (minimum)	19

D. Crushed Rock

Crushed rock shall conform to the following gradation:

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
1 1/2 in.	87 - 100 %
3/4 in.	45 - 90
No. 4	20 - 50
No. 30	6 - 29
No. 200	0 - 12

Crushed rock material shall be composed of hard, durable, sound pieces having a specific gravity of not less than 2.60. Crushed rock shall be provided in hardscape areas and below structures as indicated.

PART 3 - EXECUTION

3.01 GENERAL

A. Control of Water

The Contractor shall keep excavations free from water during construction. The static water level shall be drawn down a minimum of 3 ft below the bottom of excavations to maintain the undisturbed state of natural soils and allow the placement of any fill to the specified density. Disposal of water shall not damage property or create a public nuisance. The Contractor shall have on hand pumping equipment and machinery in good working condition for emergencies and shall have workers available for its operation. Dewatering systems shall operate continuously until backfill has been completed to 1 ft above the normal static groundwater level.

Groundwater shall be controlled to prevent softening of the bottom of excavations, or formation of "quick" conditions. Dewatering systems shall not remove natural soils.

Release of groundwater to its static level shall be controlled to prevent disturbance of the natural foundation soils or compacted fill and to prevent flotation or movement of structures or pipelines.

B. Shoring and Sheet piling

Shore and sheet excavations over 5 ft in depth in accordance with Section 02160, EXCAVATION SUPPORT SYSTEMS.

C. Surplus Material

Unless otherwise specified, surplus excavated material shall remain the property of the District and shall be disposed of on-site by the Contractor as directed by the District.

The Contractor shall satisfy himself that there is sufficient material available for the completion of the work before disposing of any material inside or outside the site. Shortage of material, caused by premature disposal of any material by the Contractor, shall be replaced by the Contractor at his expense.

Material shall not be stockpiled to a depth greater than 5 ft above finished grade within 25 ft of any excavation or structure. Stockpile location shall be approved by the District.

The Contractor shall maintain stability of the soil adjacent to any excavation.

D. Borrow Material

If the quantity of acceptable material from excavation is not sufficient to construct the structure backfill required by the work, the quantity of material needed to complete the

structure backfill shall consist of borrow material from designated areas or imported material conforming to specified requirements found in Paragraph 2.01C, Engineered Fill.

E. Hauling

When hauling is done over highways or city streets, the loads shall be trimmed and the vehicle shelf areas shall be cleaned after each loading. The loads shall be watered after trimming to eliminate dust.

F. Maintenance of Roadways

All earthwork operations shall be performed in a manner which does not disrupt the continuous flow of traffic within the WWTF. Surface slopes caused by earthwork operations shall not create mounds or depressions in excess of 1 ft when measured with a 20 ft long straight edge.

3.02 EXCAVATION

A. General

The bottom excavation elevation shall be sufficient to allow the proper placing of forms and concrete construction to the elevations indicated, as specified herein. Slopes shall vary no more than 0.5 ft from specified grade. Prior to placing structural foundation fill, the top 12 inches of the subgrade shall be scarified and recompact in accordance with Paragraph 3.04, Compaction.

Unless otherwise specified, excavations shall extend a sufficient distance from walls and footings to allow for placing and removal of forms, installation of services, and for inspection, except where concrete is specified to be placed directly against excavated surfaces.

B. Overexcavation

Overexcavation is required under structures as shown. Overexcavation shall extend 1 ft below foundations and slabs unless directed otherwise by the District. Overexcavation activities shall maintain a minimum of 2 ft separation from any existing adjacent structures. The Contractor shall supply shoring as required to protect existing structures and utilities. The base of the overexcavation shall be inspected by the District, prior to any backfilling operation. Where the existing soil at the base of the overexcavation is determined to be inadequate, the District will direct the Contractor to accomplish additional overexcavation until adequate soil is encountered. The additional overexcavation and related fill material will be paid for as extra work.

The soil removed from the overexcavation shall be reworked as engineered fill and placed and compacted back into the excavation as structural foundation fill. In general, the Contractor shall place and compact the structural foundation fill into the excavated space at his expense to the grades and elevations specified. Placement and compaction of the

structural foundation fill shall be in accordance with the procedures specified in these specifications for structural foundation fill. Only the structural foundation fill associated with the additional overexcavation directed by the District will be paid for as extra work.

C. **Foundation Inspection**

Whenever any structure excavation is substantially completed to grade, the Contractor shall notify the District who will inspect the foundation for uniformity and suitability as a structure foundation. No concrete or masonry shall be placed until the foundation has been inspected by the District. The Contractor shall, if directed by the District, dig test pits and make test borings and foundation bearing tests. If the material tested complies with the specifications, the cost thereof will be paid for as extra work. If the material tested does not comply with the specifications, the cost thereof (initial testing, remedial work, re-testing) will be borne by the Contractor.

3.03 **BACKFILLING AND FILLING**

A. **Structural Backfill**

Unless otherwise specified, structure backfill shall be engineered fill.

After completion of construction below the elevation of the final grade, and prior to backfilling, forms shall be removed and the excavation shall be cleaned of debris.

Structure backfill shall not be placed until the subgrade portions of the structure have been inspected by the District. No backfill material shall be deposited against concrete structures until the concrete has developed the specified 28 day design strength or until the concrete has been in place for 14 days, whichever occurs last. In addition, no backfill material shall be deposited against a hydraulic structure until all hydraulic leak tests are complete. Backfill material shall be placed in uniform layers (8 in. thick) and shall be brought up uniformly on all sides of the structure.

B. **Structural Foundation Fill**

Where fill materials form the foundation for a structure, materials shall be engineered fill unless otherwise specified on the plans or herein.

Materials shall be placed loose in 8-inch maximum lifts and compacted as specified herein.

3.04 **COMPACTION**

A. **General**

Compact each layer or lift of material specified so that the in-place density tested is not less than the percentage of maximum density identified herein. Compaction shall be accomplished by mechanical equipment such as tamping rollers, sheepsfoot rollers, pneumatic tire rollers, vibrating rollers, or other mechanized tampers suitable for the work.

Compaction of materials by ponding and jetting is prohibited unless specifically pre-approved by the District. Compaction equipment and procedures are subject to approval by the District.

B. Structure Subgrade

Subgrade for structures shall have a density of 95% of ASTM D1557, Method D, maximum density to a depth of 12 in.; if the existing subgrade natural density is less than 95% of ASTM D1557, Method D, maximum density, it shall be compacted to that value at the Contractor's expense.

C. Structural Foundation Fill and Backfill

Structural foundation fill and backfill materials shall be compacted to 95% of ASTM D1557, Method D, maximum density.

END OF SECTION

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**RANCHO MURIETA COMMUNITY SERVICES DISTRICT
WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
CHLORINE CONTACT BASIN EXPANSION – PHASE 1**

Division 3 – Concrete

Section 03055	Adhesive Bonding Reinforcing Bars and All Thread Rods in Concrete
Section 03100	Concrete Formwork
Section 03200	Concrete Reinforcement
Section 03300	Cast-in-Place Concrete
Section 03600	Grout

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SECTION 03055

**ADHESIVE BONDING REINFORCING BARS AND
ALL THREAD RODS IN CONCRETE**

PART 1 - GENERAL

1.01 SCOPE

This section covers bonding reinforcing bars and all thread rods in concrete using epoxy adhesive.

1.02 QUALITY ASSURANCE

A. References

The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

International Code Council – Evaluation Service, Inc. (ICC-ES):

AC308 *Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements*

American Society for Testing and Materials (ASTM) International:

ASTM C881 *Standard Specification for Epoxy Resin Base Bonding System for Concrete*

Society for Protective Coatings (SSPC):

SP-1 *Surface Preparation Standards – Solvent Cleaning*

B. Definitions

Evaluations Report: Report prepared by ICC-ES, the documents testing and review of the adhesive product to confirm that it conforms to the requirements of ICC-ES AC58.

1.03 SUBMITTALS

The Contractor shall submit the information below in accordance with Section 01300, SUBMITTALS.

A. Product Data

1. Submit technical data for adhesives, including:
 - a. Independent testing laboratory results indicating allowable loads in tension and shear for masonry walls of the types shown on the plans, with load modification factors for temperature, spacing, edge distance and other variables.
 - b. Handling and storage instructions.
 - c. Installation instructions.
2. Quality control submittals:
 - a. Special inspections: Detailed instructions for special inspection to comply with the California Building Code (2019 CBC).
 - b. Evaluation report confirming that the product complies with the requirements of ICC-ES AC308.

1.05 DELIVERY AND HANDLING

Store and protect as follows, unless manufacturer has stricter requirements.

1. Store adhesive components on pallets or shelving in a covered-storage area protected from weather.
2. Control temperature to maintain storage within manufacturer's recommended temperature range.
 - a. If products are stored at temperatures outside manufacturer's recommended temperature range, test components prior to use by methods acceptable to the Engineer to determine if the products still meet specified requirements.
3. Dispose of products that have passed their expiration date.

1.06 PROJECT CONDITIONS

Seismic design category as shown on the plans.

PART 2 - PRODUCTS**2.01 MATERIALS****A. Adhesive system**

1. Adhesive shall have a current Evaluation Report showing compliance with ICC-ES AC308 for use in cracked concrete and for seismic design categories as shown on the plans.

2. Materials

- a. In accordance with ASTM C881, Type IV, Grade 3, Class B or C depending on site conditions.
- b. 2-component, 100 percent solids, insensitive to moisture.
- c. Cure temperature, pot life, and workability: compatible with the required use and the environmental conditions.

B. Packaging

1. Furnished in side-by-side cartridges with resin and hardener components isolated until mixing through manufacture's static mixing nozzle. Nozzle designed to thoroughly blend the components for injection from the nozzle directly into prepared hole.
2. Container markings that include manufacture's name, product name, batch number, mix ratio by volume, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.

C. Manufactures

One of the following or approved equal:

1. Hilti, Inc.: RE – 500 V3 Adhesive Anchor System.
2. Simpson Strong-Tie Company, Inc.: SET-XP.

D. All Thread Rods

As specified in Section 05100, STRUCTURAL AND MISCELLANEOUS METALS.

E. Reinforcing Steel

As specified in Section 03200, CONCRETE REINFORCEMENT.

PART 3 - EXECUTION**3.01 General**

Provide epoxy adhesive packaged that is disposable, self-contained cartridge system capable of dispensing both epoxy components in the proper mixing ratio, and fits into a manually or pneumatically operated caulking gun. Dispense components through a mixing nozzle that thoroughly mixes components.

3.02 Hole Sizing and Installation

A. Drilling Holes

Determine location of reinforcing bars or other obstructions with a non-destructive indicator device, and mark locations on surface of concrete. Do not damage or cut existing reinforcing bars, electrical conduits, or other items embedded in the existing concrete without approval by District.

B. Hole drilling equipment

Electric or pneumatic rotary impact type with medium or light impact. Drill bits to be Carbide tipped in accordance with ANSI B212-15 unless otherwise recommended by the manufacture or required as a “condition of use” in the ICC Evaluation Report submitted. Hollow drill bits with flushing air systems are preferred. Air supplied to hollow drill bits shall be free of oil, water, or other contaminants that will reduce the bond. Where edge distance are less than 2 inches, use lighter impact equipment to prevent microcracking and concrete spalling during drilling process.

Hole diameter to be the reinforcing bar diameters or all thread rod diameter plus 1/8 inch.

C. Obstructions in drill path

If an existing reinforcing bar or other obstruction is hit while drilling hole, stop drilling hole and fill the hole with drypack mortar. Relocate the hole to miss the obstruction and drill another hole. Repeat the above until the hole has been drilled to the required depth.

Avoid drilling an excessive number of holes in an area of a structural member, which would excessively weaken the structural member and endanger the stability of the structure. Drypack holes which hit obstructions and allow drypack to reach strength equal to the existing concrete before drilling adjacent holes. Epoxy grout may be substituted for drypack if acceptable to the District.

Install reinforcing bars and all thread rods to depth, spacings, and locations as indicated on the plans. Do not install epoxy bonded all-thread rods or reinforcing bars in overhead applications.

3.03 INSTALLATION

A. Cleaning Holes

Insert long air nozzle into hole and blow out loose dust. Use compressed air that is free of oil, water or other contaminants that will reduce the bond. Use a stiff brush to brush hole to dislodge compacted drilling dust, then use compressed air again. The final hole shall be clean and dry before installation.

B. Cleaning Reinforcement and All Thread Rods

Solvent clean reinforcing bar and all thread rods over the embedment length in accordance with SSPC SP-1 Solvent Cleaning. Provide an oil and grease free surface to promote bonding of adhesive to steel. Clean reinforcing bars and all thread rods over embedment length to bare metal. The reinforcing bars and all thread rods shall be free oil, grease, paint, dirt, mill scale, rust or other coatings that will reduce the bond.

C. Filling Hole with Epoxy

Fill hole with epoxy before inserting the reinforcing bar or all thread rod. Fill hole with epoxy starting from bottom of hole. Fill hole without creating air voids. Fill hole with sufficient epoxy so that excess epoxy is extruded out of the hole when the reinforcing bar or all thread rod is inserted into the hole. Prior to installing epoxy, installer shall be trained by manufactures representative.

**** END OF SECTION ****

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SECTION 03100

CONCRETE FORMWORK

PART 1 - GENERAL

1.01 **SCOPE**

This section specifies the work necessary to furnish, place, and remove all formwork for cast-in-place concrete.

1.02 **QUALITY ASSURANCE**

A. **References**

The publications referred to hereinafter form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

American Concrete Institute (ACI) Publications:

ACI-347 *Recommended Practice for Concrete Formwork*

International Conference of Building Officials (ICBO) Publications:

CBC *California Building Code 2022 Edition*

U.S. Product Standard (PS) Publications:

PS-1 *Product Standard for Construction and Industrial Plywood*

The Contractor shall comply fully with the requirements of Section 1717 of the Construction Safety Orders, State of California, Department of Industrial Relations, regarding the design of concrete forms, falsework and shoring, and the inspection of same prior to placement of concrete. Where the said Section 1717 requires the services of a civil engineer registered in the State of California to approve design calculations and working drawings of the falsework or shoring system, or to inspect such system prior to placement of concrete, the Contractor shall employ a registered civil engineer for these purposes, and all costs therefore shall be included in the price named in the Contract for completion of the work as set forth in the Contract Documents.

Except as modified by the requirements specified herein and/or the details on the drawings, concrete formwork shall conform to the California Building Code (CBC), Chapter 19,

"Concrete", 2022 Edition and the American Concrete Institute - 347 (ACI-347),
Recommended Practice for Concrete Formwork.

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS. The Contractor shall submit mill affidavits stating the grade and physical properties of form materials before the materials are delivered to the site. The affidavits shall demonstrate that the materials and procedures comply with the specifications of this section.

A. Information on proposed forming system:

1. Submit in such detail as the District may require to assure that the intent of the Specifications herein can be complied with for the proposed concrete forms.
2. Alternate combinations of plywood thickness and stud spacing may be submitted.

B. Form release agent.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Forms for Exposed Finish Concrete

Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on plans. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.

Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark. Use full size 4-foot by 8-foot plywood sheets, except where smaller pieces are able to cover the entire area.

Studs and wales shall be a minimum 2-inch by 4-inch lumber and contain no loose knots and be free of warps, cups, and bows.

B. Forms for Unexposed Finish Concrete

Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal, or other acceptable material as determined by the District. Provide lumber dressed on at least 2 edges and one side for tight fit.

C. Form Ties

Provide factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent deflection, and to prevent spalling concrete surfaces upon removal. Ties shall be provided with a tightly fitting washer at midpoint.

Unless otherwise shown, provide ties so that portion remaining within concrete after removal of exterior parts is at least 1½ inch from the outer concrete surface. Unless otherwise indicated, provide form ties which will leave a cone-shaped depression at the surface at least 1 inch diameter and 1½ inch deep to allow filling and patching.

D. Incidentals

1. External angles:

- a. Where not otherwise indicated on the plans, provide ¾-inch bevel, formed by true dimensioned wood or solid plastic chamfer strip on walkways, slabs walls beams, columns, and openings.
- b. At expansion joints, provide ¼-inch bevel formed by true dimensioned wood or solid plastic chamfer strip.

E. Form Coatings

Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

PART 3 - EXECUTION

3.01 INSTALLATION OF FORMS

A. General

Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position.

Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.

Construct forms in compliance with ACI 347, to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features

required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

Chamfer all exposed corners and edges with 3/4 inch chamfers unless otherwise noted on the contract drawings, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints. Fillets are not required unless otherwise noted on the contract drawings.

B. Exposed Surface Form Tolerances

Forms for exposed concrete surfaces shall be designed and constructed so that the formed surface of the concrete does not undulate excessively in any direction between studs, joists, form stiffeners, form fasteners, or wales. Undulations exceeding either 3/32 in. or 1/270 of the center to center distance between studs, joists, form stiffeners, form fasteners or wales will be considered to be excessive. Should any form or forming system, even though previously approved for use, produce a concrete surface with excessive undulations, its use shall be discontinued until modifications satisfactory to the District have been made. Portions of concrete structures with surface undulations in excess of the limits herein may be rejected by the District.

C. Form Ties

Install factory-fabricated, adjustable-length, removable or snapoff metal form ties, designed and spaced to prevent form deflection, and to prevent spalling concrete surfaces upon removal.

D. Provisions for Other Trades

Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.

E. Cleaning and Tightening

Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing

after concrete placement if required to eliminate mortar leaks and maintain proper alignment.

3.02 PREPARATION OF FORM SURFACES

Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.

Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.03 REMOVAL OF FORMS

Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50°F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

Formwork supporting weight of concrete, such as beam soffits, joints, slabs and other structural elements, may not be removed in less than 14 days and until the concrete has attained the 28-day design compressive strength. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

Form facing material may be removed 4 days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

Removal of form ties from surfaces, fill holes as follows:

1. Remove form ties from surfaces.
2. Roughen cone shaped tie holes by sandblasting before repair.
3. Dry pack cone shaped tie holes with dry-pack mortar. Mix proportions for dry pack mortar to be by weight of 1 part Portland cement to two parts of concrete sand. Use only enough water so that resulting mortar will crumble to the touch after being formed into a ball by hand.

3.04 **RE-USE OF FORMS**

Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.

When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces.

****END OF SECTION****

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SCOPE

This section covers the furnishing and installing of reinforcing steel for cast-in-place concrete work as shown and noted on the plans and as specified.

1.02 QUALITY ASSURANCE

The publications referred to hereinafter form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

A. References

The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. The latest version in effect at the time of bid shall apply.

American Concrete Institute (ACI)
American Society for Testing and Materials (ASTM)
Concrete Reinforcing Steel Institute (CRSI)
American Welding Society (AWS)

B. Regulatory Requirements

Except as modified by the requirements specified herein and/or the details on the contract drawings, concrete reinforcing work shall conform to the 2022 Edition of *California Building Code* (CBC), Chapter 19, "Concrete" and the requirements of the CRSE Manual of Standard Practice.

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted.

A. Shop Drawings

Submit shop and placement drawings of all reinforcing for review.

Placement drawings shall show the locations and spacing of reinforcing in the various parts of the structure with details as required, all in accordance with ACI 315. Cutting and bending lists submitted without placement drawings will be returned without review as incomplete. Placement drawings shall not be reproduced, marked up copies of the design drawings. Placement drawings shall be complete so that placement of the reinforcing may proceed without reference to the plans.

Review shall not act to relieve the Contractor from responsibility for accuracy of the fabrication details and placing diagrams. Dimensions and locations shall be verified prior to the preparation of shop drawings.

No work shall be done except from reviewed drawings which must be kept at all work locations.

B. Mill Affidavits

Mill affidavits, stating the grades and physical and chemical properties of the reinforcing steel, and conformance with ASTM specifications, shall be submitted before delivery of the steel to the job site.

At the completion of the work, one complete set of placement bending diagrams shall be delivered to the District for record purposes.

1.04 DELIVERY AND STORAGE

Deliver reinforcement bundled and tagged to identify placement and certify testing.

Reinforcing steel shall be transported to the building site, stored and covered in a manner which will ensure that no damage shall occur to it from moisture, dirt, grease, or any other cause that might impair bond to concrete. A sufficient supply of approved reinforcing steel shall be stored on the site at all times to ensure that there will be no delay of the work. Identification of steel shall be maintained after bundles are broken.

1.05 COORDINATION

Contractor shall check structural and civil drawings for anchor bolt schedules and locations, anchors, inserts, conduits, sleeves, and any other items which are required to be cast in concrete, and shall make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Reinforcing Bars

New, deformed, billet steel bars, conforming to ASTM A615, Grade 60. Deliver bars new and free from rust and mill scale in original bundles with mill tags intact. Grade 60 for No. 4 bars and larger.

Reinforcement resisting earthquake-induced flexural and axial forces in frame members and in wall boundary members shall comply with low alloy ASTM A706. ASTM A615 Grade 60 reinforcement may be used in these members if the following requirements are met:

1. The actual yield strength based on mill tests does not exceed the specified yield strength by more than 18,000 pounds per square inch (retests shall not exceed this value by more than an additional 3,000 pounds per square inch).
2. The ratio of the actual ultimate tensile stress to the actual tensile yield strength is not less than 1.25.
3. Reinforcing bars that require to be welded shall use low alloy ASTM A 706 Grade 60 deformed bars.
4. Reinforcing bars that are required to resist earthquake-induced flexural and axial forces in concrete frame members and in concrete shear wall boundary members shall use low alloy ASTM A 706 grade 60 deformed bars.

Reinforcing bars to be welded shall be weldable steel ASTM A706, Grade 40 for No. 3, Grade 60 for No. 4 bars and larger.

B. Welded Wire Fabric

New welded steel wire fabric, conforming to ASTM A185. Gage and center-to-center spacing shall be as indicated.

C. Epoxy

Epoxy shall be used to drill and bond reinforcement dowels into existing concrete. Epoxy shall be Hilti HY 200, Simpson SET-XP, or an approved equal. The approved equal shall be equal in materials, strength, and intended use.

D. Accessories

Reinforcement accessories, consisting of spacers, ties, and similar items shall be provided as required for spacing, assembling, and supporting reinforcement in place. Accessories shall

be reinforcing steel or precast concrete blocks conforming to the applicable requirements of the *CRSI Manual of Standard Practice*.

E. Tie Wire

Tie wire for reinforcement shall be No. 16 gage or heavier, where noted or specified, black or galvanized steel wire, conforming to ASTM A82.

F. Welding Electrodes

AWS A5.1, grade E70XX for welding grade, Grade 60.

PART 3 - EXECUTION

3.01 FABRICATION

Fabrication of steel reinforcement shall be in accordance with the details shown on the plans. Where specific details are not shown or noted, comply with the applicable provisions shown in ACI 318, ACI 350 and ACI SP-66.

Bars shall be accurately bent, cut, and placed as indicated on the plans. Bars shall be bent cold; heating of bars will not be permitted. Bars shall not be bent or straightened in any manner that will injure the material. All reinforcing bars shall be bent in an approved fabricating shop. Field bending of reinforcement bars above #5 rebar shall not be permitted.

3.02 PLACING

A. General

Reinforcing steel shall be placed in accordance with the contract drawings and the applicable requirements of the latest edition of the *CRSI Manual of Standard Practice* and the California Building code, Chapter 19, "Concrete." Install reinforcement accurately and secure against movement, particularly under the weight of workmen and the placement of concrete.

B. Reinforcing Supports

Bars and welded wire fabric layers shall be supported on precast concrete blocks wire tied to reinforcement and accurately placed. Spacing of blocks and accessories shall conform with CRSI's Recommended Practice for Placing Bar Supports. Do not use brick, broken concrete masonry units, spalls, rocks, wood or similar materials for supporting reinforcing steel. Precast concrete blocks shall be used to support footing and slab reinforcing on ground and slab and beam reinforcement on horizontal form work. Provide a sufficient number to prevent sagging, to prevent shifting, and to support loads during construction.

C. **Placing and Tying**

All reinforcing shall be set in place, spaced, and rigidly and securely tied or wired with No. 16 gage steel tie wire at all splices and at crossing points and intersections in the position shown, or as directed by the District. Point ends of wire away from forms.

D. **Spacing**

Bars shall be spaced as indicated on the plans. Where not shown, the clear spacing for main longitudinal reinforcement shall be not less than 1.5 times the nominal bar diameter, or 1 1/2 in., or 1 1/3 times the maximum size aggregate, whichever is greater. For all other parallel bars, where spacing is not shown, the minimum clear spacing shall not be less than the nominal bar diameter, or 1 in., or 1 1/3 times the maximum size aggregate, whichever is less. The clear distance limitations above also apply between the bars being spliced at a contact lap splice and adjacent bars.

E. **Splices**

Except for temperature bars in slabs and horizontal wall reinforcing, no splicing will be allowed for reinforcing bars unless detailed locations are given for these splices on the contract drawings, or approval is given. Stagger lapped splices for horizontal wall reinforcing and slab temperature bars by the required lap splice length minimum. Wherever possible, splices of adjacent bars shall be staggered.

Reinforcing bars may be continuous at locations where splices are shown on the contract drawings, at the option of the Contractor. The location of splices, except where shown on the contract drawings, shall be determined by the Contractor based upon using available commercial lengths where practicable.

Unless specifically otherwise indicated on the plans, install bars at lap splices in contact with each other and fasten together with tie wire. Where reinforcing bars are to be lap spliced at concrete joints, ensure that bars project from first concrete placement a length equal to or greater than the minimum lap splice length indicated on the plans. Where lap splice lengths are not indicated on the plans, provide lap splice lengths in accordance with ACI 318 and ACI 350.

F. **Welded Wire Fabric**

Wire fabric shall be in as long lengths as practicable and shall be wired at all laps and splices. Laps shall be one full spacing of the cross wires plus 2 in. at splices. Welded wire fabric shall be supplied in flat sheets.

G. **Dowels**

Dowels to be placed in new concrete shall be tied securely in place before concrete is deposited. In the event there are no bars in position to which dowels may be tied, No. 3 bars shall be added to provide proper support and anchorage. Dowels to be installed in

existing concrete shall be drilled and bonded into place using epoxy. Horizontal holes shall be drilled at a slight downward angle to facilitate holding the epoxy. Reinforcing steel installed in horizontal holes shall be bent slightly accordingly. Bending of dowels after placement of concrete will not be permitted unless approval is obtained. Dowels extended for future construction shall be protected from weather as shown on the contract drawings. Compliance with safety law requirements for extended dowels is required.

H. **Cleaning**

Reinforcement, at time of pour, shall be free of mortar, oil, dirt, excessive mill scale, scabby rust and other coatings that would impair bond to concrete.

I. **Welding**

Welding of reinforcing steel shall comply with AWS D1.4. Do not weld reinforcing steel until a chemical analysis sufficient to determine the carbon equivalent of the steel has been performed. This analysis shall be made from the chemical composition shown in the mill test reports or by chemical analysis of bars representative of the bars to be welded. The carbon equivalent shall not exceed 0.55. Preheating of Grade 60 bars will be required immediately prior to welding.

3.03 **TESTING AND INSPECTION**

Contractor shall provide notification at least 2 working days ahead of each concrete pour, and no concrete shall be placed until all reinforcing steel has been installed by the Contractor and approved by the District. All reinforcing shall be complete in every way by the end of the working day prior to concrete placing.

3.04 **SPECIAL INSPECTION**

Special inspection is required as defined in CBC Chapter 17.

3.05 **DEFECTIVE WORK**

The following reinforcing steel work will be considered defective and shall be removed and replaced by the Contractor at no additional cost to the District.

- A. Bars with kinks or bends not shown on plans.
- B. Bars injured due to bending or straightening.
- C. Bars heated for bending.
- D. Reinforcement not placed in accordance with the plans or specifications.

****END OF SECTION****

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SCOPE

This section covers the furnishing and placing of cast-in-place concrete as indicated and as specified.

1.02 QUALITY ASSURANCE

The publications referred to hereinafter form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

A. References

The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. The latest version in effect at the time of bid shall apply.

American Concrete Institute (ACI):

ACI 305 *Hot Weather Concreting Standard*

ACI 318 *Building Code Requirements for Structural Concrete and Commentary*

ACI 350 *Code Requirements for Environmental Engineering Concrete Structures and Commentary*

ACI *Manual of Concrete Practice*

American Society for Testing and Materials (ASTM) Publications:

ASTM C31 *Standard Practice for Making and Curing Concrete Test Specimens in the Field*

ASTM C33 *Standard Specification for Concrete Aggregates*

ASTM C39 *Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens*

ASTM C40	<i>Standard Test Method for Organic Impurities in Fine Aggregates for Concrete</i>
ASTM C42	<i>Standard Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete</i>
ASTM C88	<i>Standard Test Method of Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate</i>
ASTM C94	<i>Standard Specification for Ready-Mixed Concrete</i>
ASTM C114	<i>Standard Test Methods for Chemical Analysis of Hydraulic Cement</i>
ASTM C117	<i>Standard Test Method for Materials Finer than 75-μ (No. 200) Sieve in Mineral Aggregates by Washing</i>
ASTM C123	<i>Standard Test Method for Lightweight Particles in Aggregate</i>
ASTM C131	<i>Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.</i>
ASTM C136	<i>Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates</i>
ASTM C142	<i>Standard Test Method for Clay Lumps and Friable Particles in Aggregate</i>
ASTM C143	<i>Standard Test Method for Slump of Hydraulic-Cement Concrete</i>
ASTM C150	<i>Standard Specification for Portland Cement</i>
ASTM C156	<i>Standard Test Method for Water Loss [from a Mortar Specimen] Through Liquid Membrane-Forming Curing Compounds for Concrete</i>
ASTM C157	<i>Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete</i>
ASTM C171	<i>Standard Specifications for Sheet Materials for Curing Concrete</i>
ASTM C172	<i>Standard Practice for Sampling Freshly Mixed Concrete</i>
ASTM C227	<i>Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)</i>
ASTM C289	<i>Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)</i>

ASTM C311	<i>Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete</i>
ASTM C494	<i>Standard Specification for Chemical Admixtures for Concrete</i>
ASTM C618	<i>Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.</i>
ASTM D75	<i>Standard Practice for Sampling Aggregates</i>

B. Regulatory Requirements

Except as modified by the requirements specified herein and/or the details on the plans, concrete work shall conform to the California Building Code (CBC), Chapter 19, "Concrete."

C. Performance Requirements

1. Except as otherwise specified, provide concrete composed of Portland cement, fly ash, fine aggregate, coarse aggregate, admixtures, and water so proportioned and mixed as to produce plastic, workable mixture in accordance with requirements as specified in this Section and suitable to specific conditions of placement.
2. Proportion materials in a manner that will secure lowest water-cementitious materials ratio that is consistent with good workability, plastic and cohesive mixture, and a mixture that is within specified slump range.
3. Proportion fine and coarse aggregates in manner such as not to produce harshness in placing or honeycombing.

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted.

- A. Certificates of compliance for portland cement.
- B. Manufacturers technical literature that certify compliance with applicable standards as indicated in these specifications for admixtures, curing compounds, expansion joint filler, sealer and chemical hardener, and all other concrete products to be used.
- C. Concrete mix design.
 1. Full details, including mix design calculations for concrete mixes proposed for each class of concrete used.
 2. Include information on correction of batching for varying moisture content of fine aggregates.

3. Include calculations for required compressive strength f'_{cr} , based on past test records from same source.
 4. Compressive strength test results f'_c , for trial batch or from prior performance of the proposed mix design.
- D. Concrete aggregate tests: Certified copies in triplicate of commercial laboratory tests not more than 90 days old of all samples of concrete aggregates:
1. Coarse aggregate:
 - a. Abrasion loss.
 - b. Clay lumps and friable particles.
 - c. Coal and lignite.
 - d. Materials finer than 200 sieve.
 - e. Reactivity.
 - f. Shale and chert.
 - g. Soundness.
 2. Fine aggregate:
 - a. Clay lumps.
 - b. Color.
 - c. Decantation.
 - d. Reactivity.
 - e. Shale and chert.
 - f. Soundness.
- E. Fly and Slag Ash Certificate of Compliance: Identify source of material and certify compliance.
- F. For conditions that promote rapid drying of freshly placed concrete such as low humidity, high temperature, and wind: Corrective measures for use prior to placing concrete.
- G. For hot weather concreting, submit procedures for production, placement, finishing, curing, protection, and temperature monitoring for concrete during hot weather and appropriate corrective measures.
- H. Trial batch test data:
1. Submit data for each test cylinder.
 2. Submit data that identifies mix and slump for each test cylinder.
- I. Proposed construction joint locations and pour sequences.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Portland Cement

Portland cement shall be either “Type IP (MS) Modified” or “Type II Modified”. “Type IP (MS) Modified” cement shall conform to the specifications for Type IP (MS) cement in ASTM C595 and shall be comprised of an intimate mixture of “Type II Modified” cement and not more than 20% of a pozzolanic material. “Type II Modified” cement shall conform to the specifications of Type II cement in ASTM C150. In addition, for “Type IP (MS) Modified” and “Type II Modified” cement shall conform to the following requirements:

1. The cement shall not contain more than 0.60% by weight of alkalis, calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O when determined by either direct intensity flame photometry or by the atomic absorption method. The instrument and procedure used shall be qualified as to precision and accuracy in accordance with the requirements of ASTM C114.
2. The autoclave expansion shall not exceed 0.50%.
3. Mortar, containing the portland cement to be used and Ottawa sand, shall not expand in water more than 0.010% and shall not contract in air more than 0.048%.

Mineral admixtures may be used to replace a portion of the required portland cement in accordance with the provisions of Part 2.01B, Mineral Admixture.

All cement used in the manufacture of cast-in-place concrete for exposed surfaces of like elements of a structure shall be from the same cement mill.

Cement shall be protected from exposure to moisture until used. Sacked cement shall be piled to permit access for tally, inspection, and identification of each shipment.

B. Fly Ash

1. Fly ash in accordance with ASTM C618, Class F or C, may be used in concrete made with Type II Portland cement.
2. Maximum of 15 percent by weight of fly ash to total weight of cementitious material.
3. Do not use in concrete made with Type IP (MS).
4. Loss on ignition: not exceed 4 percent.

C. Mineral Admixture

1. Mineral admixture shall conform to ASTM C618, Type F or C.

2. Required use: For all liquid bearing concrete structures, the concrete shall conform with either:
 - a. Concrete containing "Type IP (MS) Modified" cement conforming to the provisions in Part 2.01A - Portland Cement, in an amount sufficient to satisfy the specified minimum cement content. The modified cement shall contain a minimum of 15%, by weight, pozzolanic material.
 - b. Concrete containing "Type II Modified" cement conforming to the provisions in Part 2.01A - Portland Cement, in an amount not less than 85% of the amount required to satisfy the specified minimum cement content. The concrete shall also contain a mineral admixture in an amount not less than 15% by weight, of the amount of cement required to satisfy the specified minimum cement content.
3. Optional Use: At structures other than liquid bearing water treatment concrete structures, the Contractor will be permitted to replace up to 15% of the required Portland cement, other than "Type IP (MS) Modified", with a mineral admixture. The weight of the mineral admixture used shall be equal to or greater than the weight of Portland cement replaced.
4. Admixtures shall conform to ASTM C494, be of a type that increases workability and reduces water demand of concrete, but will not increase shrinkage. Admixtures shall be subject to approval as to type and amount used. Admixtures shall contain not more than 1% chloride ions.

D. Concrete Aggregates

Before beginning concrete work, the Contractor shall submit in writing to the District the gradation of the primary aggregate nominal sizes which he proposes to furnish. If the primary coarse aggregate or the fine aggregate is separated into two or more sizes, the proposed gradation shall consist of the gradation for each individual size, and the proposed portions of each individual size, combined mathematically to indicate one proposed gradation. Such gradation shall meet the grading requirements shown in ASTM C33 for normal weight concrete and ASTM C330 for lightweight concrete.

In lieu of the use of ASTM C227 to determine alkali reactivity of the aggregates as specified therein, the alkali reactivity shall be "innocuous" as determined by ASTM C289.

Fine aggregate shall be washed clean, shall be uniformly screen graded, and shall contain not more than 2% by weight of deleterious materials such as shale, schist, alkali, clay lumps, earth, loam, mica or similar materials. Fine aggregate shall be graded uniformly from fine to coarse.

Coarse aggregate shall consist of clean, hard, crushed rock or washed gravel, free from organic materials or soft or friable materials and shall not contain more than 2% by weight of shale or cherty material and not more than 15% by weight of elongated fragments. Work

fragments are strictly prohibited. Provide unit weight of fine and coarse aggregate that produces in concrete with weight of not less than 140 pounds per cubic foot.

E. Admixtures

ASTM C494, of a type that increases workability and reduces water demand of concrete, but will not increase shrinkage. Admixture shall be subject to approval as to type and amount used. Admixtures shall contain not more than 0.5% chloride ions.

Water reducing admixture:

1. May be used at Contractor's option.
2. In accordance with ASTM C494, Type A Type D.
3. May not contain air-entraining agents.
4. Should be in liquid form before adding to the concrete mix.
5. No decrease in cement is permitted as result of the use of water reducing admixture.

Super-plasticizers are not to be used without acceptance by the District.

F. Air-Entraining Agent

ASTM C260, subject to approval by the District.

G. Water Used in Mixing Concrete

Potable, clean and free from deleterious amounts of acid, alkalis, organic or other materials.

H. Curing Membrane

Non-staining paper conforming to ASTM C171, or 6 mil thick polyethylene film.

I. Curing Compound

ASTM C309, liquid membrane forming, with fugitive dye for identification. Compound shall be compatible with finish to be applied thereto. Curing compound and areas receiving it must be approved by the District.

J. Expansion Joint Filler

Premolded, of sizes and thicknesses shown on plans, conforming to ASTM D1751.

K. Expansion Joint Sealing Compound

Expansion joint sealant and backer rod shall be in accordance with Section 07900, JOINT SEALERS.

L. Waterstops

1. PVC Waterstops: PVC waterstops shall be manufactured from virgin polyvinyl chloride (PVC) conforming to the CRD-C572.

PVC waterstops in construction joints shall be Greenstreak Type 679, or approved equal. Waterstops in expansion joints shall be Greenstreak Type 732, or approved equal.

2. Bentonite Waterstops: Bentonite waterstops in construction joints shall be Volclay Waterstop-RX as manufactured by Colloid Environmental Technologies Company (CETCO) or equal. Bentonite waterstops shall contain 75% Sodium Bentonite and 25% Butyl Rubber Compound and shall have the following properties.

Property	Test	Results
Specific Gravity	ASTM D71	1.57
Flash Point	ASTM D93-97	365° F
Penetration	ASTM D217	
	150 GTL	50
	300 GTL	85

M. Bonding Compounds

Epoxy resin bonding compounds shall be used for all concrete repairs and shall be Degusa Admixtures, Inc. Concessive Liquid (LPL), Paste (LPL), or Paste (SPL), as applicable; or ChemCo Liquid (LWL), Paste (LWL), Paste (SWL), as applicable or approved equal.

Non-epoxy bonding compounds may be used for dry areas and shall be Intralock as manufactured by W.R. Meadows, Weld-Crete as manufactured by Larsen Products Corp, or equal.

Bonding compounds shall be applied in accordance with the manufacturer's instructions.

2.02 PROPERTIES AND PROPORTIONS

A. Concrete

All concrete shall be normal weight concrete unless otherwise specified herein. Normal weight concrete shall have a minimum density of 150 pounds per cubic foot. Light weight concrete shall have a maximum density of 110 pounds per cubic foot.

The Contractor shall be responsible that the concrete formulation meets all aspects of this specification i.e., 28 day compressive strength, etc.

Provide concrete conforming to the following unless otherwise noted on the plans:

Location	28 Day Compressive Strength (psi)	Maximum Aggregate Size (in.)	Slump (in.)	Maximum Water- Cement Ratio (by weight)
Exterior Slabs on Grade	3,000	1	3	0.50
Tank Farm Foundation	4,000	1	4	0.45
Walks and Curbs	3,000	1	3	0.55
Storm Drainage Structures and Storm Drain Manholes	3,000	1	4	0.50
Thrust Blocks, Anchor Blocks, Pipe Encasement, and Fence Posts	2,500	1	4	0.60
Electrical Conduit Duct Banks, Encasing with red oxide, 5 lbs per yd ³ of concrete	2,500	1	4	0.60

The quantity of cement to obtain the strength is the sole responsibility of the Contractor. To assure durable concrete using local materials, a minimum weight of cement/yd³ shall be used for the following:

1. Tank Farm Foundation = 658 lbs
2. Walks, Curbs, Fence Foundations = 470 lbs
3. All Other Structures = 564 lbs
4. Concrete Cap for Future Expansion Dowels = 470 lbs
5. Electrical Conduit Duct Banks, = 470 lbs
pipe encasement, fence posts,
thrust blocks and lean concrete

In no case shall the maximum aggregate size used exceed 20% of a member's thickness, nor 3/4 of the clear spacing between reinforcing.

B. Grout

Grout shall be in accordance with Section 03600, GROUT.

2.03 LABORATORY TESTS AND MIX DESIGNS

A. General

Compression tests of concrete shall be performed by a qualified testing laboratory retained and paid by the District. Mill tests and manufacturer's certification of compliance with ASTM Specifications may be submitted to the District in lieu of testing of cement and aggregate analysis.

B. Mix Designs

Contractor shall employ an approved testing laboratory who shall determine mix designs to fulfill the specified requirements for strength, aggregate size and workability of concrete, and such designs shall be used in proportioning all structural concrete. Mix designs shall be submitted for review by the District.

Mix designs shall be made in accordance with ACI 211.1.

Cover and clear distances between reinforcing bars shown on the plans shall be considered in determining the aggregate size for mix designs and may result in an aggregate size smaller than the maximum aggregate size allowed elsewhere in this specification.

A list of where the mix designs are to be used shall accompany the designs.

Review shall not be considered unqualified approval, and shall not relieve the Contractor of his responsibility to furnish concrete of proper consistency and specified strengths.

2.04 MIXING

Ready mixed concrete shall be mixed and transported in accordance with ASTM C94.

Concrete shall be mixed only in quantities for immediate use and shall be placed within 1 1/2 hours after the introduction of water to the mixture. Concrete which has set shall be discarded and shall not be retempered.

Indiscriminate addition of water to increase slump shall be prohibited. If concrete arrives at the project with slump below that suitable for placing, water may be added only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. Additional water shall be added to the concrete one time only, upon immediate delivery of the concrete to the job site. The water must be incorporated by additional mixing equal to at least half of the total mixing required. Any addition of water above that permitted by the limitation of water-cement ratio must be accompanied by a quantity of cement sufficient to maintain the proper water-cement ratio. Such addition must be approved by the District.

PART 3 - EXECUTION

3.01 CONVEYING AND PLACING CONCRETE

A. Notification

Notify the District at least two working days in advance of placing concrete.

B. Preparation Before Placing

Hardened concrete and foreign materials shall be removed from the inner surfaces of the conveying equipment.

Formwork shall have been completed; excess water shall have been removed; reinforcement shall have been secured in place; expansion joint materials, anchors, and other embedded items shall have been positioned; and the entire preparation shall have been approved on the day before the placing of concrete.

Semiporous subgrades shall be sprinkled sufficiently to eliminate suction and extremely porous subgrades shall be sealed in an approved manner.

Before placing of any concrete, all forms shall be thoroughly cleaned, washed out with water, and made tight. Before reinforcing steel is placed on top of and/or adjacent to forms which have been sealed, the surface sealer shall be wiped off so that none may be traced over, or in any other way come in contact with the reinforcing steel. Bottoms of forms shall be cleaned and wet down before placing concrete.

All incrustation shall be removed from forms and reinforcing steel at construction joints.

Before depositing new concrete on or against hardened concrete, retighten forms and roughen surface of hardened concrete as follows. Concrete which has been placed longer than 3 1/2 hours, but less than 6 1/2 hours, prepare by removing all laitance from concrete by wire brushing. Concrete which has been placed longer than 6 1/2 hours, prepare by sand blasting to roughen surfaces to a 1/4 inch amplitude and remove curing compounds previously applied to the construction joint. Thoroughly clean off foreign matter and laitance, and moisten with water.

C. Placement

Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients.

Conveying equipment shall be of size and design to ensure a continuous flow of concrete at the delivery end.

Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams, planes, or weakness within the section, or visible pour lines in the finish surface.

All concrete shall be consolidated by vibration so that the concrete is thoroughly worked around the reinforcement, around the embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness. All mechanical vibrators shall have a minimum frequency of 7,000 rpm and shall be operated by competent workers. Over-vibration and use of vibrators to transport concrete within forms shall not be allowed. Vibrators shall be inserted and withdrawn at

many points, from 18 to 30 in. apart, for 5 to 15 seconds duration. A spare vibrator shall be kept on the job site during all concrete placing operations. Particular care shall be given at exposed concrete surfaces.

Concrete for horizontal members and sections shall not be placed until the concrete in the supporting vertical members or sections has been consolidated and settlement due to bleeding has occurred.

Free fall placement of concrete is limited to 6 ft.

D. Flatwork

Edge forms and intermediate screed strips shall be set accurately to produce the designed elevations and contours in the finished surface, and shall be sufficiently strong to support vibrating bridge screeds or roller pipe screeds if the nature of the finish specified requires the use of such equipment. The concrete surface shall be aligned to the contours of screed strips by the use of strike-off templates or approved compacting type screeds.

When the formwork is cambered, screeds shall be set to a like camber to maintain the proper concrete thickness.

Joints in slabs on grade shall be located and detailed as indicated in the plans and indicated in Part 3.07, Construction Joints, of this section.

Concrete slabs shall be thoroughly consolidated. Internal vibration shall be used along the bulkheads of slabs on grade. Consolidation of slabs and floors shall be obtained with vibrating bridge screeds, roller pipe screeds, or other approved means. Concrete to be consolidated shall be as dry as practicable and the surfaces thereof shall not be manipulated before the finishing operations.

3.02 REPAIR OF SURFACE DEFECTS

A. Repair of Surface Defects

All form tie holes shall be filled and repairable defective areas patched and cured immediately after the forms have been removed. Remove fins and burrs.

B. Removal

After forms have been removed, any concrete which is not formed as shown on the plans, or does not meet the approval of the District shall be removed and replaced. Defective surfaces may be repaired and patched in accordance with the following procedure. All conditions requiring patches and completed patches will be inspected. Patches disapproved as not restoring the quality and appearance of the surrounding work shall be removed and replaced so as to match the surrounding work.

C. Repair Procedure

All honeycombed and other defective concrete shall be removed to sound concrete, but in no case to a depth of less than 1 in. The area to be patched and an area of at least 6 in. wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. A bond of neat Portland cement, water, and if permitted, some fine sand passing a No. 30 sieve, shall be mixed to the consistency of thick cream and shall then be well brushed into the surface. Other concrete bonding agents may be used when approved.

The patching mixture shall be made of the same materials and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than 1 part cement to 2 1/2 parts sand by damp loose volume. White Portland cement shall be substituted for a part of the gray Portland cement on exposed concrete in order to produce a color matching the color of the surrounding concrete, as determined by a trial patch.

The quantity of mixing water shall be no more than necessary for handling and placing. The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing.

After surface water has evaporated from the areas to be patched, the bond coat shall be well brushed into the surface. When the bond coat begins to lose the water sheen, the premixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least one hour before being finally finished. The patched area shall be kept damp for 7 days.

Before proceeding with any patch work, the Contractor is responsible for establishing trial patch areas to develop the approved patching color and the method of applying and surface-texturing the patching material.

3.03 FORMED SURFACE FINISHES

Formed surfaces shall be finished as soon as practicable after form removal and repair of surface defects. Finishes shall be as follows:

A. Finish A

Finish A shall be a grout clean finish in accordance with ACI 301, Section 10.3.2. To identify any surface air pockets and other defects, surfaces shall be lightly sandblasted prior to sacking. For interior areas not exposed to moisture or weather, water used in the mortar shall be mixed with a PVA bonding compound as recommended by the manufacturer. Finish A shall be provided for all painted surfaces and unpainted surfaces as follows: surfaces of stair wells, interior surfaces of equipment rooms, operations areas, structures exposed to view, and permanently exposed (i.e. not covered) vertical and sloped surfaces, such as pipe chases or valve vaults.

B. Finish B

Finish B shall be the same as Finish A except that the final burlap rubbing may be omitted, providing the steel trowel scraping removes the loose buildup and imperfections from the surface. Finish B shall be provided on all surfaces not receiving Finish A which will receive waterproof or moisture-proof coatings or systems.

C. Finish C

Finish C shall be the finish for surfaces which may be left as they come from the forms, except that tie holes shall be plugged, and defects greater than 1/2 inch in any dimension shall be repaired. Finish C shall be provided on all below grade surfaces not receiving Finish A or Finish B.

3.04 SLAB FINISHES

A. General

The finishes specified herein include surface finishes for floors and slabs. Floors shall be sloped to drain uniformly. Unless otherwise specified, slope shall be minimum 1/8 in./ft toward nearest drain. Where finish is not specified, floor slabs shall receive steel troweling. Dry cement shall not be used on new concrete surfaces to absorb excess moisture. Edges shall be rounded to a radius of 1/2 in. Joints shall be grooved to a radius and depth of 1/4 inch each. Finished surfaces shall be cured and protected as specified in Part 3.06, Protection and Curing.

B. Float Finish

Float finish shall conform to ACI 301, Section 11.7.2. Floating shall be performed with a hand or power-driven float. Floating of any one area shall be the minimum necessary to produce the finish specified. Floating shall compact and smooth the surface and close any cracks and checking of surfaces. Float finish shall be applied to footings.

C. Steel Trowel Finish

Steel trowel finish shall conform to ACI 301, Section 11.7.3. Immediately after final troweling, the surface shall be cured and protected as specified in Part 3.06, Protection and Curing. Steel trowel finish shall be provided on structure foundation slabs unless specified otherwise.

D. Broomed Finish

Broomed finish shall conform to ACI 301, Section 11.7.4, except that steel trowelling shall precede the broomed finish. Broomed finish shall be provided for walks, top decks of all structures, slabs on grade exposed to atmosphere, and where otherwise indicated or specified.

3.05 RELATED SURFACES

A. Monolithic Surfacing

Monolithic surfacing shall be provided on floor areas as specified. Monolithic surfacing shall consist of a steel trowel finish.

B. Finishing of Unformed Surfaces

1. Related Unformed Surfaces: Tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to a texture reasonably consistent with that of the adjacent formed surfaces. Final treatment of formed surfaces shall continue uniformly across the unformed surfaces.
2. Pavements and Sidewalks: The surfaces of the concrete shall be screeded to grade and sloped to drain. After screeding, the surface shall receive a broomed finish. Edges and expansion joints shall be rounded to a radius of 1/2 in. Joints shall be grooved to a radius and depth of 1/4 in. each.

3.06 PROTECTION AND CURING

A. General

Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures, and shall be maintained without drying at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.

B. Initial Curing

Initial curing shall immediately follow the finishing operation. Concrete shall be kept continuously moist at least overnight. One of the following materials or methods shall be used.

1. Ponding or continuous sprinkling.
2. Absorptive mat or fabric kept continuously wet.
3. Sand or other covering kept continuously wet.
4. Curing compounds shall be applied in accordance with the recommendations of the manufacturer and shall not be used on any surfaces against which additional concrete or other cementitious finishing materials are to be bonded, or on surfaces to be coated, waterproofed, moisture-proofed, tiled, roofed, or on surfaces on which such curing is prohibited by these specifications.

C. Final Curing

Immediately following the initial curing and before the concrete has dried, additional curing shall be accomplished by one of the following materials or methods.

1. Continuing the method used in initial curing.
2. Waterproof paper covering.
3. Other moisture-retaining coverings as approved.

D. Duration of Curing

The final curing shall continue until the cumulative number of days or fractions thereof, not necessarily consecutive, during which temperature of the air in contact with the concrete is above 50°F has totaled 7 days. If high early strength of concrete has been used, the final curing shall continue for a total of 3 days. Rapid drying at the end of the curing period shall be prevented.

E. Formed Surfaces

Steel forms heated by the sun and all wood forms in contact with the concrete during the final curing period shall be kept wet. If forms are to be removed during the curing period, one of the above curing materials or methods shall be employed immediately. Such curing shall be continued for the remainder of the curing period.

F. Protection from Mechanical Injury

During the curing period, the concrete shall be protected from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage caused by construction equipment, materials, or methods, and by rain or running water. Self-supporting structures shall not have form supports removed until the concrete strength has met the requirements of Section 03100, CONCRETE FORMWORK.

3.07 CONSTRUCTION JOINTS

A. General

Concrete in each unit of construction shall be placed continuously. Before new concrete is placed on or against concrete which has set, forms shall be retightened, and the surface of the set concrete shall be cleaned of foreign matter. Concrete surfaces on which new concrete is placed shall not be wetted. Watertight joints, where required, shall be provided as specified in Part 3.10, Waterstops, of this section.

B. Construction

Construction joints shall be formed as specified. A rough surface of exposed concrete aggregates shall be produced using a surface retardant at construction joints, including joints between slab and topping concrete. The limit of the treated surfaces shall be 1 in. away from the joint edges. Within 24 hours after placing, retarded surface mortar shall be removed either by high pressure water jetting or stiff brushing or combination of both so as to expose aggregate. A rough surface of exposed aggregate may also be produced by abrasive blasting followed by high pressure water jetting. Abrasive blasting, if used, shall remove 1/4 inch of laitance film and shall expose coarse aggregate to ensure adequate bond and watertightness at the construction joints.

C. Locations

Construction joint locations shall be as follows:

1. Walls exceeding 60 feet in length shall be cast in panels not to exceed 50 feet in length. Where the number of panels is three or more, the panels shall be cast in an alternating pattern, unless 5 days have elapsed between casting of adjoining panels.
2. Joints in beams or girders shall be located at or near the quarter points between permanent supports.
3. Joints in the members of a floor system, if needed, shall be made at or near the outer quarters of the span.
4. Joints in walls and columns shall be at the underside of floors, slabs, beams or girders and at the tops of footings or floor slabs. Joints in columns shall be perpendicular to the axis.
5. Unless otherwise shown on the plans, building slabs on grade shall be cast in panels not to exceed 45 feet in length or not to exceed 2,025 ft² in area. Water treatment structure foundation slabs shall be cast in panels not to exceed 50 feet in length or not to exceed 2,500 ft² in area. Panels shall be cast in checkerboard patterns. Minimum lapsed time between placing adjacent panels shall be 24 hours.

Reinforcing steel and welded wire fabric shall be continued across construction joints unless shown otherwise on the plans. Girders and floor slabs shall not be constructed over columns or walls until at least 1 hour has elapsed to allow for shrinkage in the column or wall. No joint will be allowed between a slab and a beam or girder unless otherwise specified. Joints shall be perpendicular to the main reinforcement. Waterstops shall be provided in construction joints at locations as specified in Part 3.10, Waterstops, of this section.

3.08 EXPANSION JOINTS

Provide premolded expansion joints to full depth of slabs where indicated on the plans. Install with top edge 3/4 inch below the surface and tool adjacent concrete edges to a 1/8 inch radius. Use steel pins to hold material in place during placing and floating of concrete. After a minimum of 28 days after slabs have been placed and finished, fill tops of expansion joints with backer rod and sealant to 1/8 inch below surface of slabs. No traffic shall be permitted to travel over sealed joints until sealer is thoroughly dry.

3.09 INSERTS AND EMBEDMENTS

A. Inserts

Where pipes, castings or conduits are to pass through structures, the Contractor shall place such pipes or castings in the forms before placing the concrete; or the Contractor may provide openings in the concrete for subsequent insertion of such pipes, casting or conduits. Such openings shall be provided with waterstops and V-shaped construction joint and shall have a slight flare to facilitate grouting and permit the escape of entrained air during grouting.

Additional reinforcement shall be provided around large openings as shown. The grout shall be nonshrink grout as specified in Section 03600, GROUT.

B. Embedments

Gate frames, gate thimbles, special castings, channels or other miscellaneous metal parts that are to be embedded in the concrete shall be set and secured in the forms prior to concrete placement. Unless otherwise specified, anchor bolts and inserts shall be embedded in concrete as shown. The Contractor shall provide inserts, anchors or other bolts necessary for the attachment of piping, valves, metal parts and equipment. Nailing blocks, plugs, strips, and the like necessary for the attachment of trim, finish and similar work shall be provided. Voids in sleeves, inserts and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids. Operators or sleeves for gate or valve stems shall be positioned to clear reinforcing steel, conduit and other embedments, and to align accurately with equipment.

3.10 WATERSTOPS

Waterstops shall conform to ACI 301, section 6.3. Waterstops shall be securely held in position during placing of concrete. If, after placing concrete, waterstops are materially out of position or shape, the surrounding concrete shall be removed, the waterstop reset, and concrete replaced in accordance with Part 3.11, Modification of Existing Concrete, of this section.

PVC waterstops shall be provided at all expansion joints. PVC or Bentonite waterstops shall be provided at construction joints as indicated on the drawings.

Field splices of PVC waterstops are acceptable only in straight sections. Crosses, tees and other shapes shall be fabricated prior to delivery to the site of the work.

3.11 SIDEWALKS AND MISCELLANEOUS CONCRETE PAVING

Sidewalks and miscellaneous concrete paving shall be constructed in accordance with the details on these drawings, these specifications, and Chapter 11, of ACI 301.

3.12 FIELD SAMPLING AND TESTS

Field sampling and testing will be performed by the District. Samples of aggregates and concrete shall be taken at random locations and at such times as to represent the quality of the materials and work throughout the project. The District will provide the necessary labor, materials and facilities for sampling the aggregate and for casting, handling and storing the concrete samples at the site of work.

3.13 TESTING AND REPAIR OF HYDRAULIC STRUCTURES

A. General

All concrete tanks, hydraulic channels, sumps, basins and other structures designed to contain, convey, and/or treat water shall be tested prior to backfilling. Testing shall be accomplished by filling each structure with water. Tests shall be made prior to the application of any waterproofing coating. The Contractor shall submit a minimum 48-hour advance notice of his proposed testing schedule for review and concurrence by the District. The Contractor shall perform, or provide, the following:

1. The District shall provide the water required for the initial testing. The Contractor shall provide water for any retesting.
2. The Contractor shall provide at his expense all pumps, power, piping, and any other equipment required and make all installations necessary to fill the structures for testing.
3. The Contractor shall make all provisions necessary to dispose of the water after he has completed testing, including pumping if necessary. At the completion of the tests, all temporary piping and connections shall be removed. Disposed water shall be removed without creating a nuisance or damage to adjacent properties.
4. Each structure shall be filled with water to the extreme high operating water surface level or to the overflow weir level. Temporary bulkheads, if required, shall be furnished and installed by the Contractor at his expense. After the structure has been filled, it shall be maintained full for a period of 48 hours before commencing testing, to permit concrete absorption and adjustment of valves, slide gates, and or temporary bulkheads.

B. Test Procedure

Each structure shall be full at the beginning of the test. The Contractor shall keep each structure full of water for 48 hours prior to the commencement of the test to allow for water absorption by the concrete and adjustment of valves, slide gates, and or temporary bulkheads. The test period shall consist of three consecutive 24-hour periods totaling five consecutive days. After the test period is completed, the liquid level shall be accurately measured to determine the amount of leakage, if any.

The Contractor shall submit for review and approval the procedure to compensate for evaporation. This procedure shall use a standard 48 in. evaporation pan to determine the actual evaporation after application of any necessary corrections.

All observed running or dripping leaks and visible damp areas that have not healed autogenously during the tests, shall be marked for repair after draining. If leakage from the structure exceeds that permitted for the types of mechanical equipment providing closure (i.e., valves or gates) plus 0.2-0.5 gpm per million gallon storage capacity in any 24 hour period of five consecutive days, and/or if any leaks or damp areas require repairs, the Contractor shall perform a retest after completing the repairs. The repair procedure shall be reviewed and approved by the District prior to making any repairs. Repairs by painting or surface treatment will not be acceptable. Repairs shall be made by pressure grouting with epoxy grout per the requirements specified in section 03600, GROUT, of these specifications. The test procedure shall be continued until the structure meets the leakage requirements and all observed leaks and damp areas have been repaired.

3.14 SPECIAL INSPECTION

Special inspection is required as defined in CBC Chapter 17.

3.14 DEFECTIVE WORK

Defective concrete work shall be removed and replaced at Contractor's expense.

****END OF SECTION****

SECTION 03600

GROUT

PART 1 - GENERAL

1.01 **SCOPE**

This section specifies grout for uses other than masonry.

1.02 **QUALITY ASSURANCE**

A. **References**

The publications referred to hereinafter form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

American Society for Testing and Materials (ASTM) Publications

ASTM C33	<i>Concrete Aggregates</i>
ASTM C40	<i>Standard Test for Organic Impurities in Fine Aggregates for Concrete</i>
ASTM C88	<i>Standard Test for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate</i>
ASTM C117	<i>Standard Test for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing</i>
ASTM C136	<i>Sieve Analysis for Fine and Coarse Aggregates</i>
ASTM C150	<i>Portland Cement</i>
ASTM C289	<i>Standard Test for Potential Reactivity of Aggregates (Chemical Method)</i>
ASTM C494	<i>Chemical Admixture for Concrete</i>
ASTM E329	<i>Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction</i>
CALTEST No. 217	<i>Method of Test for Sand Equivalent</i>

US Army Corps of Engineers (CRD) Specifications

CRD-C621

Specification for Nonsbrink Grout

B. Tests

To demonstrate conformance with the specified requirements for grout, the District will provide the services of an independent testing laboratory which complies with the requirements of ASTM E329. The testing laboratory shall sample and test grout materials as required in this section. Costs of testing laboratory services shall be borne by the District. In addition, the District may sample and test grout materials to check compliance with these specifications.

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted.

- A. Certificate of Compliance with applicable ASTM requirements for Portland cement and fine aggregate.
- B. Manufacturer's technical literature for admixtures indicating compliance with applicable specifications.
- C. Grout mix design.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement

Portland cement shall be ASTM C150 Type II or Type V, low alkali, containing less than 0.60% alkalis.

B. Aggregate

1. General: Aggregate shall be nonreactive and shall be washed before use.

When sources of aggregate are changed, test reports shall be provided for the new material. The test specified shall be performed prior to commencing grout work.

2. Fine Aggregate: Fine aggregate shall be hard, dense, durable particles of either sand or crushed stone regularly graded from coarse to fine and shall conform to ASTM C33 as

modified herein. When tested in accordance with ASTM C136, gradation shall be such that 100% by weight will pass a standard No. 8 mesh sieve and no less than 45% by weight will pass a standard No. 40 mesh sieve.

Variation from the specified gradations in individual tests will be acceptable if the average of three consecutive tests is within the specified limits and the variation is within the permissible variation listed below:

<u>U.S. standard sieve size</u>	<u>Permissible variation in individual tests, percent</u>
30 or coarser	2
50 or finer	0.5

Other tests shall be in accordance with the following specifications:

<u>Test</u>	<u>Test Method</u>	<u>Requirements</u>
Organic Impurities	ASTM C40	Color lighter than standard
Amount of Material Passing No. 200 Sieve	ASTM C117	3% maximum by weight
Soundness	ASTM C88	10% maximum loss with sodium sulfate
Reactivity	ASTM C289	Innocuous aggregate
Sand Equivalent	CALTEST No. 217	Minimum 80

3. Admixtures

- a. General: Admixtures shall be compatible with the grout. Calcium chloride or admixtures containing calcium chloride are not acceptable. Admixtures shall be used in accordance with the manufacturer's recommendations and shall be added separately to the grout mix.
- b. Water Reducing Retarder: Water reducing retarder shall be ASTM C494 Type D and shall be Master Builders Pozzoloth 300-R, Sika Corporation Plastiment, or equal.
- c. Lubricant for Cement Pressure Grouting: Lubricant additive for cement pressure grouting shall be Intrusion Prepakt Intrusion Aid, Sika Intraplast N, or equal.

4. Water

Water for washing aggregate, for mixing and for curing shall be free from oil and deleterious amounts of acids, alkalis, and organic materials; shall not contain more than 1,000 mg/L of chlorides as Cl⁻, nor more than 1,300 mg/L of sulfates as SO₄; and shall not contain an amount of impurities that may cause a change of more than 25% in the setting time of the cement nor a reduction of more than 5% in the compressive strength of the grout at 14 days when compared with the result obtained with distilled water. Additionally, water used for curing shall not contain an amount of impurities sufficient to discolor the grout.

2.02 **GROUT**

A. **Drypack Grout**

One part Portland cement and 2 parts fine aggregate, by volume. Grout shall be of a consistency suitable for the intended purpose and shall be used immediately after mixing.

B. **Cement Grout**

Cement grout shall be a mixture of one part cement, two parts sand, proportioned by volume, admixtures for pressure grouting, and sufficient water to form a workable mix.

C. **Nonshrink Grout**

Nonshrink grout shall be nonrusting non-metallic aggregate grout and shall be Degussa Admixtures, Inc. Masterflow 713 "Plus", Sika Chemical Corporation Sika Grout 212, or equal.

D. **Epoxy Grout**

Epoxy grout shall be Hilti CI 060 EP, Simpson CRACK-PAC, or equal.

2.03 **PRESSURE GROUTING EQUIPMENT**

Pressure grouting equipment shall include a mixer and holdover agitator tanks and shall be designed to place grout at pressures up to 50 psi. Gages shall be designed to place grout at pressures up to 50 psi. Gages shall be provided to indicate pressure used. The mixer shall be provided with a meter capable of indicating to 1/10th of a cubic ft the volume of grout used.

PART 3 - EXECUTION

3.01 **GENERAL**

Holes required for grouting shall be blown clean. Horizontal holes for grouting shall be drilled at a slight downward angle to facilitate holding the grout until setting is complete.

Bonding compound for use with grout is specified in Section 03300, CAST-IN-PLACE CONCRETE.

3.02 **DRYPACK GROUT**

Drypack grout shall be used for built-up surfaces, setting miscellaneous metal items and minor repairs. Grout used under minor bearing plates shall also be drypack grout.

Surfaces required to be built up with drypack grout shall be roughened by brushing, cleaned, and coated with bonding compound specified in Part 2.01L, Section 03300, CAST-IN-PLACE CONCRETE, before the application of the grout. The drypack grout shall be applied immediately following the application of the bonding compound in bands or strips to form a covering of the required thickness. The covering shall be smooth. Construction joints in the grout shall be sloped and shall be cleaned and wetted before application is resumed.

Drypack grout shall be cured in accordance with Section 03300, CAST-IN-PLACE CONCRETE.

Grout shall not be placed when ambient temperature is below 40°F or when it is likely that the ambient temperature will fall below 40°F during or within 48 hrs of placement, unless adequate protection is provided.

3.03 **CEMENT GROUT**

Cement grout shall be used for filling nonbearing portions of equipment pads and pressure grouting.

Except for the specialized equipment for pressure grouting, mixing and placing apparatus shall be similar to that normally used for cast-in-place concrete. Diluted grout shall be agitated to keep ingredients mixed.

3.04 **NONSHRINK GROUT**

Nonshrink grout shall be used for the bearing surfaces of machinery and equipment bases, column baseplates and bearing plates. Nonshrink grout also shall be used for setting bolts and reinforcing steel in holes for grouting.

Where specified, nonshrink grout shall meet the requirements of CRD-C621. Grout shall be placed in accordance with manufacturer's instructions.

3.05 **EPOXY GROUT**

Epoxy grout shall be used for repairing cracks by pressure grouting, and repairing structural concrete. Epoxy grout shall be HILTI CI 060 EP, Simpson's ETI injection system, or approved equal. Concrete shall be primed in accordance with the grout manufacturer's instructions.

3.06 **PRESSURE GROUTING**

Prior to grouting, systems and holes to be grouted shall be washed clean. Washing is not required for grouting soil voids outside pipe cylinders or casing pipes. Grouting, once commenced, shall be completed without stoppage. In case of breakdown of equipment, the Contractor shall wash out the grouting system sufficiently to ensure fresh grout and adequate bond and penetration will occur upon restarting the grouting operation. Grout pressure shall be maintained until grout has set.

****END OF SECTION****

**RANCHO MURIETA COMMUNITY SERVICES DISTRICT
WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
CHLORINE CONTACT BASIN EXPANSION – PHASE 1**

Division 5 – Metals

Section 05031	Hot-Dip Zinc Coating
Section 05100	Structural and Miscellaneous Metals
Section 05501	Anchor Bolts and Powder Actuated Fasteners

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SECTION 05031

HOT-DIP ZINC COATING

PART 1 – GENERAL

1.01 SCOPE

This section specifies hot-dip zinc coating.

1.02 QUALITY ASSURANCE

A. References

The publications referred to hereinafter form a part of this specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

American Society for Testing and Materials (ASTM) Publications

ASTM A123	<i>Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products</i>
ASTM A143	<i>Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement</i>
ASTM A153	<i>Zinc Coating (Hot-Dip) on Iron and Steel Hardware</i>
ASTM A384	<i>Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies</i>
ASTM A385	<i>Providing High-Quality Zinc Coatings (Hot-Dip)</i>

Military Specifications (Mil Spec.)

Mil Spec DOD-P-21035	Paint, High Zinc Dust Content, Galvanizing Repair
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1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted.

- A. Zinc dust-zinc oxide coating manufacturer's product data showing conformance to the specified product.
- B. Manufacturer's recommendation for application of zinc dust-zinc oxide coating.
- C. Coating applicator's Certificate of Compliance that the hot-dip galvanized coating meets or exceeds the specified requirements of ASTM A123 or ASTM A153, as applicable.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Zinc Coating

Zinc coating material shall be as specified in ASTM A153.

B. Zinc Dust-Zinc Oxide Coating

Zinc dust-zinc oxide coating shall conform to Mil Spec DOD-P-21035. Coating shall be as manufactured by Z.R.C. Chemical Products Company, or equal.

2.02 FABRICATION REQUIREMENTS

Fabrication practices for products to be galvanized shall be in accordance with applicable portions of ASTM A143, ASTM A384, and ASTM A385.

PART 3 – EXECUTION

3.01 APPLICATION

Steel members fabrications and assemblies shall be galvanized after fabrication in accordance with ASTM A123. Unless otherwise specified, steel items weighing 100 lbs or less shall be hot-dip zinc coated. Anchor bolts, bolts, screws, nuts, washers, and other minor steel fasteners shall be as specified in Section 05100, STRUCTURAL AND MISCELLANEOUS METALS.

Where field welding of galvanized steel is allowed, the coating should be repaired according to Part 3.03 of this specification section.

3.02 **COATING REQUIREMENTS**

Coating weight shall conform with Paragraph 5.1 of ASTM A123 or Table 1 of ASTM A153, as appropriate.

3.03 **FIELD REPAIR**

Where zinc coating has minor physical damage as determined by the District, substrate surface shall be first cleaned and then repaired with zinc dust-zinc oxide coating. Application shall be as recommended by the zinc dust-zinc oxide coating manufacturer. Coating shall consist of multiple coats to dry film thickness of 8 mils.

Items physically damaged, or which have insufficient or deteriorating zinc coatings, shall be removed from the project site for repair by the hot-dip zinc coating method.

****END OF SECTION****

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SECTION 05100

STRUCTURAL AND MISCELLANEOUS METALS

PART 1 – GENERAL

1.01 **SCOPE**

This section specifies structural and miscellaneous metals consisting of standard shapes, fasteners, rods and plates that are used in structural supports and connections, and for miscellaneous fabrications.

1.02 **QUALITY ASSURANCE**

A. **General**

Structural assemblies and shop welding shall meet the requirements of the AISC specifications and the *Specification for Aluminum Structures of the Aluminum Association*.

The use of salvaged, reprocessed or scrap materials shall not be permitted.

B. **References**

The publications referred to hereinafter form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

American Institute of Steel Construction, Inc.

AISC *Manual of Steel Construction*, Current Edition

AISC *Framed Beam Connections*, Current Edition

AISC S326 *Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings*

American Society for Testing and Materials (ASTM) Publications

ASTM A36/A36M7 *Structural Steel*

ASTM A307 *Carbon Steel Externally Threaded Standard Fasteners*

ASTM A320 *Alloy-Steel Bolting Materials for Low-Temperature Service*

ASTM A666	<i>Austenitic Stainless Steel, Sheet, Strip, Plate and Flat Bar for Structural Applications</i>
ASTM B308	<i>Aluminum-Alloy Standard Structural Shapes, Rolled or Extruded</i>
American Welding Society (AWS) Publications	
AWS D1.1	<i>Structural Welding Code-Steel</i>
AWS D1.2	<i>Structural Welding Code-Aluminum</i>
AWS	<i>Code for Arc Welding in Building Construction</i>
Federal Specifications (Fed. Spec.)	
Fed. Spec. TT-P-645A	<i>Primer, Paint, Zinc Chromate, Alkyd Type</i>
Aluminum Association Specifications (SAS)	
SAS	<i>Specifications for Aluminum Structures of the Aluminum Association</i>
International Conference of Building Officials, California Building Code, Current Edition	
CBC Chapters	<i>California Building Code - Chapter 20, 22, 27 and 28</i>
UBC Standards	<i>Uniform Building Code Standard No. 22-1</i>

C. Qualification of Welding

Qualify welding procedures and welding operators in accordance with AWS D1.1 for steel construction and AWS D1.2 for Aluminum Construction. Provide certifications that welders to be employed in the work have satisfactorily passed AWS qualification tests. If re-certification of welders is required, retesting will be the Contractor's responsibility.

D. Regulatory Requirements

Except as modified by the requirements specified herein and detailed on the Contract Drawings, structural steel work shall conform to the *California Building Code* (Current CBC), Chapter 22 "Steel", and structural aluminum work shall conform to the *California Building Code*, Chapter 20 "Lightweight Metals".

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted.

1. Fabrication drawings
2. Certifications for welders

1.04 **MEASUREMENT**

The Contractor shall verify all dimensions and shall make any field measurements necessary and shall be fully responsible for accuracy and layout of work. The Contractor shall review the Contract Drawings, and any discrepancies shall be reported to the District for clarification prior to starting fabrication.

PART 2 – PRODUCTS

2.01 **MATERIALS**

A. **Steel**

Materials for structural steel shall be as specified in Table A.

TABLE A
STRUCTURAL AND MISCELLANEOUS STEEL REQUIREMENTS

Material	Specification
Structural and miscellaneous bars, plates, shapes, and similar items	ASTM A36
Stainless steel	ASTM A666, Grade A, Type 304, unless shown otherwise
Stainless steel bolts, nuts and washers	ASTM A320, Type 316, unless shown otherwise
Steel bolts, hex head, and washers	ASTM A307, Grade A
Epoxy anchors	HILTI-HVA ADHESIVE ANCHOR SYSTEM, or equal, Type 304 stainless steel HAS Anchor Rod, unless shown otherwise.
Expansion anchors	HILTI-BOLT, McCulloch Industries, or equal, Type 304 stainless steel, unless shown otherwise
Wedge anchors	ITT, Phillips Drill Company, or equal, Type 304 stainless steel, unless shown otherwise
Shop primer	Shall conform to Section 09800, PAINTING AND SPECIAL COATING SYSTEMS

B. Aluminum

Materials for structural and miscellaneous aluminum shall be as specified in Table B.

TABLE B
STRUCTURAL AND MISCELLANEOUS ALUMINUM REQUIREMENTS

Material	Specification
Structural and miscellaneous bars, plates, shapes, and similar items	ASTM B308, 6061-T6 or 6063-T6 Alloy
Stainless steel bolts, nuts, and washers	ASTM A320, Type 316, unless shown otherwise

Note: All bolted aluminum assemblies shall use stainless steel bolts, nuts, and washers. Aluminum and carbon steel bolts, nuts, and washers are not acceptable.

C. Anchor Bolts

Anchor bolts shall conform to the requirements specified in Section 05501, ANCHOR BOLTS AND POWDER ACTUATED FASTENERS.

2.02 FABRICATION

Fabricate items of structural steel and aluminum in accordance with the plans, AISC Specifications, Aluminum Association Standards and as indicated on the approved shop drawings.

Galvanizing shall conform to Section 05031, HOT-DIP ZINC COATING.

2.03 STEEL FASTENERS LUBRICANT (ANTI-SEIZING)

Where stainless steel nuts, machined bolts, and other threaded fasteners are used, the Contractor shall apply an anti-seizing lubricant to the threads prior to making up the connections. The lubricant shall contain substantial amounts of molybdenum disulfide, graphite, mica, talc, or copper.

PART 3 – EXECUTION

3.01 INSTALLATION

A. General

Measurements shall be verified at the job. Holes shall be punched 1/16 in. larger than the nominal size of the bolts, unless otherwise specified. Whenever needed, because of the thickness of the metal, holes shall be subpunched and reamed or drilled. No drifting of bolts nor enlargement of holes will be allowed to correct misalignment. Mismatched holes shall be corrected with new material.

Dissimilar metals shall be protected from galvanic corrosion by means of pressure tapes, coatings or isolators. Aluminum in contact with concrete or grout shall be protected with a heavy coat of bituminous paint or two coats of zinc chromate. Zinc chromate shall conform to Fed. Spec. TT-P-645.

Metalwork to be embedded in concrete shall be as specified in Section 03300, CAST-IN-PLACE CONCRETE. Metalwork shall be placed accurately and held in correct position while the concrete is placed; or, if specified, recesses or blockouts shall be formed in the concrete after design strength is attained, and the metalwork shall be grouted in place in accordance with Section 03300, CAST-IN-PLACE CONCRETE. The surfaces of structural steel in contact with or embedded in concrete shall be thoroughly cleaned. The surfaces of aluminum in contact or embedded in concrete shall be thoroughly coated as required by the previous paragraph of this section.

Anchor bolts shall be installed as specified in Section 05501, ANCHOR BOLTS AND POWDER ACTUATED FASTENERS.

Structural steel completely encased in concrete shall not be galvanized or painted and shall have a clean surface for bonding to concrete.

Metalwork which is bent, broken or otherwise damaged shall be repaired or replaced by the Contractor.

B. Welding

1. The technique of welding employed, appearance, quality of welds made, and the methods of correcting defective work shall conform to codes for Arc and Gas Welding in Building Construction of the AWS and AISC. Surfaces to be welded shall be free from loose scale, rust, grease, paint, and other foreign material, except that mill scale which will withstand vigorous wire brushing may remain. A light film of linseed oil may likewise be disregarded. No welding shall be done when the temperature or the base metal is lower than 0°F. Finished members shall be true to line and free from twists.

2. Aluminum shall be welded with gas metal arc (MIG) or gas tungsten arc (TIG) processes in accordance with the manufacturer's recommendations as approved, and in accordance with the recommendations of the AWS contained in the *Welding Handbook*, as last revised. Grind smooth all exposed aluminum welds. Field welding of aluminum members is prohibited.
3. All structural steel and reinforcing steel welding operators shall be qualified in accordance with the requirements of the current AWS D1.1, Chapter 5, and shall be certified for all positions of welding in accordance with such procedure. All aluminum welding operators shall be qualified in accordance with the requirements of the current AWS D1.2, certified for all positions of welding in accordance with such procedure. Qualification tests shall be run by a recognized testing laboratory at the Contractor's expense. Previous recent qualification by the State of California Division of Highways will be acceptable.
4. All welding operators shall be subject to examination for requalification using the equipment, materials, and electrodes employed in the execution of the contract work. Such requalification, if ordered by the District, shall be done at the expense of the Contractor.

C. Bolted Connections

Bolted connections shall conform to AISC *Framed Beam Connections* and shall be bearing type connections with threads excluded from shear planes.

3.02 CLEANING

After installation, damaged surfaces of shop primed metals shall be cleaned and touched up with the same material used for the shop coat. Damaged surfaces of galvanized metals shall be repaired as specified in Section 05031 HOT-DIP ZINC COATING.

END OF SECTION

SECTION 05501

ANCHOR BOLTS AND POWDER ACTUATED FASTENERS

PART 1 – GENERAL

1.01 SCOPE

This section specifies anchor bolts complete with washers and nuts as well as powder actuated fasteners. Unless otherwise specified, anchor bolts shall be hot-dip galvanized or type 304 or 316 stainless steel.

1.02 QUALITY ASSURANCE

A. References

The publications referred to hereinafter form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

International Conference of Building Official (ICBO) Publications

2013 CBC *California Building Code, Current Edition*

American Society for Testing and Materials (ASTM) Publications

ASTM A307 *Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength*

ASTM A325 *Structural Bolts, Steel, Heat Treated 120/105 KSI Minimum Tensile Strength*

ASTM A320 *Alloy Steel Bolting Materials for Low-Temperature Service*

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted.

- A. Data indicating load capacities.
- B. Chemical resistance.

- C. Temperature limitations.
- D. Installation instructions.
- E. Manufacturer's data and catalogue numbers.
- F. ICC-ES evaluation reports for expansion and adhesive type anchors as specified in Part 3.03, Adhesive Anchors, and Part 3.04, Expansion Anchors.
- G. Design calculation in accordance with Part 2.04, Design.

PART 2 – PRODUCTS

2.01 ANCHOR BOLTS

A. General

Anchor bolt holes in equipment support frames shall not exceed the bolt diameters by more than 25 percent, up to a limiting maximum oversizing of 1/4 inch. Minimum anchor bolt diameter shall be 1/2 inch. Anchor bolts shall be furnished with leveling nuts, the faces of which shall be tightened against flat surfaces as shown to not less than 10 percent of the bolt's safe tensile stress.

Tapered washers shall be provided where mating surface is not square with the nut.

Expansion shields set in holes drilled in the concrete after the concrete is placed will not be permitted in substitution for anchor bolts except where otherwise specified. Upset threads shall not be acceptable.

B. Materials

Anchor bolt materials shall be as specified in Table A for concrete installation unless otherwise specified on the plans. Anchor bolt materials shall be as specified in Table B for CMU installations unless otherwise specified on the plans.

TABLE A
ANCHOR BOLT MATERIALS

Anchor Bolt Type	Carbon Steel Assemblies	Equipment Anchorage/ Aluminum Assemblies/ Stainless Steel Assemblies
Cast-in-Place Anchor Bolts	ASTM A307, Grade C, or ASTM A325 hot dip galvanized	ASTM A320 Type 316 SST
Adhesive Anchors	HILTI RE 500-SD with ASTM A193, Grade B7 Threaded Rod or Simpson “SET-XP” with ASTM A307 Grade C Threaded Rod, or equal	HILTI RE 500-SD with ASTM F593 CW1 Type 316 SST Threaded Rod, or Simpson “SET-XP” with ASTM A193 Grade B6 SST Threaded Rod, or equal
Expansion Anchors	HILTI KWIK-BOLT-TZ, Simpson Strong-Bolt, or equal	Type 304 SST HILTI KWIK-BOLT-TZ, Type 304 SST Simpson Strong-Bolt, or equal
Headed Anchor Studs	Nelson Stud, or equal	Nelson Stud, or equal.

Note: All anchor bolts supporting crane loads shall be high strength steel per ASTM A325. All anchor bolts supporting centrifuge loads shall be Type 316 SST.

TABLE B
ANCHOR BOLT MATERIALS IN CMU

Anchor Bolt Type	Carbon Steel Assemblies	Equipment Anchorage/ Aluminum Assemblies/ Stainless Steel Assemblies
Cast-in-Place Anchor Bolts	ASTM A307, Grade C, or ASTM A325 hot dip galvanized	ASTM A320 Type 316 SST
Adhesive Anchors	HILTI “HIT HY-150 Max” with ASTM A193 B7 Rod or Hilti HIT-TZ rods or Simpson “SET” with A307 Threaded Rod, or equal	HILTI “HIT HY-150 Max” with A304 Threaded rods or Simpson “SET” with A304 Threaded Rods, or equal
Expansion Anchors	HILTI Kwik-Bolt 3, Simpson Wedge-All, or equal	SST HILTI Kwik-Bolt 3, Type 304, SST Simpson Wedge-All Type 304, or equal
Headed Anchor Studs	Nelson Stud, or equal	Nelson Stud, or equal.

2.02 POWDER ACTUATED FASTENERS

A. General

All powder actuated fasteners shall be as manufactured by Hilti incorporated, Simpson Strong-Tie Co., or an approved equal. The approved equal shall be equal in materials, strength, and intended use. Reference shall be made to the Hilti “Product Technical Guide”, or Simpson's SAS Technical Manual for additional information.

B. Materials

1. Powder actuated fasteners driven into steel base material shall be 0.145 inch-diameter shank. Length of fastener shall be as required to penetrate through the steel base material. Minimum edge distance to any connected part shall be 1/2 inch and minimum fastener spacing shall be 2 inches.
2. Powder actuated fasteners driven into aluminum base material shall be X-CR type with P8 washers. Length of fastener shall be as required to penetrate through the aluminum base material. Minimum edge distance to any connected part shall be 1/2 inch and minimum fastener spacing shall be 2 inches.
3. Powder actuated fasteners driven into concrete base material shall be 0.145 inch-diameter shank. Length of fastener shall be as required to penetrate 1-1/2 inch into the concrete base material. Minimum edge distance to any concrete material shall be 3-inches and minimum fastener spacing shall be 4-inches.
4. Powder actuated fasteners driven into concrete base material through metal deck shall be 0.145 inch-diameter shank. Length of fasteners shall be as required to penetrate 1 inch into the concrete through the low flute. Fasteners shall be centered in the low flute. The minimum fastener spacing shall be 4-inches.
5. Where steel washers are indicated on the plans, powder actuated fasteners shall be 0.145 inch-diameter shank with 3/4-inch minimum diameter premounted steel washers.

2.03 STEEL FASTENERS LUBRICANT (ANTI-SEIZING)

Where stainless steel anchor bolts, adhesive anchors, and expansion anchors are used, the Contractor shall apply an anti-seizing lubricant to the threads prior to making up the connections. The lubricant shall contain substantial amounts of molybdenum disulfide, graphite, mica, talc, or copper.

2.04 DESIGN

Anchor bolts for equipment frames and foundations shall be designed in accordance with the CBC for Seismic Design Category D or to resist a minimum lateral seismic force of 40 percent of the operating weight of the equipment whichever is greater. This force shall be considered acting at the center of gravity of the piece under consideration. Calculations and shop drawings shall be submitted with the equipment submittal in accordance with Section 01300, **SUBMITTALS**, for all anchorage details. All calculations must be developed and signed by a civil or structural engineer currently registered in the State of California.

PART 3 – EXECUTION

3.01 GENERAL

Fieldwork, including cutting and threading, shall not be permitted on galvanized items. Dissimilar metals shall be protected from galvanic corrosion by means of pressure tapes, coatings or isolators. All stainless steel anchor bolts and fasteners shall be assembled with anti-seize compound.

3.02 CAST-IN-PLACE ANCHOR BOLTS

Anchor bolts to be embedded in concrete shall be placed accurately and held in correct position while the concrete is placed. The surfaces of metalwork in contact with concrete shall be thoroughly cleaned.

All anchor bolts shall not touch reinforcing steel. After anchor bolts have been embedded, their threads shall be protected by grease and the nuts run on. In anchoring machinery bases subject to heavy vibration, two nuts shall be used, one serving as a locknut. At locations where anchor bolts are to be installed in existing concrete, adhesive anchors or expansion anchors shall be used as specified in Part 3.03, Adhesive Anchors, and Part 3.04, Expansion Anchors.

3.03 ADHESIVE ANCHORS

Use of adhesive anchors shall be as shown on the plans and shall be subject to the following conditions:

1. Use shall be limited to locations where exposure, on an intermittent or continuous basis, to acid concentrations higher than 10 percent, to chlorine gas, or to machine or diesel oils, is extremely unlikely.
2. Use shall be limited to applications where exposure to fire or exposure to concrete or rod temperature above 120 degrees F is extremely unlikely. Overhead applications (such as pipe supports) because of the above concerns, shall be disallowed.
3. Approval from District for specific application and from supplier of equipment to be anchored, if applicable.
4. Anchor diameter shall be per contract documents or per equipment supplier specifications. Anchor shall be threaded or deformed full length of embedment and shall be free of rust, scale, grease, and oils.
5. Embedment depth shall be as specified on the plans.

6. All installation recommendations by the anchor system manufacturer shall be followed carefully, including, but not limited to, maximum hole diameter, minimum embedment, minimum concrete thickness and minimum edge distance.
7. Holes shall have rough surfaces, such as can be achieved using a rotary drill.
8. Holes shall be blown clean with compressed air and be free of dust or standing water prior to installation.
9. Anchor shall be left undisturbed and unloaded for full adhesive curing period as required by manufacturer.
10. Concrete temperature (not air temperature) shall be compatible with curing requirements of adhesives per adhesive manufacturer. Anchors shall not be placed in concrete below 40 degrees F.

The Contractor shall supply the District with the current ICC-ES evaluation report from the ICC Evaluation Service for the particular brand of adhesive anchors to be used.

3.04 **EXPANSION ANCHORS**

Use of expansion anchors shall be as shown on the plans and shall be subject to conditions 2, 3, 4, 6, 7, and 8 specified in Part 3.03, Adhesive Anchors.

The Contractor shall supply the District with the current ICC-ES evaluation report from the ICC Evaluation Service for the particular brand of expansion anchors to be used.

3.05 **POWDER ACTUATED FASTENERS**

Powder actuated fasteners shall be provided and installed as specified on the plans. Fastener installation shall be per the requirements of these specifications and the fastener manufacturer's recommendations. Use of powder actuated fasteners other than as shown on the plans shall not occur unless specifically approved by the District.

The Contractor shall supply the District with the current ICC-ES evaluation report from the ICC Evaluation Service for the particular brand of powder actuated fasteners to be used.

****END OF SECTION****

**RANCHO MURIETA COMMUNITY SERVICES DISTRICT
WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
CHLORINE CONTACT BASIN EXPANSION – PHASE 1**

Division 6 – Wood and Plastics

Section 06741 Fiberglass Reinforced Gratings

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SECTION 06741

FIBERGLASS REINFORCED GRATINGS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. This section covers the design, fabrication, and installation of FRP grating components at the Chemical Tank facility interior areas as specified and shown on the plans.

1.02 SUBMITTALS

- A. Submit shop drawings, product data, model numbers, materials of construction, and details of installation in accordance with Section 01300, SUBMITTALS.
- B. Certification stamped by a structural or civil engineer registered in California that all products and materials meet all performance and design requirements.
- C. Copies of all grating load test results.

1.03 QUALITY ASSURANCE

- A. All materials shall be new and of the best quality of their respective kind.
- B. All materials and FRP components specified herein shall meet or exceed the standards of the Occupational Safety and Health Administration (OSHA) and the Uniform Building Code (UBC).
- C. All items specified herein shall meet the requirements of ASTM D3917, ASTM D3918, ASTM D3647, ASTM D4385, and ASTM E84.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Reference to a manufacturer's name and model number or catalog number is for the purpose of establishing the standard of quality and general configuration desired.

2.02 PERFORMANCE AND DESIGN REQUIREMENTS

- A. Unless otherwise specified, minimum structural properties shall be:

<u>Parameter</u>	<u>Value</u>
Area, in ² /ft of width	2.88
Modulus of Elasticity, in ⁴ /ft of width	0.96
Section Modulus, in ³ /ft of width	0.94
2-in Bearing Bars	Values per foot of width
Open Space, percent	72
Approximate Weight, lbs/ft ²	4.0

- B. Grating shall have a maximum deflection of 0.562 inches when supported up to 4-foot centers and subjected to a concentrated safe load of 520 pounds per lineal foot. Minimum thickness shall be 2-inch with 2-inch square grid. Surface shall be slip resistant with a concave profile.
- C. The resin system shall be corrosion resistant vinyl ester and shall have a flame spread rating of 25 or less per ASTM E84. Resin system shall be premium grade and include ultraviolet inhibitor and fire retardant.
- D. Color shall be yellow.
- E. Grating shall be molded in one piece with concave walking surface. The tops of lengthwise and crosswise bars shall be in the same plane. Mesh pattern shall be square.
- F. All metallic hardware, nuts, and bolts shall be type 304 stainless steel.
- G. Grating manufacturer shall be Strongwell DuraGrate 2-inch thick 2-inch square mesh or District approved equal.

PART 3 - EXECUTION

3.01 GENERAL

- A. All work shall be installed clean, straight, square, and accurate with even joints. Work shall be free from blemishes, poor joining misfits, or any other anomalies that may affect durability functionality, and/or appearance.
- B. All items shall be installed as shown on the plans, in accordance with manufacturer's recommendations, and these specifications. Any discrepancies shall be brought to the attention of the District immediately.
- C. All measurements shall be field verified before fabrication and all components shall be fitted accurately.
- D. Bolts to be embedded in concrete shall be placed accurately and held in correct position while the concrete is place.
- E. Adhesives for connections shall be field applied under the direct supervision of manufacturer's representative.

- F. At joints to be bonded, surface preparation, materials, mixing, application, and curing shall comply with manufacturer's recommendations.

3.02 **GRATING**

- A. The Contractor shall install grating in sheet sizes compatible with the support conditions shown on the plans and shall require a minimum of field cutting.
- B. FRP grating shall be fabricated by the open mold process. Grating shall be slip resistant. Field conditions shall be pre-measured prior to cut outs.
- C. Type M clips shall be used to attach grating to supports.
- D. All cut edges, holes, and abrasions shall be completely sealed with compatible resin as recommended by the manufacturer. No uncoated edges or exposed fibers shall be allowed.

END OF SECTION

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**RANCHO MURIETA COMMUNITY SERVICES DISTRICT
WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
CHLORINE CONTACT BASIN EXPANSION – PHASE 1**

Division 7 – Thermal and Moisture Protection

Section 07900 Joint Sealers

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SECTION 07900

JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

This section specifies sealants for use throughout the project.

1.02 QUALITY ASSURANCE

A. References

The publications referred to hereinafter form a part of this specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

American Association of State Highway and Transportation Officials (AASHTO)

M 198 *Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants*

American Society for Testing and Materials (ASTM) Publications

C920 *Standard Specification for Elastomeric Joint Sealants*
C990 *Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants*
C1330 *Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants*
C1521 *Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints*
D412 *Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension*
D624 *Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer*

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, for the following:

- A. Product data
- B. Samples, include color selections

C. Manufacturer's Installation Instructions

D. Warranty

1.04 **QUALIFICATIONS**

- A. Manufacturer qualifications: Manufacturer of proposed product for minimum 5 years with satisfactory performance record.
- B. Installer qualifications: Manufacturer approved installer of products similar to specified products on minimum 5 projects of similar scope as Project with satisfactory performance record.

1.05 **PROJECT/SITE CONDITIONS**

- A. Environmental requirements: Do not apply sealant on wet or frosty surfaces or when surface temperature is higher than 100 degrees Fahrenheit or lower than recommended by the manufacturer.

1.06 **DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, and handle products in accordance with manufacturer's recommendations.
- B. Code date packages. Do not use material older than manufacturer's published shelf life. Store materials at temperatures lower than 80 degrees Fahrenheit. Condition materials in accordance with manufacturer's instructions prior to installation.

1.07 **SEQUENCING AND SCHEDULING**

- A. Caulk joints prior to painting.

1.08 **WARRANTY**

- A. Warrant to correct defective products for minimum 1 year in accordance with manufacturer's standard warranty.

1.05 **SPECIAL GUARANTEE**

- A. Provide a written guarantee covering replacement of sealant work that fails within 2 years of the date of project acceptance.

Failure includes:

1. Becoming brittle or cracking due to exposure, contraction or expansion.
2. Failure to resist abrasion of normal use and traffic.
3. Tear failure due to movement within 50% of joint width for Class A sealants.

4. Water infiltration for joints intended to exclude water, air infiltration for joints intended to exclude air.

PART 2 - PRODUCTS

2.01 SEALANTS

A. General:

1. Provide colors matching materials being sealed.
2. Where compound is not exposed to view in finished work, provide manufacturer's color which has best performance.
3. Nonsagging sealant for vertical and overhead horizontal joints.
4. Sealants for horizontal joints: Self-leveling pedestrian/traffic grade.
5. Joint cleaner, primer, bond breaker: As recommended by sealant manufacturer.
6. Sealant backer rod and/or compressible filler made from closed cell polyethylene, polyethylene jacketed polyurethane foam, or other flexible, nonabsorbent, non-bituminous material recommended by sealant manufacturer to:
 - a) Control joint depth.
 - b) Break bond of sealant at bottom of joint.
 - c) Provide proper shape of sealant bead.
 - d) Serve as expansion joint filler.

2.02 ACRYLIC-LATEX SEALANT

- A. Permanently flexible, nonstaining, and nonbleeding latex modified acrylic sealant compound, colors as selected by District from manufacturer's standard options.
- B. Manufacturers: One of the following or district approved equal:
 1. Tremco, Tremflex 834.
 2. Pecora Corp., Number AC-20.
 3. Sonneborn, Sonolac.

2.03 PRECAST CONCRETE JOINT SEALANT

- A. Preformed, cold-applied, ready-to-use, flexible joint sealant in accordance with ASTM C990 and AASHTO M198. Manufacturers: One of the following or equal:
 1. Henry Corporation, Ram-Nek.
 2. Concrete Sealants Division, ConSeal.

2.04 SILICONE SEALANT

- A. ASTM C920, Type S, Grade NS, Class 25, single component silicone sealant.
- B. Manufacturers: One of the following or District approved equal:
 - 1. Tremco, Proglaze.
 - 2. Pecora Corp., Number 864.
 - 3. Dow Corning, Number 795.
 - 4. General Electric, Number 1200 Series.

2.05 SYNTHETIC RUBBER SEALING COMPOUND

- A. Manufacturer: One of the following or District approved equal:
 - 1. Sika Corporation, Sikaflex 2c NS or SL.
 - 2. Pacific Polymers, Elastothane 227R.
- B. Material: In accordance with ASTM C920 Type M, Grade P (pourable), Class 25 and Type M, Grade NS (non-sag), Class 25; multi-part polyurethane; able to cure at room temperature to firm, highly resilient polymer; able to perform satisfactory when continuously submerged in water or sewage and exposed to direct sunlight in dry condition; with the following properties determined at 75 degrees Fahrenheit and 50 percent relative humidity:
 - 1. Base: Polyurethane rubber.
 - 2. Application time: Minimum 2 hours.
 - 3. Cure time: Maximum 3 days.
 - 4. Tack free time: Maximum 24 hours.
 - 5. Ultimate hardness: Non-sag 25, Pourable/SL 40, within 5 Shore A.
 - 6. Tensile strength: Non-sag 95 pounds per square inch minimum and selfleveling minimum 170 pounds per square inch when tested in accordance with ASTM D412.
 - 7. Ultimate elongation: Minimum 340 percent when tested in accordance with ASTM D412.
 - 8. Tear resistance: Non-sag 45 pounds per inch minimum and self-leveling minimum 85 pounds per inch when tested in accordance with ASTM D624, Die C.
 - 9. Service temperature range: Minus 25 degrees to 158 degrees Fahrenheit.
- C. Color: Gray to match concrete, unless indicated on the plans.

2.06 SYNTHETIC SPONGE RUBBER FILLER

- A. Closed-cell expanded sponge rubber manufactured from synthetic polymer neoprene base, or resilient polyethylene foam backer rod. In accordance with ASTM C1330, Type O:
- B. Manufacturers: One of the following or District approved equal:
 - 1. Presstite, Number 750.3 Ropax Rod Stock.

2. Rubatex Corp., Rubatex-Cord.

C. Characteristics:

1. Suitable for application intended.
2. Strength: As necessary for supporting sealing compound during application.
3. Resiliency: Resistance to environmental conditions of installation.
4. Bonding: No bonding to the sealing compound.
5. Structure: Cellular, prevents absorption of water.
6. Compatibility with other materials in joint and acceptance by manufacturer of sealing compound.
7. Size: Minimum 25 percent greater than nominal joint width.

2.07 RELATED MATERIALS

- A. Primer: Nonstaining type, recommended by sealant manufacturer to suit application.
- B. Joint cleaner: Noncorrosive, nonstaining, compatible with joint forming materials and as recommended by sealant manufacturer.
- C. Bond breaker tape: Pressure-sensitive tape recommended by sealant manufacturer to suit application.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify acceptability of joint dimensions, physical, and environmental conditions.
- B. Verify that surfaces are dry, clean, and free of dirt, grease, curing compound, and other residue which might interfere with adhesion of sealants.

3.02 PREPARATION

- A. Allow concrete to cure thoroughly before caulking.
- B. Synthetic sponge rubber filler:
 1. Prepare surfaces designated to receive filler in accordance with manufacturer's installation instructions.
 2. Do not stretch filler beyond its normal length during installation.

C. Caulking:

1. Verify that surfaces are dry, clean, and free of dirt, grease, curing compounds, and other residue that might interfere with adhesion of sealant.
2. Concrete, masonry, wood, and steel surfaces: Clean and prime in accordance with manufacturer's instructions prior to caulking.

D. Synthetic rubber sealing compound:

1. Ensure surfaces to which synthetic rubber must bond are dry and free of dust, dirt, and other foreign residue.
2. Heavy sandblasted caulking groove to sound surface, and prime with manufacturer's recommended primer for particular surface.

E. For sidewalks, pavements, and similar joints sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to depth equal to 75 percent of joint width, but neither more than 5/8 inches deep nor less than 3/8 inches deep.

F. For normal moving building joints sealed with elastomeric sealants not subject to traffic, fill joints to depth equal to 50 percent of joint width, but neither more than 1/2 inch deep nor less than 1/4 inch deep.

G. For joints sealed with acrylic-latex sealants, fill joints to depth in range of 75 percent to 125 percent of joint width.

H. Use joint filler to achieve required joint depths, to allow sealants to perform properly.

I. Prepare surfaces and install synthetic sponge rubber filler in accordance with manufacturer's recommendations.

J. Do not stretch filler beyond normal length during installation.

K. Apply bond breaker when recommended by joint sealer manufacturer.

3.03 **INSTALLATION**

A. Synthetic sponge rubber filler: Install filler in accordance with manufacturer's installation instructions.

B. Caulking, joints, and sealing:

1. Construct expansion, contraction, and construction joints as indicated on the plans.
2. Install pipe and conduit in structures as indicated on the plans.
3. Caulk doors, windows, louvers, and other items installed in or over concrete openings inside and out.
4. Use synthetic rubber sealing compound for caulking where indicated on the plans or as specified, except for masonry construction and where specified otherwise.

5. Complete caulking prior to painting.
6. Verify that concrete is thoroughly cured prior to caulking.
7. When filler compressible material is used, use untreated type.
8. Apply caulking with pneumatic caulking gun.
9. Use nozzles of proper shape and size for application intended.
10. Maintain continuous bond between caulking and sides of joint to eliminate gaps, bubbles, or voids and fill joint in continuous operation without layering of compound.
11. Employ experienced applicators to caulk joints and seams in neat workmanlike manner.
12. To hasten curing of compound when used on wide joints subject to movement, apply heat with infrared lamps or other convenient means.
13. Apply synthetic rubber sealing compound with pneumatic caulking tool or other acceptable method.

3.04 **CLEANING**

- A. Clean surfaces adjacent to sealant as work progresses.
- B. Remove excess uncured sealant by soaking and scrubbing with sealant cleaning solvent.
- C. Remove excess cured sealant by sanding with Number 80 grit sandpaper.
- D. Leave finished work in neat, clean condition.

3.05 **SCHEDULE**

- A. Acrylic latex:
 1. Use where indicated on the plans.
 2. Interior joints with movement less than 7.5 percent and not subject to wet conditions.
- B. Silicone:
 1. Use where indicated on the Plans.
 2. Joints and recesses formed where window, door, louver and vent frames, and sill adjoin masonry, concrete, stucco, or metal surfaces.
 3. Door threshold bedding.
 4. Moist or wet locations, including joints around plumbing fixtures.
 5. Stainless steel doors and frames, including joints between applied stops and frames, and around anchor bolts.
 6. Plenum joints.
- C. Synthetic rubber sealing compound, non-sag Type II:
 1. Use where indicated on the Plans.
 2. Water-bearing and earth-bearing concrete structures.
 3. Joints in masonry, concrete vertical surfaces, and metal-faced panels in vertical surfaces.
 4. Joints between sheet metal flashing and trim.

5. Joints between sheet metal flashing and trim, and vertical wall surfaces.
6. Small voids between materials requiring filling for weathertight performance in vertical surfaces.
7. Perimeters of frames of doors, windows, louvers, and other openings where bonding is critical to airtight performance.
8. Expansion and control joints in masonry vertical surfaces.

D. Synthetic rubber sealing compound, self-leveling Type I:

1. Use where indicated on the plans.
2. Expansion and control joints in masonry, concrete horizontal surfaces, and metal panels in horizontal surfaces.
3. Small voids between materials requiring filling for weathertight performance in horizontal surfaces.
4. Pavement joints.
5. Perimeters of frames of doors, windows, louvers, and other openings in horizontal surfaces where bonding is critical to airtight performance.

3.06 FIELD QUALITY CONTROL

A. Adhesion testing:

1. Perform adhesion tests in accordance with ASTM C1521 per the following criteria:
 - a) Water bearing structures: 1 test per every 1,000 LF of joint sealed.
 - b) Exterior precast concrete wall panels: 1 test per every 2,000 LF of joint sealed.
 - c) Chemical containment areas: 1 test per every 1,000 LF of joint sealed.
 - d) Building expansion joints: 1 test per every 500 LF of joint sealed.
 - e) All other type of joints except butt glazing joints: 1 test per every 3,000 LF of joint sealed.
 - f) Manufacturer's authorized factory representative provide written recommendations for remedial measures on failing tests.

END OF SECTION

**RANCHO MURIETA COMMUNITY SERVICES DISTRICT
WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
CHLORINE CONTACT BASIN EXPANSION – PHASE 1**

Division 9 – Finishes

Section 09800 Painting and Special Coating Systems

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SECTION 09800

PAINTING AND SPECIAL COATING SYSTEMS

PART 1 – GENERAL

1.01 **SCOPE**

The work covered by this section consists of furnishing all labor, equipment and material necessary to perform surface preparation and to furnish and apply all paint, protective coatings and finishes as specified herein and/or as indicated on the plans.

1.02 **QUALITY ASSURANCE**

A. **References**

The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

American Society for Testing and Materials (ASTM) Publication:

ASTM D1653	<i>Test Method for Water Vapor Permeability of Organic Coating Films</i>
ASTM D2200	<i>Pictorial Surface Preparation Standards for Painting Steel Surfaces</i>
ASTM D3960	<i>Practice for Determining Volatile Organic Contents (VOC) of Paints and Related Coatings</i>
ASTM D4258	<i>Practice for Surface Cleaning Concrete for Coating</i>
ASTM D4259	<i>Standard Practice for Abrading Concrete</i>
ASTM D4585	<i>Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation</i>
ASTM E84	<i>Test Method for Surface Burning Characteristics of Building Materials</i>

Federal Specifications (Fed. Spec.) Publications:

Fed. Spec. TT-C-555	<i>Coating, Textured (for Interior and Exterior Masonry Surfaces)</i>
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The Society for Protective Coatings; formally known as Steel Structures Painting Council (SSPC) Specifications:

SSPC-SP-1	<i>Solvent Cleaning</i>
SSPC-SP-2	<i>Hand Tool Cleaning</i>
SSPC-SP-5/NACE 1	<i>White Metal Blast Cleaning</i>
SSPC-SP-6/NACE 3	<i>Commercial Blast Cleaning</i>
SSPC-SP-7/NACE 4	<i>Brush-Off Blast Cleaning</i>
SSPC-SP-10/NACE 2	<i>Near-White Blast Cleaning</i>

B. Experience

The Coating subcontractor shall hold a current C-33 painting and decorating license and have a minimum of 5 years practical experience and successful history in the application of specified products to surfaces. He shall substantiate this requirement by furnishing a list of six references of similar projects.

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted.

A. Manufacturer's Data

1. Manufacturer's Product Data Sheets including complete data on each type of paint and primer.
2. Material Safety Data Sheets (MSDS).
3. Manufacturer's published surface preparation application instructions.
4. Color charts for each paint for color selection by the District.

1.04 DELIVERY AND STORAGE

All materials shall be delivered to the site in the manufacturer's sealed containers. Each container shall be labeled by the manufacturer, and the label shall be intact upon delivery. Labels shall give the manufacturer's name, brand, type of paint, batch number, color of paint, date of manufacture, storage life, and instructions for reducing. Job mixing or job tinting may be done when approved by the District for sample colors.

The Contractor shall store all materials and equipment in a storage place protected from weather and excessive heat and cold. Necessary precautions shall be taken to reduce hazards to a minimum. Materials exceeding the storage life recommended by the manufacturer shall be removed from the site.

Where shop-primed or shop-finished items are to be shipped to the job site, protect coatings from damage by the use of battens, padded straps, and nonmetallic slings. Excessive shipping damage will be considered grounds for rejection of shop primers and shop finishes.

1.05 ENVIRONMENTAL CONTROLS

- A. Provide ambient temperatures recommended by manufacturer of material to be applied.
- B. Provide adequate ventilation and safety measures for Contractor's employees.
- C. Provide adequate illumination on all surfaces in areas to be painted, including floors, walls and ceilings, even though they do not require painting.
- D. Use temporary dust barriers to close off areas being painted from areas where other work is being performed.

1.06 COMPLIANCE WITH REGULATORY REQUIREMENTS

All applicable federal, state, and local regulatory agency requirements shall be complied with during the course of the work. The Contractor's attention is directed to the following list of agency requirements that generally apply to coatings work; the Contractor is responsible for identifying and complying with any other agencies or requirements not listed.

- 1. OSHA - Personnel protection during all phases of work, including exposure to airborne solvents, dust, and lead.
- 2. CAL/OSHA - Personnel protection; requirements may supersede OSHA regulations.
- 3. California Title 22 - Environmental requirements, including definition of abrasive blast materials and residue relative to hazardous waste disposal requirements.
- 4. Sacramento Valley Air Quality Management District - Environmental requirements for limiting airborne emissions from equipment, products, and methods of operation.

1.07 MANUFACTURER'S REPRESENTATIVE

The coating manufacturer shall provide a representative to visit the job site at intervals during surface preparation and coating as may be required for product application quality assurance, and to determine compliance with manufacturer's instructions and these specifications, and as may be necessary to resolve field problems attributable to, or associated with, the manufacturer's products furnished under this contract.

PART 2 – PRODUCTS

2.01 MATERIALS

All paint and coating materials furnished for each coating system shall be new products of a single manufacturer.

Only compatible materials shall be used in the work. Particular attention shall be directed to compatibility of primers and finish coats.

The volatile organic content (VOC) of the applied coatings, as determined in accordance with ASTM D3960, shall comply with prevailing air pollution regulations.

Regulations prohibit the manufacture, sale, or application of Architectural Coatings and Specialty Coatings having greater than stipulated levels of volatile organic compounds measured in grams per liter by weight of coating as applied, after January 1, 2004.

The Contractor shall base his own bid on using the products specified. If the specified products are not available in formulations that meet applicable regulations on VOC levels at time of application, the Contractor shall submit for review products of equivalent quality and function that comply with regulations in effect at that time.

If the Contractor applies any coatings, which do not meet regulations as referred to in this Section for VOC content, or if he applies coatings that have been modified or thinned other than as recommended by manufacturer, he shall be responsible for any fines, costs, remedies, or legal actions that may result.

The paints, primers and coating shall be the product of the PPG Protective and Marine Coatings Group (Amercoat), Pittsburgh, PA; Sherwin-Williams, Industrial Maintenance Coatings, Cleveland, OH; Devoe International Coatings, Cleveland, OH; the Carboline Company, St. Louis, MO; or equal. Examples of paint systems from four manufacturers are listed in the following specifications. The "or equal" clause refers to dry film thickness (solids content), generic type of primer, paint, or coating, and ingredients in the coating system. The coating must be recommended for each service.

No request for substitution for an "or equal" will be considered which decreases the film thickness designated, the number of coats to be applied, solids content by volume, the general type of coating, paint, or primer, or the quantity, quality and type of ingredients in the coatings specified. The Contractor shall provide a list of references where coating of the same generic type has been applied on similar projects. The reference list shall give the project name, city, state, owner, phone number of owner, coating system reference and number, and year coating was applied. Paints not listed in these specifications shall be submitted with certified ingredients analysis so that a complete comparison between specified and proposed paint may be made by the District.

PART 3 – EXECUTION

3.01 COATINGS

A. General

Coating products shall not be used until the District has inspected the materials. Adequate ventilation shall be used at all times. Adequate illumination shall be provided on all surfaces in areas to be painted.

B. Coating Systems

1. Shop Applied Prime Coat: Except as otherwise specified, prime coats may be shop or field applied. Shop applied primer shall be compatible with the specific coating system and shall be applied at the minimum dry film thickness recommended by the manufacturer. Approved submittal data identifying the shop primer used shall be provided to the onsite finish coat applicator and to the Construction Representative before delivery of items to the jobsite. Damaged, deteriorated and poorly applied shop coatings that do not meet the requirements of this section shall be removed and replaced by a field coating. The field coating may consist of touching up the shop prime coat and then applying the finish coats to achieve the specified film thickness and continuity.
2. Field Coats: Field coats shall consist of one or more prime coats and one or more finish coats to build up the coating to the specified dry film thickness. Finish coats shall not be applied until other work in the area is complete and until the prime and intermediate coats have been inspected by the District.

3.02 PREPARATION

A. General

All surfaces to be coated or painted shall be in the proper condition to receive the material specified before any coating or painting is performed. Substrates shall be prepared in strict accordance with coating system manufacturer's requirements. Primers shall be used where coatings are not self-priming whether specified herein or not. No more abrasive blasting or surface preparation than can be coated or painted in a normal working day will be permitted unless approved in writing by the District. All sharp edges, burrs and weld spatter shall be removed. The following levels of surface preparation are subsequently referred to:

1. White Metal Blast Cleaning (SSPC-SP-5): Removal of all visible rust, mill scale, paint, and foreign matter by blast cleaning by wheel or nozzle (dry) using sand, grit, or shot.
2. Near-White Blast Cleaning (SSPC-SP-10): Blast cleaning nearly to white metal cleanliness until at least 95% of each element of surface area is free of all visible residues.

3. Commercial Blast (SSPC-SP-6): Blast cleaning until at least 67% of each element of surface area is free of all visible residues.
4. Brush-Off Blast Cleaning (SSPC-SP-7): Blast cleaning of all except tightly adhering residues of mill scale, rust, and coatings, exposing numerous evenly distributed flecks of underlying metal.
5. Solvent Cleaning (SSPC-SP-1): Removal of all grease, oil and dirt.

Clean cloths and clean fluids shall be used in solvent cleaning. Cleaning and painting shall be scheduled so that dust and spray from the cleaning process will not fall on wet, newly painted surfaces. Hardware, electrical fixtures and similar accessories shall be removed or masked during preparation and paint operations or shall otherwise be satisfactorily protected. Equipment adjacent to walls shall be disconnected and moved to permit cleaning and painting of equipment and walls and, following painting, shall be replaced and reconnected.

B. Metallic Surfaces

Metallic surfaces shall be prepared in accordance with applicable portions of surface preparation specifications of the *Society for Protective Coatings*, formally the *Steel Structures Painting Council (SSPC)* specified in each coating system. The solvent in solvent cleaning operations shall be as recommended by the manufacturer.

Preparation of metallic surfaces shall be based upon comparison with ASTM D2200, and as described herein. To facilitate inspection, the Contractor shall, on the first day of abrasive blasting operations, abrasive blast metal panels to the standards specified. Plates shall measure a minimum of 8-1/2 in. x 11 in. Panels shall measure a minimum of 8-1/2 in. x 11 in. Panels meeting the requirements of the specifications shall be initialized by the Contractor and the District and coated with a clear non-yellowing finish. One of these panels shall be prepared for each type of abrasive blasting and shall be used as the comparison standard throughout the project.

C. Detailed Surface Preparation

Surface preparations for each type of surface shall be in accordance with the specific requirements of each coating system.

D. Existing Facilities – Touch Up and Recoating

Unless otherwise specified, existing coating systems damaged by new construction shall be repaired and coated in accordance with the appropriate system specified for new work.

Contractor shall demonstrate that the existing coating is compatible with field coating by applying small test patches of specific paints over existing coatings. If the existing coating is not compatible with the field coat (it lifts or ripples), the existing coating shall be reprimed with a primer compatible with both the existing coating and the field applied paint or

replaced with the proper prime coat. The primer shall be as recommended by the manufacturer of the field applied paints.

The Contractor has the option of completely removing the existing coating before applying the specified coating.

3.03 **APPLICATION**

A. **Workmanship**

Each coat of paint shall be of the consistency as supplied by the manufacturer, or thinned if necessary, and applied in accordance with the manufacturer's written instructions. Each coat shall be well brushed, rolled, or sprayed to obtain a uniform and evenly applied finish. Work shall be free from "runs", "bridges", "shiners", or other imperfections due to faulty intervals. Particular care shall be taken to obtain a uniform, unbroken coating over all bolts, threads, nuts, welds, edges and corners. Further, all weld splatter shall be removed and all welds neutralized with thinner.

B. **Paint Properties, Mixing and Thinning**

Paint, when applied, shall provide a satisfactory film and smooth even surface, and glossy undercoats shall be lightly sanded to provide a surface suitable for the proper application and adhesion of subsequent coats. Paints shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings consisting of two or more components shall be mixed in accordance with the manufacturer's instructions. Unless otherwise specified, paint shall not be reduced more than necessary to obtain the proper application characteristics. Thinner shall be both type and amount as recommended by the coating manufacturer.

C. **Environmental Conditions**

Paints shall be applied only to surfaces that are dry, and only under such atmospheric conditions as will cause evaporation rather than condensation. Paint shall not be applied during rainy, misty weather, or to surfaces upon which there is frost or moisture condensation. During damp weather, when the temperature of the surface to be coated is within 5°F of the dew point, the surfaces shall be heated to prevent moisture condensation thereon. Bare metal surfaces, except those which may be warped by heat, may be dehydrated by flame-heating devices immediately prior to paint application. During painting, and for a period of at least 8 hours after the paint has been applied, the temperature of the surfaces to be painted, the painted surfaces, and the atmosphere in contact shall be maintained at or above 50°F and not less than 10°F above the dew point or specifically at manufacturer's recommended ambient temperatures and humidity ranges. Fans or heaters shall be used inside enclosed areas where conditions causing condensation are severe.

Paint shall not be applied on surfaces hotter than 120°F.

No painting of concrete, masonry work, plaster or plasterboard is permitted until all construction activities involving moisture in adjacent areas have been completed, the moisture involved has been dissipated, and adjacent masses and the surface to be painted have reached a constant condition of humidity suitable for the application of paint.

Paint shall not be applied to masonry or concrete within 30 days of construction of same or if the moisture content is greater than 15% as measured on the Delmhorst moisture meter.

D. Protection of Coated Surfaces

Items that have been coated shall not be handled, worked on, or otherwise disturbed, until the paint is completely dry and hard. After delivery at the site of permanent erection or installation, shop-coated metalwork shall be repainted or retouched with specified paint when it is necessary to maintain the integrity of the film.

E. Method of Paint Application

Where two or more coats are required, the alternate coats shall be of contrasting colors. Colors shall not contain lead, or any lead compound, which may be destroyed or affected by hydrogen sulfide or any other corrosive gas.

Electrical, instrumentation, and mechanical equipment, on which the manufacturer's coating is acceptable, shall be touch-up primed and painted with two coats of the specified coating system to match the color scheduled. This does not apply to electrical and instrumentation equipment specified in Division 16.

Only good, clean brushes and equipment shall be used; and all brushes, buckets, and spraying equipment shall be cleaned immediately at the end of each painting period.

If paint is applied by spray, the air pressure used shall be within the ranges recommended by both the paint and spray equipment manufacturers. Spray painting shall be conducted under controlled conditions, and the Contractor shall be fully responsible for any damage occurring from spray painting.

Care shall be exercised not to damage adjacent work during abrasive blasting operations. Stainless steel shall not be abrasive blasted. Blasted surfaces shall be coated as soon as possible after being abrasive blasted and before any rust bloom occurs. If rust bloom occurs, abrasive blasting the surface must be repeated prior to coating. All dust shall be removed from the surfaces prior to painting.

F. Film Thickness and Continuity

Coating system thickness is the total thickness of primer and finish coats and does not include passivators or sealers.

The surface area covered per gallon of paint for various types of surfaces shall not exceed those recommended by the manufacturer. The first coat (prime coat) on metal surfaces

refers to the first full paint coat and not to conditioning, tie coats, sealers or other pretreatment applications. Coatings shall be applied to the thickness specified, and in accordance with these specifications. Unless otherwise specified, the average total thickness (dry) of any completed protective coating system on exposed metal surfaces shall be not less than 1.25 mils per coat, and the minimum thickness at any point shall not deviate more than 25% from the required average. Unless otherwise specified, no less than 2 coats shall be applied.

In testing for continuity of coating about welds, projections (such as bolts and nuts), and crevices, the District will determine the minimum conductivity for smooth areas of like coating where the dry mil thickness has been accepted. This conductivity shall then be taken as the minimum required for those rough or irregular areas. Pinholes and holidays shall be repainted to the required coverage.

G. Special Requirements

Hangers and supports shall be coated, except for the final coat, prior to the installation. Except for those to be filled with grout, the underside of ungalvanized equipment bases and supports shall be coated with at least one coat of primer specified for System C prior to setting the equipment in place. Bolts and bolt holes in flanges (such as those used with couplings or wafer type valves where holes and bolts as finally installed will be exposed to weather or moisture) shall be coated prior to assembly to prevent rusting of the unprotected metals.

H. Cleanup

Upon completion of coating, the Contractor shall remove surplus materials, protective coverings, and accumulated rubbish, and thoroughly clean all surfaces and repair any overspray or other paint related damage.

3.04 ELEVENTH MONTH INSPECTION

The Contractor shall guarantee all coating work for a period of one year following the date of final acceptance by the District. The Contractor is hereby notified that the District will inspect the project during the eleventh month following the date of final acceptance. The Contractor shall be notified by certified letter as to the date and time of the eleventh month inspection and will be expected to attend with the coating subcontractor. All defects in workmanship and materials shall be repaired by the Contractor at no cost to the District in accordance with this specification and to the satisfaction of the District or their appointed representative.

3.05 COATING SYSTEMS

The coating systems used for different types of surfaces are listed below and followed by specification for each:

<u>Surface Type</u>	<u>Coating Description</u>	<u>System</u>
Ferrous Metal - Continuously or Intermittently Submerged	Epoxy	A
Ferrous Metal - Exposure to Moisture or Fumes	Epoxy	B
Ferrous Metal - Interior and Exterior - Normal Exposure	Epoxy/Urethane	C
Metal - High Temperature Exposure	Inorganic Zinc	D
Metal - Aluminum, Copper, Brass	Pretreatment/Primer	E
Metal - Exposed with Bleeding Surfaces	Epoxy	F
Concrete and Masonry - Exterior - Normal Exposure	Acrylic	G
Concrete - Subject to Chemical Attack	Epoxy	H
Concrete and Masonry - Interior - Mild Exposure	Water-Based Catalyzed Epoxy	I
Concrete Floors	Epoxy	J
Woodwork - Interior and Exterior	Alkyd Primer Acrylic Coating	K
Gypsum Board	PVC/Acrylic Epoxy	L
Underground Piping Appurtenances	Coal Tar Epoxy	M
Plastic Pipe	Epoxy/Urethane	N
Fiberglass Piping, Ductwork and Equipment	Polyamide Epoxy	O
Concrete and Masonry - Interior - Normal Exposure	Epoxy/Acrylic	P
Fusion Epoxy Coated Fabrications	Epoxy	Q

A. System A - Ferrous Metal - Continuously or Intermittently Submerged

1. General: All submerged metalwork, gates, equipment, valves, exposed pipe work, and all other metalwork within areas which will be submerged, except as noted hereinafter, shall be painted with this coating system.
2. Surface Preparation: All metal surfaces (non-galvanized) shall be abrasive blasted according to SSPC-SP-10, to provide a surface profile of 1.5 to 2 mils. Where metal is galvanized, pretreat with Paint System E after Brush Blasting per SSPC-SP-7. Where metal has bleeding surfaces, pretreat with System F.
3. Coatings
 - a. PPG: Apply two coats of Amerlock 2 VOC Epoxy at 4 to 8 mils dry film thickness per coat. Total dry film thickness (DFI) for this system shall be a minimum of 13 mils.
 - b. Devoe International Coatings: Bar-Rust 233H LV – two coats at 6 to 8 mils dry film thickness per coat. Total dry film thickness to this system shall be a minimum of 13 mils

B. System B - Ferrous Metal - Exposure to Moisture and Fumes

1. Surface Preparation: All metal surfaces, except those with a factory pretreatment and primer (such as doors and frames), shall be abrasive blasted according to SSPC-SP 10, using low dust methods. Any tightly adherent coating that remains should be Brush Blasted per SSPC-SP-7. Damage to thin gauge steel surfaces from abrasive blasting shall be avoided.
2. Coatings
 - a. Devoe International Coatings: Apply one coat of Enviroline 222 to a dry film thickness of 20 mils.
 - b. Carboline: Apply one coat of Phenoline 1205, flake filled epoxy novolac to a dry film thickness of 15 mils.

C. System C - Ferrous Metal - Interior and Exterior - Normal Exposure

1. General: The Contractor shall paint all exposed steel work, exposed pipe work, fittings, all mechanical equipment, pumps, motors, and window sash with this coating system.

All metal work previously given a shop prime coat approved by the District shall be touched up as required in the field with primers specified below.

2. Surface Preparations: All metal surfaces shall be cleaned according to SSPC-SP-6. Where metal is galvanized, pretreat with Paint System E after Brush Blasting per SSPC-SP-7. Where metal has bleeding surfaces, pretreat with System F.
3. Coatings
 - a. PPG: Prime coat shall consist of Amerlock 2 VOC polyamide epoxy applied to a dry film thickness of 4 to 6 mils. Finish coat shall consist of Amershield VOC polyurethane applied to a dry film thickness of 3 mils. Total dry film thickness of this system shall be a minimum of 8 mils.
 - b. Sherwin-Williams: Apply one coat of Macropoxy 646 B58-600 to a minimum dry film thickness of 4 mils. Finish coat shall consist of Hi-Solids Polyurethane B65-300 to a dry film thickness of 4 mils. The total dry film thickness for this system shall be a minimum of 8 mils.
 - c. Devoe International Coatings: Prime coat shall consist of Bar Rust 235 at 4 to 6 mils dry film thickness. One finish coat of Devthane 379H at 2 to 3 mils dry film thickness. Total dry film thickness of this system shall be a minimum of 7 mils.
 - d. Carboline: Prime coat shall consist of Carboguard 890 applied at 4 to 6 mils dry film thickness. Finish coat shall consist of Carbothane 134HG applied at 2 to 2.5 mils dry film thickness. Total dry film thickness for this system shall be a minimum of 7 mils.

D. System D - Metal - High Temperature Exposure

1. General: Engine mufflers, exhaust systems and other metal surfaces subjected to high temperatures (up to 700°F) shall be coated with this system.
2. Surface Preparation: Surfaces shall be field abrasive blasted in accordance with SSPC-SP-10.
3. Coatings:
 - a. PPG: Apply one coat of Dimetcote 9HS to a minimum 3 mils dry film thickness.
 - b. Sherwin-Williams: Apply one coat of Zinc Clad II HS B69VZ3/ B69VZ1/ B69D11 to a minimum dry film thickness of 3 mils.
 - c. Devoe International Coatings: Apply one coat of Catha-Coat 304V at a minimum of 3 mils dry film thickness.
 - d. Carboline: Apply one coat of Carbozinc 11HS at a minimum dry film thickness of 3 mils.

E. System E - Metal - Aluminum, Copper, Brass

1. General: All aluminum, copper and brass to be painted shall be pretreated in accordance with this system. Painting of galvanized materials is not required.
2. Surface Preparation: Surfaces shall be solvent cleaned in accordance with SSPC-SP-1. Where metal is galvanized, Brush-off Blast per SSPC-SP-7.
3. Coatings:
 - a. Devoe International Coatings: Apply one coat of Devran 203 Universal Epoxy Primer to a dry film thickness of 2 to 3 mils.
 - b. Sherwin-Williams: Apply one coat of DTM Wash Primer B71Y1 to a dry film thickness of 0.7 to 1.3 mils.

Next, apply the recommended coating or paint for the particular surface to be painted.

F. System F - Metal - Exposed with Bleeding Surfaces

1. General: This paint system is intended to be applied to asphalt or coal tar coated (bleeding surface) pipe and metal before finish painting.
2. Surface Preparation: Surfaces shall be solvent cleaned in accordance with SSPC-SP-1.

3. Coatings:

- a. PPG: Apply two coats of Amerlock 2 VOC polyamide epoxy at a minimum dry film thickness of 4 to 8 mils per coat.
- b. Sherwin-Williams: Apply two coats of Epoxy Mastic Aluminum II B62S100 at a minimum dry film thickness of 4 mils per coat.
- c. Devoe International Coatings: Apply two coats of Bar-Rust 235 at 4 to 6 mils per coat dry film thickness.
- d. Carboline: Apply two coats of Carbomastic 90 at 3 to 5 mils per coat dry film thickness.

Next, apply the recommended coating or paint for this particular surface to be painted.

G. System G - Concrete and Masonry - Exterior - Normal Exposure

1. General: All exterior concrete and masonry surfaces subject to normal exposure shall be painted with this system.
2. Surface Preparation: Surfaces shall be free of dirt, grease, or other deleterious matter before coating. All cracks and voids shall be filled with a caulking material compatible with the specified coating. Surface preparation and applications shall be in accordance with manufacturer's instructions.
3. Performance Criteria:
 - a. No cracking over concrete block after 15 freeze-thaw cycles.
 - b. No blistering, softening, loss of film integrity, adhesion, or change of color after 2,000 hours of humidity testing per ASTM D4585.
 - c. No water damage or dampness visible on back of lightweight block after 48 hours of wind-driven rain per Fed. Spec. TT-C-555 B, Section 4.4.7.3.
 - d. Moisture vapor transmission average/meter² in 24 hours shall be equal or less than 120 grams/meter² out to in and 160 grams/meter² in 24 hours inside substrate to outside per ASTM D1653.
4. Coating:
 - a. PPG: Two finish coats of Perma-Crete High Build 100% Acrylic Masonry Coating, 4-22, 4 mils minimum dry film thickness each.
 - b. Sherwin-Williams: Two finish coats of Loxon Exterior Masonry Acrylic Coating, A24W301, 5 mils minimum dry film thickness each.

- c. Devoe International Coatings: Prime coat of Dulux #3030 Bond Prep Interior/Exterior Waterborne Bonding Primer at 350 to 450 square feet per gallon. Apply finish coat of Decra-Flex Elastomeric #2260 Smooth Finish at 6 to 12 mils dry film thickness per coat. Total dry film thickness of this system shall be a minimum of 10 mils.
- d. Carboline: Two finish coats of Carbocrylic 600 at 5 to 7 mils dry film thickness per coat.

H. System H - Concrete - Subject to Chemical Attack

- 1. General: Surfaces subject to chemical attack, including submerged or intermittently submerged areas, chemical containment areas, and chemical sumps, shall be coated with this system unless indicated otherwise.
- 2. Surface Preparation: All surfaces shall be Brush-Off Blast Cleaned per SSPC-SP-7. Remove all oil, grease, mildew, loose laitance, and foreign matter. Abrade the surface or acid etch to remove laitance and create a suitable profile.
- 3. Coatings:
 - a. Devoe International Coatings: Precoat with Enviroline 54, epoxy primer, to a dry film thickness of 3 to 5 mils. Apply Enviroline 222, epoxy novolac, to a dry film thickness of 40 to 60 mils. Total dry film thickness of this system shall be a minimum of 45 mils.
 - b. Carboline: Apply three coats of Semstone 145 AFC, epoxy novolac aggregate filled coating, at 20 mils per coat dry film thickness. Total dry film thickness of this system shall be a minimum of 60 mils.

I. System I - Concrete and Masonry - Interior - Mild Exposure

- 1. Surface Preparation: All masonry surfaces shall be abrasive blast cleaned per SSPC-SP-7. All large cavities and voids shall be repaired and trowelled smooth with epoxy putty. Clean sand may be added to the putty to fill large cavities and voids.
- 2. Coatings: When a pinhole free surface is required, concrete block walls shall be filled with an epoxy or cementitious block filler prior to painting. Latex block fillers are not acceptable. Unless noted, otherwise on the contract drawings or finish schedule, a pinhole free surface is not required.
 - a. PPG: One or more finish coats of Amercoat 335 waterbased epoxy to achieve a minimum dry film thickness of 3 to 5 mils.
 - b. Sherwin-Williams: One or more finish coats of Water-based Tile Clad B73-100 Series to achieve a minimum dry film thickness of 5 mils.

- c. Devoe International Coatings: One or more finish coats of Tru-Glaze 4408 to achieve a minimum dry film thickness of 5 mils.
- d. Carboline: One or more finish coats of Carboguard Water based Epoxy to achieve a minimum dry film thickness of 5 mils.

J. System J - Concrete Floors

1. General: Includes specified concrete floors subject to moisture and pedestrian traffic.
2. Surface Preparation: Surfaces to be coated must be abrasive blasted in accordance with SSPC-SP-7, to remove all cement glaze and residue or other agents and provide a uniform surface profile depth of approximately 1 mil.
3. Coatings:
 - a. PPG: Prime coat shall be Amerlock Epoxy Sealer applied at 1.5 mils dry film thickness. Finish shall be one coat of Amerlock 2 VOC for a total system dry film thickness of 8 mils minimum.
 - b. Sherwin-Williams: Prime coat shall be Armorseal 33 Primer/Sealer B58AQ33 applied to a minimum dry film thickness of 8 mils. Finish coat shall be ArmorSeal 650SL 100% solids, self-leveling epoxy applied to a minimum dry film thickness of 10 mils.
 - c. Devoe International Coatings: Prime coat shall be Pre-Prime 167 at 1.0-1.5 dry film thickness. Finish coat shall be Bar Rust 235 at 6-8 mils dry film thickness.
 - d. Carboline: Prime coat shall be Carboguard 1340 at 2 to 3 mils dry film thickness. Finish coat shall consist of one coat of Carboguard 890 at 6 to 8 mils for a total system dry film thickness of 8 mils minimum.

Add 5 lb of 50 mesh dry, washed silica to each gallon of mixed topcoat material for a non-skid finish.

K. System K - Woodwork - Interior and Exterior

1. General: The Contractor shall paint or stain all interior and exterior wood including, but not limited to, doors, frames, panel, sash and trim.
2. Surface Preparation: Wood surfaces to be painted shall be cleaned of dirt, oil or other foreign substances with mineral spirits, scrapers, sandpaper or wire brushes. Finished surfaces exposed to view shall, if necessary, be made smooth by planing or sandpapering. Millwork shall be sandpapered where necessary and given a coat of the specified primer on all sides before installation.

Small, dry, seasoned knots shall be surface scraped, sandpapered and thoroughly cleaned, and shall be given a thin coat of WP-578 Western Pine Association knot sealer before application of the priming coat.

Large, open unseasoned knots, and all beads or streaks of pitch shall be scraped off; or if the pitch is still soft, it shall be removed with mineral spirits or turpentine and the resinous area shall be thinly coated with knot sealer. After priming, all holes and imperfections shall be filled with putty or plastic wood (colored to match the finish coat), allowed to dry, and sandpapered smooth. Painting of interior wood surfaces shall proceed insofar as practicable, only after masonry work has dried.

3. Coatings:
 - a. Ameron: No coating available.
 - b. Sherwin-Williams: Prime coat shall be PrepRite ProBlock Interior/Exterior Latex Primer Sealer B51W20 applied to a minimum dry film thickness of 1.5 mils. Finish coat shall be Metalatex Semi-Gloss Coating B42W101 applied to a minimum dry film thickness of 4 mils.
 - c. Devoe International Coating: Apply one coat Dulux Ultra-Hide #3210 Gripper Primer/Sealer at 300 to 450 square feet per gallon. Apply one or two coats of #4226 Lifemaster Pro HB Acrylic Semi-gloss enamel at 2 to 4 mils dry film thickness per coat.
 - d. Carboline: Prime coat shall be Carbocrylic 120 applied at 1 to 2 mils. Finish coat shall be Carbocrylic 3359 applied at 2 to 3 mils per coat in one or more coats.

L. System L - Gypsum Board

1. General: Gypsum board shall be primed with this system and finish painted with System I (Concrete and Masonry, Interior, Mild Exposure) per the schedule.
2. Surface Preparation: Sand and feather joint compound. Apply texture where noted on the finish schedule.
3. Coatings
 - a. Ameron: No coating available.
 - b. Sherwin-Williams: One coat of PrepRite 200 Latex Wall Primer B28W200 to a minimum dry film thickness of 1-2 mils.
 - c. Devoe International Coatings: One coat of Gripper at 1 mil dry film thickness.
 - d. Carboline: One coat of Carbocrylic 120 at 1 to 2 mils dry film thickness.

M. System M - Underground Piping Appurtenances

1. General: Unless otherwise specified in the specific pipe and valve sections, buried pipeline items, such as valves, couplings and bolts, shall be coated with this system.
2. Surface Preparation: Apply only to clean, dry surfaces. Remove rust, paint and other foreign matter by sandblasting (SSPC-SP-6), wire brushing, or scraping.
3. Coating:
 - a. PPG: Two coats of Amercoat 78HB coal tar epoxy applied at 8 to 10 mils dry film thickness per coat. Total dry film thickness of this system shall be a minimum of 20 mils.
 - b. Sherwin-Williams: Two coats of TarGuard Epoxy B69B60/B69V60, 8 to 16 mils each coat. Total dry film thickness of this system shall be a minimum of 20 mils.
 - c. Devoe International Coatings: Two coats of Devtar 5A-HS at 8 to 10 mils dry film thickness per coat. Total dry film thickness of this system shall be a minimum of 20 mils.
 - d. Carboline: Two coats of Bitumastic 300M at 10 to 12 mils dry film thickness per coat. Total dry film thickness of this system shall be a minimum of 20 mils.

N. System N - Plastic Pipe/PVC Bonded Rigid Conduit

1. General: Plastic piping and PVC-bonded rigid electrical conduit exposed to view shall be painted with this system.
2. Surface Preparation: Plastic shall be solvent cleaned per SSPC-SP-1, and scuff sanded with light grit sandpaper.
3. Coatings:
 - a. Devoe International Coatings:

Prime Coat: Apply one coat of Interline 975 to 5 mils dry film thickness.
Interior Coat: Apply one coat of Interline 975 to 5 mils dry film thickness.
Second Coat: Apply one coat of Interline 975 to 2.5 mils dry film thickness.
 - b. Carboline:

Prime Coat: Apply one coat of Sanitile 755 to 5 mils dry film thickness.
Interior Coat: Apply one coat of Sanitile 755 to 5 mils dry film thickness.
Second Coat: Apply one coat of Sanitile 755 to 2.5 mils dry film thickness.

O. System O - Fiberglass Piping, Ductwork, Vessels and Equipment

1. General: All exposed FRP ductwork, FRP vessels and equipment shall be painted with this system.
2. Surface Preparation: SSPC-SP-1. Solvent shall not damage FRP. Lightly sand with 100 grit paper.
3. Coatings:
 - a. PPG:

Interior: Apply one coat of Amerlock 2 VOC epoxy at 4 mils dry film thickness.
Exterior: Apply one coat of Amershield VOC high solids polyurethane at 4 mils dry film thickness.
 - b. Sherwin-Williams: Apply one coat of Dura Plate 235 Epoxy B67-235 Series at a minimum dry film thickness of 3 mils.
 - c. Devoe International Coatings: Apply one coat of Bar-Rust 235 at 4 to 6 mils dry film thickness.
 - d. Carboline: Apply one coat of Carboguard 890 at 4 to 6 mils dry film thickness.

P. System P - Concrete and Masonry - Interior - Normal Exposure

1. Surface Preparation: All masonry surfaces shall be Brush-Off Blast Cleaned per ASTM D4259. All large cavities and voids shall be repaired and trowelled smooth with epoxy putty. Clean sand may be added to the putty to fill large cavities and voids.
2. Coatings: When a pinhole free surface is required, concrete block walls shall be filled with an epoxy or cementitious block filler prior to painting. Latex block fillers are not acceptable. Unless noted, otherwise on the contract drawings or finish schedule, a pinhole free surface is not required.
 - a. PPG: One or more coats of Amerlock 2 VOC epoxy shall be applied to achieve a minimum dry film thickness of 6 mils.
 - b. Sherwin-Williams: Apply one or more coats of Epo-Plex Multi-Mil Water Based Epoxy B71-100 to achieve a minimum dry film thickness of 8 mils.
 - c. Devoe International Coatings: One or more finish coats of Tru-Glaze 4408 Waterbourne Polyamide Epoxy to achieve a minimum dry film thickness of 6 mils.
 - d. Carboline: Apply one or more finish coats of Carboguard 890 to achieve a minimum dry film thickness of 6 mils.

Q. System Q - Fusion Epoxy Coated Fabrications

1. General: All fusion epoxy-coated pipe fabrication shall be painted with this coating system.
2. Surface Preparation: All surfaces shall be cleaned and brushed-blasted, if necessary, to provide good adhesion.
3. Test Section: After substrate is prepared, a small test section shall be coated. Contractor will inspect the section no sooner than 72 hours. Contractor must certify satisfactory performance of the test section to the Construction Representative before completing the work.
4. Coatings:
 - a. Sherwin-Williams: Prime coat shall consist of Dura Plate 235 to dry film thickness of 4 to 8 mils. Finish coat of Dura Plate 235 at dry film thickness of 4 to 8 mils. Total dry film thickness of this system shall be a minimum of 8 mils.
 - b. Devoe International Coatings: Apply two coats of Bar-Rust 235 at 4 to 8 mils dry film thickness per coat. Total dry film thickness of this system shall be a minimum of 8 mils.
 - c. Carboline: Apply two coats of Carboguard 890 at 4 to 6 mils dry film thickness per coat. Total dry film thickness of this system shall be a minimum of 8 mils.
 - d. PPG: Two coats of Amerlock 2 VOC epoxy shall be applied to achieve a minimum dry film thickness of 8 mils.

3.06 COATING SYSTEMS SCHEDULE

Specific coating systems, colors and finishes for rooms, galleries, piping, equipment, and other items which are painted or have other architectural finishes are specified in the following coating system schedule. Unless otherwise specified in the coating system schedule, the word "interior" shall mean the inside of a building or structure, and the word "exterior" shall mean outside exposure to weather elements. Whenever a color is not specified, the District shall select the color from the coating manufacturer's standard colors.

COATING SYSTEM SCHEDULE

Surface/Location	Coating System Identification	Color
Equipment and Metal Appurtenances		
1. Equipment, unless otherwise specified		See Note 1
a) Interior	B	Submit choices
b) Exterior	B	Submit choices
2. Exterior surface of submerged equipment including any appurtenances	A	Submit choices
3. Electrical switchgear panels, unit substations, motor control centers, power transformers, distribution centers, and relay panels (interior and exterior)	See Division 16	Standard ANSI 61 Grey (outside); flat White (inside)
4. Instrumentation panels, indicating and transmitting field panels, unless otherwise specified	See Division 16	Standard ANSI 61 Grey (outside); flat White (inside)
5. Stainless steel, aluminum, factory finished aluminum storefronts, and metal panels, unless otherwise specified	Uncoated	--
Conduit, Piping and Ductwork		
1. Ductile iron or steel piping, including galvanized, unless otherwise specified		Submit choices
a) Submerged and within 12 in. of water	A	Submit choices
b) Not submerged	B	Submit choices
2. Plastic piping or PVC coated rigid conduit, exposed, interior and exterior	N	Yellow (Sodium Bisulfite) White (Conduit)
3. Conduit, outlet and junction boxes, appurtenant hangers, clamps and supports on uncoated surfaces, unless otherwise specified	B	Match background color
4. Lighting transformers, lighting, communication, small power panels, and control stations	Standard factory coating	Standard factory color
5. Racked conduits and cable trays	Uncoated	--
6. Insulated pipe jacketing	Uncoated	--
7. Stainless steel	Uncoated	--
8. Buried valves, couplings, fittings, bolts, etc., unless otherwise specified	M	Black
9. Fusion epoxy-coated fabrications	Q	Submit choices
Concrete		
1. Concrete containment bay, sodium bisulfite storage tanks	H	--

Surface/Location	Coating System Identification	Color
Door and Door Frames		
1. Ferrous metal	B	Submit choices
2. Roll-up doors	Factory Coated	Submit choices
Wood		
1. Interior	K	Submit choices
2. Exterior	K	Submit choices
Gypsum Board		
1. Walls	L	Submit choices
2. Ceiling	L	Submit choices
Structural Steel and Miscellaneous Metal		
1. Submerged	A	Submit choices
2. Chemical Building Canopy Exterior	B	--
Handrails, Grating, Floor Plates, and Hatches	Uncoated	--
Metal Ladders, Platforms, and Supports, Except Treads and Grating		
1. Interior	B	Submit choices
2. Exterior	B	Submit choices
3. Aluminum and Stainless Steel	Uncoated	--
Aluminum Flashing, Light Standards, Supports and Louvers		
1. Interior and exterior, unless otherwise specified	Uncoated	--
Precast Concrete Metalwork		
1. Fasteners, anchors, supports, etc.	B	Match wall

Notes:

- (1) Equipment shall match attached piping service color unless otherwise specified.
- (2) Where color is to be selected, coating supplier shall submit complete line to District.

3.07 PIPELINE COLOR CODING

Where pipelines are specified to be painted, they shall be of the color specified below:

PIPING SERVICES COLOR CODE

Symbol	Service	Fluid Category	Pipe Marker Background Color	Pipe Marker Letter Color
ALUM	Alum	Chemical	Green	White
NAOCL	Sodium Hypochlorite	Chemical	Yellow	White
PD	Plant Drain	Wastewater	Dark Grey	White

After painting, all pipelines, including tubing, above ground, inside or outside buildings and structures, in concrete trenches or tunnels, in boxes, etc., and in pipe trays shall be marked with a removable identification marker, as specified, indicating contents of the pipe and direction of flow.

****END OF SECTION****

**RANCHO MURIETA COMMUNITY SERVICES DISTRICT
WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
CHLORINE CONTACT BASIN EXPANSION – PHASE 1**

Division 11 – Equipment

Section 11000 General Requirements for Equipment

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SECTION 11000

GENERAL REQUIREMENTS FOR EQUIPMENT

PART 1 - GENERAL

1.01 SCOPE

This section specifies general requirements which are applicable to all mechanical equipment. The Contractor is responsible for ensuring that all mechanical equipment meets the requirements of this section in addition to the specific requirements of the individual equipment specification section.

1.02 QUALITY ASSURANCE

The manufacture, fabrication and assembly of the equipment and all its parts shall be in accordance with the latest provisions and recommendations of codes and standards authorities like ASTM, ASME, AGMA, ANSI, which are applicable and commonly applied by the water and wastewater equipment manufacturing industries in the manufacturing of such equipment, when it is not specifically indicated in this and other sections of these specifications.

A. References

The publications referred to hereinafter form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

American Bearing Manufacturers Association, Inc. (ABMA) Publications:

ABMA Std 9 *Load Ratings and Fatigue Life for Ball Bearings*

ABMA Std 11 *Load Ratings and Fatigue Life for Roller Bearings*

American National Standards Institute (ANSI) Publications:

ANSI B1.1 *Unified Screw Threads*

ANSI B1.20.1 *Pipe Threads, General Purpose (Inch)*

ANSI B2.1 *Pipe Threads (Except Dupeal)*

ANSI B16.1 *Cast Iron Pipe Flanges and Flanged Fittings, Class 125*

ANSI B16.5	<i>Steel Pipe Flanges, Flanged Valves and Fittings, Class 150</i>
ANSI B18.2.1	<i>Square and Hex Bolts and Screws, Including Askew Head Bolts, Hex Cap Screws, and Log Screws</i>
ANSI B18.2.2	<i>Square and Hex Nuts</i>
American Society for Testing and Materials (ASTM) Publications	
ASTM A193	<i>Alloy-Steel and Stainless Steel Materials for High-Temperature Service</i>
ASTM A194	<i>Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service</i>
ASTM A449	<i>Standard Specification for Quenched and Tempered Steel Bolts and Studs</i>

B. Design Requirements

All equipment shall be of new sturdy construction of ample strength for all stresses which may occur during fabrication, transportation, erection and during continuous or intermittent operations and shall be adequately stayed, or braced and anchored, and shall be installed in a neat and workmanlike manner. Appearance as well as utility shall be given consideration in the design of details.

All equipment shall include all production line improvements made up to the delivery or contract date.

The furnishing and installation of equipment shall include testing, painting, checking levels and alignment, furnishing and placing of lubricants of whatever type, and furnishing of factory trained service mechanics or engineers where called for. All equipment when finally installed shall be complete and ready for operation without binding or overloading of critical components or motors. The Contractor shall furnish at no extra cost to the District all appurtenances, piping, valves, fittings, wiring, supports, hangers, etc. as are required to place the equipment in first class operating condition and in a neat and workmanlike manner.

All fasteners for aluminum shall be stainless steel. All steel other than stainless steel shall be isolated from aluminum with stainless steel, neoprene, or other approved material.

C. Arrangement

The arrangement of equipment shown on the plans is based upon information available at the time of design and is not intended to show exact dimensions particular to a specific manufacturer. The plans are, in part, diagrammatic, and some features of the illustrated equipment installation may require revision to meet actual equipment installation requirements. Structural supports, foundations, connected piping and valves shown may have to be altered to accommodate the equipment provided. No additional payment will be

made for such revisions and alterations which shall be accomplished by the Contractor and approved by the District.

D. Motors and Control Devices

1. Motors: Motors and motor modifications shall be as specified in the particular equipment section.
2. Control Devices: Control devices, wiring, starters, and other electrical items provided with mechanical equipment shall be as specified in Division 16 and the particular equipment section.

E. Unit Responsibility

Equipment systems made up of two or more components shall be provided as a unit by the responsible manufacturer. Unless otherwise specified, the Contractor shall obtain each system from the supplier of the driven equipment, for which supplier shall provide all components of the system to enhance compatibility, ease of construction and efficient maintenance. Contractor is responsible to the District for performance of all systems.

F. Mounting

Support, anchorage, and mounting of all tanks, piping, and equipment shall be provided by the Contractor according to the Uniform Building Code and the manufacturer's recommendations, unless otherwise specified. All elements required to resist the calculated forces described herein or required by the equipment manufacturer shall be provided by the Contractor.

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted.

- A. Submittals shall be made as specified for each equipment item or group of related equipment items.
- B. Identify the equipment by the number listed in the specification section, manufacturer and type designation.
- C. Anchor bolt, vibration isolation and seismic restraint design shall be made and signed by a civil or structural engineer currently registered in the State of California.

Inasmuch as all anchorage of equipment is to be made of poured-in-place concrete elements, it is imperative that types of anchorage be coordinated with the concrete construction so that anchorage may be installed at time of pouring. If calculations and anchorage details are

not submitted prior to pouring of concrete, the Contractor shall become responsible for any strengthening of concrete elements because of superimposed seismic loading.

1.04 OPERATION AND MAINTENANCE INSTRUCTIONS

Submit operation and maintenance instructions in accordance with Section 01730, OPERATION AND MAINTENANCE DATA. A copy of Section 01730 with each paragraph check marked to show compliance shall be submitted. O&M instructions shall be submitted after the submittals specified in Part 1.03, Submittals, have been returned “NO EXCEPTIONS TAKEN” or “MAKE CORRECTIONS NOTED”. O&M instructions shall reflect the approved materials and equipment.

PART 2 - PRODUCTS

2.01 FLANGES AND PIPE THREADS

Flanges on equipment and appurtenances provided under this section shall conform in dimensions and drilling to ANSI B16.1, Class 125 or ANSI B16.5, Class 150, as applicable. Pipe threads shall conform in dimension and limits of size to ANSI B1.1, coarse thread series, Class 2 fit.

Threaded flanges shall have a standard taper pipe thread conforming to ANSI B1.20.1. Unless otherwise specified, flanges shall be flat faced.

Flange assembly bolts shall be heavy pattern, hexagonal head carbon steel machine bolts, ASTM A449, with heavy pattern, hot pressed hexagonal nuts conforming to ANSI B18.2.1 and ANSI B18.2.2. Submerged equipment shall have Type 316 stainless steel, ASTM A193, Grade B8M bolts and Type 316 stainless steel ASTM A194 hexagonal nuts conforming to ANSI B18.2.1 and ANSI B18.2.2. Threads shall be Unified Screw Threads, Standard Coarse Thread Series, Class 2A and 2B, ANSI B1.1.

2.02 BEARINGS

Unless otherwise specified, equipment bearings shall be oil or grease lubricated, ball or roller type, designed to withstand the stresses of the service specified. Each bearing shall be rated in accordance with the latest revisions of ABMA *Methods of Evaluating Load Ratings of Ball and Roller Bearings*. Unless otherwise specified, equipment bearings shall have a minimum L-10 rating life of 50,000 hours. The rating life shall be determined using the maximum equipment operating speed.

Grease lubricated bearings, except those specified to be factory sealed and lubricated, shall be fitted with easily accessible grease supply, flush, drain and relief fittings. Extension tubes shall be used when necessary. Grease supply fittings shall be standard hydraulic Alemite type.

Oil lubricated bearings shall be equipped with either a pressure lubricating system or a separate oil reservoir type system. Each oil lubrication system shall be of sufficient size to safely absorb the heat energy normally generated in the bearing under a maximum ambient temperature of 60°C and shall be equipped with a filler pipe and an external level indicator gage.

2.03 SEALS

A. Mechanical

Unless otherwise specified in the equipment sections, rotating shafts shall be provided with mechanical seals and stuffing boxes tapped for flushing seal faces. Seals shall be factory installed. Seals shall be internal, single or double as specified, and unbalanced; except balanced seals shall be provided when shaft speed is greater than 3,600 rpm or when pressures are greater than shown in the following table.

<u>Seal Inside Diameter</u> (inches)	<u>Shaft Speed</u> (rpm)	<u>Sealing Pressure</u> (psig)
1/2 to 2	Up to 1,800 1,801 to 3,600	100 50
Over 2 up to 4	Up to 1,800 1,801 to 3,600	50 25

Single unbalanced seals shall be Crane 8-1, Durametallc RO, or equal unless specified otherwise. Single balanced seals shall be Chesterton 880, Crane 8B-I, or equal. Double seals shall be Chesterton 241, Durametallc RO/RD, or equal unless specified otherwise.

To maintain the necessary minimum or maximum pressure across the seal faces, spring pressure shall be uniformly distributed to the sealing faces by a coil spring or multiple springs. The rotating seal element shall be clamped to the shaft and provided with an O-ring seal. The stationary seal element shall be sealed with O-ring or gasket material.

Seal faces shall be either tungsten carbide, carbon, silicon carbide or ceramic. Elastomeric materials shall be Viton. Metal parts shall be Type 316 stainless steel.

B. Shaft Packing

Where shaft packing is specified, stuffing boxes shall be tapped to permit introduction of seal liquid and shall hold a minimum of five rows of packing and a bronze lantern ring. Packing shall be die-molded graphite impregnated non-asbestos packing rings of material suitable for the intended service and as recommended by the manufacturer. Lantern rings shall be of two piece construction and shall be provided with tapped holes to facilitate removal.

2.04 COUPLINGS

Unless otherwise specified in the particular equipment sections, equipment with a driver greater than 1/2 hp, and where the input shaft of a driven unit is directly connected to the output shaft of the driver, shall have its two shafts connected by a flexible coupling which can accommodate angular misalignment, parallel misalignment, end float, and which cushions shock loads and dampens torsional vibrations. The flexible member shall consist of a tire with synthetic tension members bonded together in rubber. The flexible member shall be attached to flanges by means of clamping rings and cap screws, and the flanges shall be attached to the stub shaft by means of taperlock bushings which shall give the equivalent of a shrunk-on fit. There shall be no metal-to-metal contact between the driver and the driven unit. Each coupling shall be sized and provided as recommended by the coupling manufacturer for the specific application, considering horsepower, speed of rotation, and type of service.

Where torque or horsepower capacities of couplings of the foregoing type is exceeded, Thomas-Rex, Falk Steel Flex, or equal, couplings will be acceptable provided they are sized in accordance with the equipment manufacturer's recommendations and sizing data are submitted. Couplings shall be installed in conformance with the coupling manufacturer's instructions.

The use of mechanical couplings as specified above shall not relieve the Contractor of his responsibility for precise alignment of all driver and driven units.

All metal parts shall be Type 316 stainless steel.

2.05 GUARDS

Exposed moving parts shall be provided with guards which meet the requirements of OSHA. Guards shall be fabricated of 14 gage steel, 1/2-13-15 expanded metal screen to provide visual inspection of moving parts without removal of the guard. Guards shall be galvanized after fabrication and painted with the equipment. Guards shall be designed to be readily removable to facilitate maintenance of moving parts. Provisions shall be made to extend lube fittings through guards. Any holes in the guards shall be reinforced.

2.06 CAUTION SIGNS

Equipment with guarded moving parts which operate automatically or by remote control shall be identified by signs reading "CAUTION AUTOMATIC EQUIPMENT MAY START AT ANY TIME".

Signs shall be constructed of corrosion proof material. Signs shall be installed near guarded moving parts.

2.07 PRESSURE TAPS, TEST PLUGS AND GAGES

Pressure taps shall be provided on the suction and discharge sides of all pumps, blowers and compressors. Pressure and vacuum test plugs and gages shall be provided where specified.

2.08 NAMEPLATES

Nameplates shall be provided on each item of equipment and shall contain the specified equipment name or abbreviation and equipment number. Equipment nameplates shall be engraved or stamped on stainless steel and fastened to the equipment in an accessible location with stainless steel screws or drive pins.

2.09 LUBRICANTS

The Contractor shall provide for each item of mechanical equipment a supply of the lubricant required for the commissioning period. Lubricants shall be of the type recommended by the equipment manufacturer. The Contractor shall limit the various types of lubricants by consolidating them, with the equipment manufacturer's approval, into the least number of different types. Not less than 90 days before the date shown in his construction schedule for starting, testing and adjusting equipment, the Contractor shall provide the District with 3 copies of a list showing the required lubricants, after consolidation, for each item of mechanical equipment. The list shall show estimated quantity of lubricant needed for a full year's operation, assuming the equipment will be operating continuously.

2.10 SPARE PARTS

Where spare parts are required by the specifications, the spare parts for each separate piece of equipment shall be packed in a heavily constructed painted wood box with hinged cover and a locking clasp. The top of the cover shall be painted with the words "SPARE PARTS" followed by the name and number of the piece of equipment involved.

Each part shall be individually wrapped in a waterproof container and tagged. Spare bearings shall be encapsulated in an airtight plastic film.

Spare parts shall not be used by the Contractor during the startup and commissioning of equipment.

2.11 SPECIAL TOOLS AND ACCESSORIES

Any and all tools, instruments or accessories of a special nature which are required to assemble, disassemble, maintain or repair any item of equipment shall be furnished by the Contractor with that piece of equipment. Special tools shall be tagged and well marked indicating their service and the piece of equipment for which their use is intended. Operation and maintenance manuals shall contain a list and description or pictorial representation of all special tools required for a given piece of equipment.

2.12 LIFTING EYES

Lifting eyes shall be provided on all equipment weighing over 80 lb.

2.13 EQUIPMENT BASES

A. General

Unless the equipment incorporates unit construction using an integral rigid frame, or is specified otherwise, each item of mechanical equipment, together with its driver, shall be mounted on a rigid steel or cast iron base. Cast iron bases are acceptable only if the equipment is not furnished with a vibration isolation system. Steel or cast bases shall be hot-dip galvanized after fabrication and rigidly grouted into place with non-shrink grout. (Finish painting shall be in accordance with Section 09800, PAINTING AND SPECIAL COATING SYSTEMS). Motor mounting hardware for any belt driven configuration shall allow for belt tension adjustment.

B. Anchor Bolts

Anchor and assembly bolts shall be of ample size and strength for the purposes intended as determined by the equipment manufacturer in accordance with the requirements of this section. Anchor bolts shall be designed for lateral and pullout forces as specified in accordance with Section 05501, ANCHOR BOLTS AND POWDER ACTUATED FASTENERS. Anchor bolt material shall be as specified in the individual equipment specifications. If material is not specified in the individual equipment section, material shall be per Section 05501, ANCHOR BOLTS AND POWDER ACTUATED FASTENERS. In case of conflict, the individual equipment section shall prevail.

C. Structural Steel Base

Structural steel bases shall be rectangular in shape for all equipment other than centrifugal refrigeration machines and pump bases, which may be "T" or "L" shaped where shown. Pump bases for split case pumps shall include supports for suction and discharge base ells. All perimeter members shall be beams with a minimum depth equal to one tenth of the longest dimension of the base. Beam depth need not exceed 14 in., provided that the deflection and misalignment is kept within acceptable limits as determined by the manufacturer. Grout holes shall be provided for the bases of all equipment where vibration isolation is not specified. Where vibration isolation is required, height saving brackets shall be employed in all mounting locations to provide a base clearing of 1 in. Structural steel bases shall be hot dip galvanized after fabrication and finish painted in accordance with Section 09800, PAINTING AND SPECIAL COATING SYSTEMS.

D. Cast Iron Bases

Cast iron bases located within a building do not require galvanizing but must be sealed in accordance with the requirements for bleeding surfaces specified in Section 09800, PAINTING AND SPECIAL COATING SYSTEMS, prior to grouting. All fasteners

requiring connections to the base shall be terminated by nuts welded to the bottom side of the base and plugged with cork, plastic plugs or grease, or acorn nuts. In no case shall the fastener terminate only into the metal base.

E. Concrete Pedestals

All equipment, including bases, shall be mounted on a concrete pedestal. Concrete pedestals shall be at least 3 inches larger than the steel or cast base, unless indicated otherwise, and shall be adequately doweled into the floor slab. All conduits, piping connections, drains, etc. shall be enclosed by the concrete base. Unless otherwise shown or specified, no related conduits, piping connections, drains, etc. shall be accepted which rise directly from the floor.

PART 3 - EXECUTION

3.01 FACTORY APPLIED COATINGS

Unless otherwise noted, each item of equipment shall be shipped to the site of the work with a shop applied prime coating meeting the requirements of Section 09800, PAINTING AND SPECIAL COATING SYSTEMS. The prime coating shall be applied over clean, dry, surfaces prepared in accordance with Section 09800, PAINTING AND SPECIAL COATING SYSTEMS. The prime coating will serve as a base for field applied finish coats.

3.02 PROTECTION DURING SHIPMENT

Equipment shall be shipped in sealed, weathertight, enclosed conveyances and protected against damaging stresses during transport and handling.

Bearing housings shall be wrapped or otherwise sealed to prevent contamination by grit and dirt; and ventilation and other types of openings shall be taped closed.

Damage shall be corrected to conform to the requirements of the contract before the assembly is incorporated into the work. The Contractor shall bear the costs arising out of dismantling, inspection, repair and reassembly.

3.03 INSTALLATION AND TESTING

Equipment shall be provided and tested within the tolerances recommended by the equipment manufacturer.

The Contractor shall cause each item of equipment to be installed, aligned and tested under the direction of installation engineers who have been factory trained by the equipment manufacturer. Upon completion of the project and as a condition precedent to final acceptance, the Contractor shall furnish written certification from the equipment manufacturers that each item has been installed, aligned and tested correctly and that the installation meets all of the manufacturer's requirements for efficient, trouble-free operation.

This provision, however, shall not be construed as relieving the Contractor of his responsibility for this portion of the work. The Contractor shall furnish all fuel, lubricants, and other required materials for testing and shall perform all work, all in accordance with manufacturers' recommendations.

3.04 **EQUIPMENT MOUNTING**

A. **Equipment**

Each piece of equipment shall be anchored to resist a minimum lateral force required by the CBC or the manufacturer of the equipment, whichever is greater. This force shall be considered acting at the center of gravity of the piece under consideration. No equipment shall be anchored to vertical structural elements without written approval of the District.

Equipment which is not vibration isolated shall be anchored directly to the supporting floor system. In addition to the anchorage, all such equipment shall be internally designed so that all static and moving parts are anchored to the supporting framework to resist the imposed seismic force. All forces must be transmitted to the base in order to be anchored as required. Vibration isolated equipment shall be specially designed to meet these same requirements.

B. **Piping**

All piping, raceways, accessories, and appurtenances furnished with equipment shall be anchored to resist a lateral seismic force of 40% of its operating weight without excessive deflection. This force shall be considered acting at the center of gravity of the piece under consideration.

Piping with flexible connections and/or expansion joints shall be anchored such that the intended uses of these joints are maintained in the piping system.

C. **Ductwork**

All ductwork for both heating and ventilating and for mechanical equipment shall be anchored to the floor system(s), walls, or to the roof as shown.

****END OF SECTION****

**RANCHO MURIETA COMMUNITY SERVICES DISTRICT
WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
CHLORINE CONTACT BASIN EXPANSION – PHASE 1**

Division 13 – Special Construction

Section 13100 Chemical Storage Tanks
Section 13340 Metal Building Systems

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SECTION 13100

CHEMICAL STORAGE TANKS

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall furnish, install, and place in successful operation two vertical, high density linear polyethylene (HDLPE) tanks and accessories, including ladder/access platform, complete and in place; and two vertical, high density cross-linked polyethylene (HDXLPE) tanks and accessories, including ladder, access platform, complete and in place in accordance with the Contract Documents. Two HDXLPE tanks shall be suitable for the storage of alum and two HDLPE tanks shall be suitable for storage of 12.5% sodium hypochlorite solution.
- B. Unit Responsibility: The Contractor shall be responsible for furnishing the vertical tank(s) and its accessories for the chemical storage facility as noted.

1.02 QUALITY ASSURANCE

The publications referred to herein form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

The latest edition of the referenced publication in effect at the time of bid shall govern. In case of conflict between the requirement of this section and the listed standards, the requirement of this section shall prevail.

Association of Rotational Molders (ARM) Publications:

Low Temperature Impact Resistance (Falling Dart Test Procedure)

International Conference of Building Officials (ICBO) Publications:

International Building Code (IBC), latest edition

American National Standards Institute (ANSI) Publications:

ANSI B16.5 *Pipe Flanges and Flanged Fittings*

American Society of Testing Materials (ASTM) Publications:

ASTM D635 *Rate of Burning and/or Extent and Time of Burning of Self-Supported Plastics in a Horizontal Position*

ASTM D638	<i>Tensile Properties of Plastics</i>
ASTM D883	<i>Standard Definitions of Terms Relating to Plastics</i>
ASTM D1505	<i>Density of Plastics by the Density-Gradient Technique</i>
ASTM D1525	<i>Test Method for Vicat Softening Temperature of Plastics</i>
ASTM D1693	<i>ESCR Specification Thickness 0.125" F50-10% Igepal</i>
ASTM D1998	<i>Standard Specification for Polyethylene Upright Storage Tanks</i>
ASTM E84	<i>Standard Test Method for Surface Burning Characteristics of Building Materials</i>
ASTM F412	<i>Standard Terminology Relating to Plastic Piping Systems</i>

1.03 SUBMITTALS

- A. Shop Drawings: Shop drawings shall be approved by the District prior to the manufacturing of the vertical tank(s). Submit the following as a single complete initial submittal in accordance with Section 01300, SUBMITTALS. Sufficient data shall be included to show that the product conforms to Specification requirements. Provide the following additional information:
1. Vertical tank and fitting material
 - a. Resin manufacturer data sheet
 - b. Fitting material
 - c. Gasket style and material
 - d. Bolt material
 2. Dimensioned tank drawings
 - a. Location and orientation of openings, fittings, accessories, restraints and supports.
 - b. Details of manways, flexible connections, and vents.
 3. Calculations shall be stamped and signed by a California registered, structural engineer.
 - a. Wall thickness. Hoop stress shall be calculated using 600 psi at 100°F.
 - b. Tank restraint system. Show seismic and wind criteria.
 4. Dimensional drawings for access platform/ladder. Calculations stamped and signed by a California registered structural engineer for platform uniform loading, support sizing, and anchor bolts.
- B. Manufacturer's warranty
- C. Manufacturer's unloading procedure
- D. Manufacturer's installation instructions
- E. Supporting information of Quality Management System.

F. Factory Test Report

1. Material, specific gravity rating at 600 psi @ 100°F. design hoop stress.
2. Wall thickness verification.
3. Fitting placement verification.
4. Visual inspection
5. Impact test
6. Gel test
7. Hydrostatic test

G. Operations and Maintenance Manual for tanks and accessories in accordance with Section 01730, OPERATIONS AND MAINTENANCE DATA.

1.04 **MANUFACTURER'S QUALIFICATIONS**

- A. The Contractor shall provide vertical tanks of high-density linear polyethylene and high-density cross-linked polyethylene where specified. Tanks furnished under this Section shall be supplied by a manufacturer who has been regularly engaged in the design and manufacture of chemical storage tanks for over 10 years.
- B. Tanks shall be manufactured from virgin materials.

1.05 **MANUFACTURER'S REPRESENTATIVES SERVICES**

Manufacturer to provide a 1 hour training session to prepare operators to service and maintain the tank system. Included in training session will be five training manuals.

1.06 **WARRANTY**

The manufacturer shall provide a 5-year full replacement warranty.

PART 2 – PRODUCTS

2.01 **GENERAL**

Tanks shall be rotationally-molded, vertical, high density cross-linked polyethylene, one-piece seamless construction, cylindrical in cross-section and vertical with flat bottoms. Tanks shall be adequately vented as required by Poly Processing Company technical bulletin, "Venting – Design for ACFM." Where indicated, tanks shall be provided with ancillary mechanical fittings and accessories. Tanks shall be marked to identify the manufacturer, date of manufacture, and serial numbers must be permanently embossed into the tank.

2.02 MANUFACTURER

Tanks shall be manufactured by Poly Processing Company, Snyder Industries, Inc., or approved equal.

2.03 POLYETHYLENE STORAGE TANKS – DESIGN REQUIREMENTS

A. Service: Chemical storage tanks shall be suited for the following operating conditions:

1. High Density Cross-linked Polyethylene resin used in the tank manufacture shall be Poly CL™ or equal and shall contain ultraviolet stabilizer as recommended by resin manufacturer. Where black tanks are indicated, the resin shall have a carbon black compounded into it. The tank material shall be rotationally molded and be a resin that is commercially available at the time of tank manufacture.
2. For sodium hypochlorite storage, resin shall include additional medium density polyethylene (OR-1000) with four times the antioxidant properties as a standard polyethylene bounded to this interior surface during the manufacturing process or a long-term UV-15 stabilizer. Resin to be certified NSF/ANSI 61 for chemical storage.
3. Wall thickness for a given hoop stress shall be calculated in accordance with ASTM D1998. Tanks shall be designed using a hoop stress no greater than 600 psi. In no case shall the tank thickness be less than design requirements per ASTM D1998.
 - a. The wall thickness of any cylindrical portion at any fluid level shall be determined by the following equation:

$$T = P \times OD / 2SD \text{ or } 0.433 \times SG \times H \times OD / 2SD$$

Where: T = wall thickness, in
P = pressure, psi
SG = specific gravity, gm/cc
H = fluid head, ft
OD = outside diameter, ft
SD = hydrostatic design stress, 600 psi

The minimum wall thickness shall be sufficient to support its own weight in an upright position without external support but shall not be less than 0.187-inch thick.

- b. On closed top tanks the top head shall be integrally molded with the cylindrical wall. Its minimum thickness shall be equal to the thickness of the top of the straight sidewall. Flat areas shall be provided for attachment of large fittings on the dome of the tank.
 - c. The bottom head shall be integrally molded with the cylindrical wall. Knuckle radius shall be:

Tank Diameter, ft	Min Knuckle Radius, in
Less than or equal to 6	1
Greater than 6	1.5

- d. Tanks with 3,000 gal capacity or larger shall have at least 3 lifting lugs. Lugs shall be designed for lifting the tank when empty.
- e. Unless otherwise indicated, for outdoor pneumatic fill, manways shall be 18-in diameter or greater and equipped with Poly Processing Company F.S.2650® combined manway and vent or approved equal to prevent over pressurization of tank. Manway must be capable of relieving a volume flow rate of up to 2650 ACFM. Gaskets shall be closed cell, cross-linked or linear polyethylene foam, Viton, or EPDM materials.
- f. Tank vent size shall be a minimum of 6-in diameter.

B. Tank color shall be natural (unpigmented).

2.04 STORAGE TANK SCHEDULE

A. Each chemical storage tank shall be as follows:

- 1. Nominal capacity: 5,500 gal
- 2. Maximum diameter: 10 ft-6 in
- 3. Maximum height: 11 ft-1 in
- 4. Tank shall fit within existing concrete pad below canopy as shown.
- 5. Approximate overall height is measured along the straight cylindrical portion of the tank and includes the dome top.

B. Fittings

- 1. Tank fittings shall be as follows:
 - Tank fill line: 3-in
 - Tank discharge line: 2-in
 - Tank overflow line: 3-in
 - Tank drain line: 3-in
 - Tank vent: 8-in
 - Level indicator: 2-in
- 2. Bolted flange fittings shall be constructed of one 150 lb. flange with ANSI bolt pattern, one flange gasket and stud bolts with gaskets. Stud bolts to have chemical resistant polyethylene injection molded heads and gaskets to provide a sealing surface between the bolt head and the interior tank wall. Stud bolt heads are to be color coded for visual ease of identifying the bolt material by onsite operators. Green- 316 Stainless Steel, Black- Titanium, Red- Alloy C-276, Blue- Monel. All materials shall be compatible with chemical service and as indicated in the fitting schedule above.
- 3. For sodium hypochlorite storage, bolted one-piece sure seal (BOSS), double flange fittings constructed of virgin polyethylene shall be supplied. Bolts shall be welded to a common backing ring and encapsulated with polyethylene, preventing fluid contact with

the metal material. Flange shall have one full face gasket to provide a sealing surface against inside tank wall. All material shall be compatible with chemical service and as indicated in the fitting schedule above.

4. Down Pipes and Fill Pipes: Down pipes and fill pipes shall be supported at 6-ft max intervals. Down pipes and fill pipes shall be CPVC or material compatible with chemical stored.
5. Vents: Each tank must be vented for the material and flow and withdrawal rates expected. Vents shall comply with OSHA 1910.106(F)(iii)(2)(IV)(9). Vents shall be sized by the tank manufacturer and be furnished as shown.
6. All fittings on the 1/3 lower sidewall of tanks shall have 100% virgin PTFE Flexijoint® expansion joint. Expansion joint shall have a minimum of three convolutions, stainless steel limit cables and FRP composite flanges. Galvanized parts will not be accepted. Expansion joint to meet the following minimum performance requirements:
 - Axial Compression ≥ 0.67 -in
 - Axial Extension ≥ 0.67 -in
 - Lateral Deflection ≥ 0.51 -in
 - Angular Deflection $\geq 14^\circ$
 - Torsional Rotation $\geq 4^\circ$

2.05 TANK ACCESSORIES

A. Ladder and Access Platform

1. Fiberglass access ladder shall be provided with the access platform for the polyethylene chemical storage tanks at the location as shown.
2. Ladder shall be secured to the platform and secured to the concrete with anchor bolts as recommended by the tank manufacturer to allow for tank expansion/contraction due to temperature and loading changes.
3. Ladder shall be designed to meet OSHA standards 2206, 1910.27, fixed ladders.
4. Access platform including handrails and kickplates shall be fabricated of fiberglass reinforced plastic with stainless steel hardware and hold down clips. The fiberglass grating shall comply with Section 06740, FIBERGLASS REINFORCED GRATINGS. Handrail system (two rail type) including kickplates shall be yellow. Access platform and channel framing shall be as indicated on the plans. Anchor bolts shall be provided by the tank manufacturer.

B. Restraint System

1. Metal components shall be stainless steel including cables and clamps.
2. Tank restraint system shall be supplied as shown. Design of the system shall be certified by a California registered, structural engineer. System shall conform to the most recent edition of the IBC code for seismic and wind load. Anchor bolts as required by the calculations shall be supplied by the tank manufacturer.

2.06 FACTORY TESTING

A. Material Testing

1. Perform gel and low temperature impact tests in accordance with ASTM D1998 on condition samples cut from each polyethylene chemical storage tank.
2. Degree of Crosslinking. Use Method C of ASTM D1998, Section 11.4 to determine the orthoxylene insoluble fraction of cross-linked polyethylene gel test. Samples shall test at no less than 60 percent.

B. Tank Testing

1. Dimensions: Take exterior dimensions with the tank empty, in the vertical position. Outside diameter tolerance, including out-of-roundness, shall be per ASTM D1998. Fitting placement tolerance shall be +/- 1/2-in vertical and +/- 2 degree radial.
2. Visual: Inspect for foreign inclusions, air bubbles, pimples, crazing, cracking, and delamination.
3. Hydrostatic test: Following fabrication, the bottom tanks, including inlet and outlet fittings, shall be hydraulically tested with water by filling to the top sidewall for a minimum of 1 hour and inspected for leaks. Following successful testing, the tank shall be emptied and cleaned prior to shipment.

PART 3 – EXECUTION

3.01 DELIVERY, STORAGE, AND HANDLING

- A. The tank shall be shipped upright or lying down on their sides with blocks and slings to keep them from moving. Avoid sharp objects on trailers.
- B. All fittings shall be installed and, if necessary, removed for shipping and shipped separately unless otherwise noted by the Contractor.
- C. Upon arrival at the destination, the District will inspect the tank(s) and accessories for damage in transit. If damage has occurred, the Contractor and the tank manufacturer shall be notified immediately.

3.02 INSTALLATION

- A. Install the tanks in strict accordance with the tank manufacturer's installation manual and shop drawings.
- B. Manufacturer's representative shall conduct an onsite inspection of installation. Inspection will verify chemical application, plumbing connections, venting, and applicable ancillary

equipment such as ladders, restraints, etc. A verification of proper installation certificate shall be submitted to the District when equipment passes installation checklist.

- C. Manufacturer's representative shall conduct a training session for District personnel on procedures for servicing and maintaining the tank system. The training session will include a review of tank manuals including installation check lists, as-built tank drawings, fitting/nozzle schedules, materials of construction, and recommended maintenance program.

3.03 **FIELD TESTING**

- A. Tanks shall be hydrostatically tested for 24 hours prior to commissioning. Tanks shall be filled to the top sidewall and inspected for leaks. No leakage shall occur during the 24-hour test period. If leakage does occur, the tank manufacturer shall submit for approval repair procedures. Following approval of repair procedures and completion of repairs, the tanks shall undergo a second hydrostatic test. If the District does not approve the repair procedure, the tank shall be replaced at no additional cost to the District. Following successful completion of the hydrostatic testing of the tanks, the tanks shall then be emptied and prepared for filling with alum and sodium hypochlorite solution by the District.

****END OF SECTION****

SECTION 13340

METAL BUILDING SYSTEMS

PART 1 – GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment, and incidentals required to install metal building systems that consist of integrated sets of mutually dependent components including structural framing, roof panels, accessories, additional equipment support members, and anchor rods as shown on the Plans and as specified herein.

1.02 SUBMITTALS

- A. Submit, in accordance with Section 01300, SUBMITTALS.
- B. Calculations: submit structural calculations stamped and signed by a qualified Professional Engineer registered in the State of California. Calculations shall include all appropriate code minimum lateral and gravity demands. Capacity of the metal building systems shall be determined by the appropriate code minimum standard.
- C. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following metal building system components:
 - 1. Structural-framing system.
 - 2. Prefinished Insulated Metal roof panels.
 - 3. Flashing and trim.
 - 4. Accessories.
- D. Shop Drawings: For the following metal building system components. Include plans, elevations, sections, details, and attachments to other work.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer registered in the State of California, responsible for their preparation.
 - 2. Anchor-Bolt Plans: Submit anchor-bolt plans before foundation work begins. Include location, diameter, embedment, and projection of anchor bolts required to attach metal building to foundation. Indicate vertical and horizontal column reactions at each location. Moment connections of structural framing system to the foundation are not allowed.
 - 3. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include structural framing provisions for overhead and personnel doors, mechanical equipment openings, louvers, windows, suspended piping, and suspended

- equipment. Indicate welds and bolted connections distinguishing between shop and field applications. Include transverse cross-sections.
- E. Roof Panel Analysis: Provide panel calculations to verify panels will withstand the design loads indicated without detrimental effects or deflection exceeding $L/120$. Include effects of thermal differential between the exterior and interior panel facings and resistance to fastener pullout.
- F. Finish Samples: Factory applied color finish demonstrating match to specified roof panel color.
- G. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below.
1. Metal Roof: Nominal 12 inches long by actual panel width.
- H. Product Certificates: For each type of metal building system, signed by product manufacturer.
1. Letter of Design Certification: Signed and sealed by a California qualified professional engineer. Include the following:
 - a. Name and location of Project.
 - b. Order number.
 - c. Name of manufacturer.
 - d. Name of Contractor.
 - e. Building dimensions including width, length, height, and roof slope.
 - f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
 - g. Governing building code and year of edition.
 - h. Design Loads: Include dead load, roof live load, collateral loads, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads to include pipe supports and lighting.
 - i. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
 - j. Building-Use Category: Indicate category of building use and its effect on load importance factors.
 - k. AISC Certification for Category MB: Include statement that metal building system and components were designed and produced in an AISC Certified Facility by an AISC Certified Manufacturer.
- I. Welding Certificates
- J. Erector Certificate: Signed by manufacturer certifying that erector complies with requirements.

- K. Manufacturer Certificate: Signed by manufacturer certifying that products comply with requirements.
- L. Qualification Data: Demonstrate compliance with Quality Assurance requirements.
1. For erector and manufacturer qualifications.
 2. For metal panel manufacturer and installer qualifications.
- M. Material Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
1. Structural steel including chemical and physical properties.
 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 4. Zinc coatings.
 5. Non-shrink grout.
 6. Hot-dip zinc coating.
- N. Source quality-control test reports.
- O. Field quality-control test reports.
- P. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for insulation and vapor retarders. Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.
- Q. Surveys: A survey shall be performed showing final elevations and locations of major members. The survey shall indicate discrepancies between actual installation and the plans. Surveying services shall be performed by a District approved professional surveyor selected and paid for by the Contractor.
- R. Maintenance Data: For metal panel finishes to include in maintenance manuals.
- S. Warranties: Special warranties specified in this Section.
- T. Meetings: Provide for up to 8 hours of coordination and review meetings with the District. Meetings are to be held at the District's office. Additionally, attendance of the metal building pre-erection conference is mandatory for the metal building manufacturer.

1.03 REFERENCES

- A. American Institute of Steel Construction

Code of Standard Practice for Steel Buildings and Bridges
Specification for Structural Steel Buildings - Allowable Stress Design, Plastic Design
Load and Resistance Factor Design Specification for Structural Steel Buildings

B. American Iron and Steel Institute

Specification for the Design of Cold-Formed Steel Structural Members.
Load and Resistance Factor Design Specification for Steel Structural Members.

C. American Society of Civil Engineers

ASCE 7 *Minimum Design Loads for Buildings and Other Structures.*

D. American Welding Society

AWS D1.1 *Structural Welding Code - Steel*
AWS D1.3 *Structural Welding Code - Sheet Steel.*

E. American Society for Testing and Materials (ASTM) International Publications

ASTM A36/A 36M *Specification for Carbon Structural Steel*
ASTM A123/A 123M *Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products*
ASTM A307 *Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength*
ASTM A325 *Specification for Structural Bolts, Steel, Heat Treated, 120/1 05 ksi Minimum Tensile Strength*
ASTM A480 *Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.*
ASTM A490 *Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength*
ASTM A500 *Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes*
ASTM A529/A 529M *Specification for High-Strength Carbon-Manganese Steel of Structural Quality*
ASTM A563 *Specification for Carbon and Alloy Steel Nuts*
ASTM A572/A 572M *Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel*
ASTM A653/A 653M *Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*
ASTM A755/A 755M *Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products*
ASTM A780 *Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings*
ASTM A792/A 792M *Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process*
ASTM A924 *Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process*

ASTM A992/A 992M	<i>Specification for Steel for Structural Shapes for Use in Building Framing</i>
ASTM A1008/A 1008M	<i>Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability</i>
ASTM A1011/A 1011M	<i>Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability</i>
ASTM B117	<i>Standard Practice for Operating Salt Spray (Fog) Apparatus</i>
ASTM B209	<i>Specification for Aluminum and Aluminum-Alloy Sheet and Plate</i>
ASTM C273	<i>Standard Test Method for Shear Properties of Sandwich Core Materials</i>
ASTM B370	<i>Specification for Copper Sheet and Strip for Building Construction</i>
ASTM B882	<i>Specification for Pre-Patinated Copper for Architectural Applications</i>
ASTM B695	<i>Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel</i>
ASTM C273	<i>Test Method for Shear Properties of Sandwich Core Materials</i>
ASTM C297	<i>Test Method for Flatwise Tensile Strength of Sandwich Constructions</i>
ASTM C578	<i>Specification for Rigid, Cellular Polystyrene Thermal Insulation</i>
ASTM C591	<i>Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation</i>
ASTM C612	<i>Specification for Mineral Fiber Block and Board Thermal Insulation</i>
ASTM C645	<i>Specification for Nonstructural Steel Framing Members</i>
ASTM C920	<i>Specification for Elastomeric Joint Sealants</i>
ASTM C991	<i>Specification for Flexible Glass Fiber Insulation for Metal Buildings</i>
ASTM C1107	<i>Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)</i>
ASTM C1136	<i>Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation</i>
ASTM C1289	<i>Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board</i>
ASTM C1311	<i>Specification for Solvent Release Sealants</i>
ASTM C1363	<i>Test Method for the Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus</i>
ASTM D226	<i>Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing</i>
ASTM D523	<i>Standard Test Method for Specular Gloss</i>
ASTM D522	<i>Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings</i>
ASTM D714	<i>Standard Test Method for Evaluating Degree of Blistering of Paints</i>
ASTM D968	<i>Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive</i>
ASTM D1308	<i>Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes</i>
ASTM D1621	<i>Test Method for Compressive Properties of Rigid Cellular Plastics</i>
ASTM D1622	<i>Test Method for Apparent Density of Rigid Cellular Plastics</i>

ASTM D1623	<i>Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics</i>
ASTM D1654	<i>Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments</i>
ASTM D1929	<i>Standard Test Method for Determining Ignition Temperature of Plastics</i>
ASTM D2126	<i>Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging</i>
ASTM D2244	<i>Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates</i>
ASTM D2247	<i>Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity</i>
ASTM D2794	<i>Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)</i>
ASTM D2856	<i>Test Method for Open-Cell Content of Rigid Cellular Plastics by the Air Pycnometer</i>
ASTM D3273	<i>Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.</i>
ASTM D3359	<i>Standard Test Methods for Measuring Adhesion by Tape Test</i>
ASTM D3363	<i>Standard Test Method for Film Hardness by Pencil Test</i>
ASTM D3656	<i>Specification for Insect Screening and Louver Cloth Woven from Vinyl Coated Glass Yarns</i>
ASTM D4145	<i>Standard Test Method for Coating Flexibility of Prepainted Sheet</i>
ASTM D4214	<i>Test Methods for Evaluating the Degree of Chalking of Exterior Paint films</i>
ASTM D4397	<i>Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications</i>
ASTM D5894	<i>Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV Condensation Cabinet)</i>
ASTM D6226	<i>Standard Test Method for Open Cell Content of Rigid Cellular Plastics.</i>
ASTM E72	<i>Standard Test Methods of Conducting Strength Tests of panels for Building Construction.</i>
ASTM E84	<i>Test Method for Surface Burning Characteristics of Building Materials</i>
ASTM E94	<i>Guide for Radiographic Examination</i>
ASTM E96	<i>Test Methods for Water Vapor Transmission of Materials</i>
ASTM E108	<i>Test Methods for Fire Tests of Roof Coverings</i>
ASTM E119	<i>Test Methods for Fire Tests of Building Construction and Materials</i>
ASTM E164	<i>Practice for Ultrasonic Contact Examination of Weldments</i>
ASTM E165	<i>Test Method for Liquid Penetrant Examination</i>
ASTM E283	<i>Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen</i>
ASTM E329	<i>Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction</i>

ASTM E331	<i>Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference</i>
ASTM E408	<i>Test Methods for Total Normal Emittance of Surfaces Using Inspection Meter Techniques</i>
ASTM E709	<i>Guide for Magnetic Particle Examination</i>
ASTM E903	<i>Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres</i>
ASTM E1514	<i>Specification for Structural Standing Seam Steel Roof Panel Systems</i>
ASTM E1592	<i>Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference</i>
ASTM E1646	<i>Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference</i>
ASTM E1680	<i>Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems</i>
ASTM E2140	<i>Test Method for Weather Penetration of Metal Roof Panel Systems by Static Water Pressure Head</i>
ASTM F436	<i>Specification for Hardened Steel Washers</i>
ASTM F568M	<i>Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners</i>
ASTM F844	<i>Specification for Washers, Steel, Plain (Flat), Unhardened for General Use</i>
ASTM F959	<i>Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners</i>
ASTM F1554	<i>Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength</i>
ASTM F1852	<i>Specification for "Twist Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength</i>
ASTM G153	<i>Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials</i>
ASTM G154	<i>Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials</i>
F. FM Global (FM)	
FM 4880	<i>Approval Standard for Class 1 Fire Rating of Roof/ Ceiling Panels, Interior Finish Materials or Coatings.</i>
FM 4471	<i>Approval Standard for Class 1 Panel Roofs</i>
G. Federal Specification	
FS RR-W-365	<i>Wire Fabric (Insect Screening)</i>
H. California Building Code (CBC): 2022 Edition	

I. Metal Building Manufacturers Association

Metal Building Systems Manual

J. National Association of Architectural Metal Manufacturers

Metal Finishes Manual for Architectural and Metal Products

K. National Fire Protection Agency (NFPA)

NFPA 259 *Standard Test Method for Potential Heat of Building Materials.*
NFPA 285 *Standard Fire Test Method for Evaluation of Fire Propagation
Characteristics of Exterior Non-Load-Bearing Wall Assemblies
Containing Combustible Components*

L. North American Insulation Manufacturers Association

NAIMA 202 *Standard for Flexible Fiber Glass Insulation to be Laminated for Use
in Metal Buildings*

M. Research Council on Structural Connections

Specification for Structural Joints Using ASTM A325 or A490 Bolts

N. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

Architectural Sheet Metal Manual.

O. The Society for Protective Coatings (SSPC)

SSPC-Paint 12 *Paint Specification No. 12: Cold Applied Asphalt Mastic Painting
System with Extra Thick Film*
SSPC-Paint 15 *Paint Specification No. 15: Steel Joist Shop Paint*
SSPC-Paint 20 *Paint Specification No. 20: Zinc-Rich Primers (Type I, "Inorganic,"
and Type II, "Organic")*
SSPC SP 2 *Surface Preparation Specification No. 2: Hand Tool Cleaning*
SSPC-SP 3 *Surface Preparation Specification No. 3: Power Tool Cleaning*

P. Structural Engineering Institute/American Society of Civil Engineers

SEI/ASCE 7 *Minimum Design Loads for Buildings and Other Structures*

Q. Underwriters Laboratories Inc.

UL 580 *Tests for Uplift Resistance of Roof Assemblies*
Fire Resistance Directory, Current edition.

- R. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.04 **SYSTEM DESCRIPTION**

- A. General: Provide a complete, integrated set of metal building system manufacturer's standard mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior. Include primary and secondary framing, metal roof panels, and accessories complying with requirements indicated.

1. Provide metal building system of size and with spacings, slopes, and spans indicated.

B. Primary Frame Type

1. Single-Span Rigid Frame: Solid-member, structural-framing system without interior columns. The pre-engineered building columns shall have pinned bases and shall transfer no moments to the foundation.
2. Rigid Modular Frame: Lateral load resisting moment frame without diagonal rods or cables. Moment frames shall have pinned bases and shall transfer no moments to the foundation.
3. Brace Frame: Lateral load resisting brace frame shall be in the opposite direction of the lateral resisting moment frames.

- C. Secondary Frame Type: Manufacturer's standard purlins and joists and exterior-framed (bypass) girts.

- D. Eave Height: as indicated by nominal height on the plans.

- E. Bay Spacing: as indicated on the plans.

- F. Roof Slope: as indicated on the plans.

- G. Roof System: Architectural grade appearance standing seam. Prefinished steel exterior and interior faces with foamed in place polyurethane (polyisocyanurate) core with concealed fastening and mechanically seamed side lap.

1.05 **SYSTEM PERFORMANCE REQUIREMENTS**

- A. Structural Performance: Provide metal building systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

4. Engineer metal building systems according to procedures in MBMA's "Metal Building Systems Manual."
5. Design Loads: As indicated on the plans.

6. Design Loads: As required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures."
 7. Roof Live Loads: As indicated on the plans. Roof live load shall have no reductions.
 - a. Building Occupancy: As indicated on the plans
 8. Wind Loads: Include horizontal loads induced by a basic wind speed corresponding to:
 - a. 100 mph with 3 second gust, Exposure C. (ASCE 7)
 - b. Occupancy Category III, Importance Factor $I_w = 1.00$.
 9. Collateral Loads: Include additional dead loads other than the weight of metal building system for permanent items such as sprinklers, mechanical systems, piping, electrical systems, and ceilings with a minimum 20 psf collateral load. Confirm final design collateral loads with equipment manufacturer's approved submittals.
 10. Load Combinations: Design metal building systems to withstand the most critical effects of load factors and load combinations as required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures."
 11. Deflection Limits: Engineer assemblies to withstand design loads with deflections no greater than the following:
 - a. Purlins and Rafters: Vertical deflection of $1/120$ of the span.
 - b. Main Structural Members: Vertical deflection of $1/$ of the span.
 - c. Metal Roof Panels: Vertical deflection of $1/120$ of the span.
 - d. Horizontal Drift: $0.0015 \times$ story height.
 12. Design secondary framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.
 13. Provide metal panel assemblies capable of withstanding the effects of loads and stresses indicated, based on testing according to ASTM E1592.
 14. Metal building system shall be designed to be independent of all masonry construction. No loads from the metal building system shall be imparted to the masonry.
- B. Seismic Performance: Design and engineer metal building systems capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures":
1. Site Classification: D
 2. Mapped Spectral Response Accelerations: $SS = 0.402g$, 0.2 second response, $SI = 0.207g$, 1.0 second response
 3. Spectral Response Coefficients: $SDS = 0.396g$, $SD1 = 0.453g$
 4. Seismic Design Category C
 5. Occupancy Category III, Occupancy Importance Factor = 1.25
- C. Thermal Movements: Provide metal panel systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint

sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Roof Panel Performance Criteria

1. Structural Test: Design shall be verified by representative structural test for wind loads in accordance with ASTM E72. The deflection criteria shall be $L/240$.
2. Thermal Properties: The panel shall provide a nominal R-value of 7.2 [hr·ft²·°F/Btu] per inch thickness when tested in accordance with ASTM C518 at 75°F mean temperature and 8.0 [hr·ft²·°F/Btu] per inch thickness when tested in accordance with ASTM C518 at 35°F mean temperature. See the plans for required panel thicknesses.
3. Fatigue Test: There shall be no evidence of metal/insulation interface delamination when the panel is tested by simulated wind loads of 20 psf (positive and negative loads), when applied for two million alternate cycles.
4. Bond Strength: No metal primer interface corrosion and/or delamination shall occur after 1000 hours at 140°F and 100% relative humidity. No delamination shall occur after 2-1/2 hours in a 2 psi 212°F autoclave.
5. Water Penetration: There shall be no uncontrolled water leakage at pressures of up to 20 psf when tested in accordance with ASTM E331 and ASTM E1646. Tested assembly must include endlap and sidelap conditions.
6. Air Infiltration: Air infiltration through the roof shall not exceed 0.003 cfm/sf at 6.24 psf air pressure differential when tested in accordance with ASTM E283 and ASTM E1680. Tested assembly must include endlap and sidelap conditions.
7. Hailstorm Rating: Factory Mutual 1 SH hailstorm rating.
8. Wind-Uplift Rating: Units shall be rated and carry the following listing:
 - a. UL 580, Class 90 uplift rating for 5 foot spans with a minimum 14 gauge purlins.
9. Fire Classification: Factory Mutual Class 1A Approval when installed at a maximum roof slope of 2:12.
10. Insulating Core: Polyisocyanurate (ISO) core, ASTM C591 Type IV, CFC and HCFC free, with the following minimum physical properties:
 - a. Core is minimum 88 percent closed cell when tested in accordance with ASTM D6226
 - b. Foam has a density of 2.3 - 2.6 pounds per cubic foot when tested in accordance with ASTM D1622
 - c. Compressive Strength: 14 – 22 psi
 - d. Shear Strength: 15 psi (to rise)
 - e. Tensile Strength: Minimum of 29 psi
 - f. Flame Spread and Smoke Developed Tests on exposed Insulating Core when tested in accordance with ASTM E84:
 - 1) Flame Spread: Less than 25
 - 2) Smoke Developed: Less than 450

E. Roof Panel Paint Finish Characteristics

1. Gloss: 15 +/- 5 measured at 60 degree angle tested in accordance with ASTM D523.
2. Pencil Hardness: HB-H minimum tested in accordance with ASTM D3363.
3. Flexibility, T-Bend: 1-2T bend with no adhesion loss when tested in accordance with ASTM D4145.
4. Flexibility, Mandrel: No cracking when bent 180 deg. around a 1/8 mandrel as tested in accordance with ASTM D522.
5. Adhesion: No adhesion loss tested in accordance with ASTM D3359.
6. Reverse Impact: No cracking or adhesion loss when impacted 3000 x inches of metal thickness (lb-in), tested in accordance with ASTM D2794.
7. Abrasion Resistance: Nominal 65 liters of falling sand to expose 5/32 inch diameter of metal substrate when tested in accordance with ASTM D968.
8. Graffiti Resistance: Minimal effect.
9. Acid Pollutant Resistance: No effect when subjected to 30 percent sulfuric acid for 18 hours, or 10 percent muriatic acid for 15 minutes when tested in accordance with ASTM D1308.
10. Salt Fog Resistance: Passes 1000 hours, when tested in accordance with ASTM B117 (5 percent salt fog at 95 deg. F).
11. Cyclic Salt Fog and UV Exposure: Passes 2016 hours when tested in accordance with ASTM D5894.
12. Humidity Resistance: Passes 1500 hours at 100 percent relative humidity and 95 deg. F, with a test rating of 10 when tested in accordance with ASTM D2247, and D714.
13. Color Retention: Passes 5000 hours when tested in accordance with ASTM G153 and G154.
14. Chalk Resistance: Maximum chalk is a rating of 8 when tested in accordance with ASTM D4214, Method A.
15. Color Tolerances: Maximum of 5ΔE Hunter units on panels when tested in accordance with ASTM D2244.

1.06 **QUALITY ASSURANCE**

- A. Erector Qualifications: An experienced erector who has specialized in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is approved by the manufacturer.
- B. Manufacturer Qualifications: A qualified manufacturer and member of MBMA.
 16. AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components in an AISC-Certified Facility.
 17. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer registered in the State of California.

C. Metal Panel Manufacturer and Installer Qualifications

1. Manufacturer Qualifications: Manufacturer shall have a minimum of five (5) years' experience in the production of insulated roof panels. Manufacturer shall demonstrate experience with examples of projects of similar type and exposure.
2. Installer Qualifications: Authorized by the manufacturer and the work shall be supervised by a person having a minimum of five (5) years experience installing specified insulated roof panels on similar type and size projects.

D. Testing Agency Qualifications: An independent agency qualified according to ASTM E329 for testing indicated, as documented according to ASTM E548.

E. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code-Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

F. Structural Steel: Comply with AISC's "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design," or AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings," for design requirements and allowable stresses.

G. Cold-Formed Steel: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members," or AISI's "Load and Resistance Factor Design Specification for Steel Structural Members," for design requirements and allowable stresses.

H. Pre-Erection Conference: Conduct conference at Project site. Review methods and procedures related to metal building systems including, but not limited to, the following:

1. Inspect and discuss condition of foundations and other preparatory work performed by other trades.
2. Review structural load limitations.
3. Review and finalize construction schedule and verify availability of materials, Erector's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review required testing, inspecting, and certifying procedures.
5. Review weather and forecasted weather conditions and procedures for unfavorable conditions.
6. Review of protection and security of equipment installed in facility prior to start of metal building erection.

I. Pre-installation Roof Assembly Conference: Conduct conference at Project site. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:

1. Examine purlin and rafter conditions for compliance with requirements, including flatness and attachment to structural members.
2. Review structural limitations of purlins and rafters during and after roofing.
3. Review flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.

4. Review temporary protection requirements for metal roof panel assembly during and after installation.
5. Review roof observation and repair procedures after metal roof panel installation.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling. Deliver panel materials and components in manufacturer's original, unopened, undamaged packaging with identification labels intact.
- B. Store roofing panel materials on dry, level, firm, and clean surface using the three inch factory provided foam supports under the panels. Use of wood substitute is not acceptable. Stack no more than two bundles high. Elevate and ventilate to allow air to circulate and moisture to escape.
- C. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

1.08 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements
 6. Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.
 7. Established Dimensions for Metal Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal panels without field measurements, or allow for field trimming metal panels. Coordinate construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.09 COORDINATION

- A. Coordinate size and location of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Division 3.
- B. Coordinate installation of roof equipment.

- C. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 **WARRANTY**

- A. Prefinished Metal Finish Warranty: Standard form in which manufacturer agrees to repair or replace metal panels that evidence deterioration of fluoropolymer finish, including flaking or peeling from approved primed metal substrate, chalk in excess of 8 when tested in accordance with ASTM D4214, Method A, and /or color fading in excess of 5 ΔE Hunter units on panels when tested in accordance with ASTM D2244.

8. Warranty Period: Twenty (20) years from date of Substantial Completion.

- B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam, metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 – PRODUCTS

2.01 **MANUFACTURERS**

- A. Manufacturers: Provide products by one of the following:
 - 1. The design for metal building structural system is based on a hybrid single-span rigid frame configuration with lateral load resisting moment and braced frames. Subject to compliance with requirements, provide the complete structure by one of the following:
 - a. Varco Pruden Buildings, A Division of BlueScope Buildings North America, Inc.
 - b. Butler Manufacturing Company.
 - c. Star Building Systems; Division of Robertson-Ceco Corporation.
 - d. Or District approved equal.
 - 2. The design for metal building prefinished insulated metal roof panel systems is based on a Nucor Building Systems. Subject to compliance with requirements, provide the named product or an equal product by one of the following:
 - a. Nucor Building Systems
 - b. Or District approved equal.

2.02 STRUCTURAL-FRAMING MATERIALS

- A. W-Shapes: ASTM A992/A 992M; ASTM A572/A 572M, Grade 50 or 55; or ASTM A529/A 529M, Grade 50 or 55.
 - 1. Finish: Hot-dip zinc coating, ASTM A123.
- B. Channels, Angles, M-Shapes, and S-Shapes: ASTM A361A 36M; ASTM A572/A 572M, Grade 50 or 55; or ASTM A529/A 529M, Grade 50 or 55.
 - 1. Finish: Hot-dip zinc coating, ASTM A123.
- C. Plate and Bar: ASTM A361A 36M; ASTM A572/A 572M, Grade 50 or 55; or ASTM A529/A 529M, Grade 50 or 55.
 - 1. Finish: Hot-dip zinc coating, ASTM A123.
- D. Steel Pipe: ASTM A531 A 53M, Type E or S, Grade B.
 - 1. Finish: Hot-dip zinc coating, ASTM A123.
- E. Cold-Formed Hollow Structural Sections: ASTM A500, Grade B or C, structural tubing.
 - 1. Finish: Hot-dip zinc coating, ASTM A123.
- F. Structural-Steel Sheet: Hot-rolled, ASTM A1011A 1011M, Structural Steel (SS), Grades 30 through 55, or High-Strength Low Alloy Steel (HSLAS), Grades 45 through 70; or cold-rolled, ASTM A1008 A 1008M, Structural Steel (SS), Grades 25 through 80, or High-Strength Low Alloy Steel (HSLAS), Grades 45 through 70.
 - 1. Finish: Hot-dip zinc coating, ASTM A123.
- G. Metallic-Coated Steel Sheet: ASTM A653/A 653M, Structural Steel (SS), Grades 33 through 80 or High-Strength Low Alloy Steel (HSLAS), Grades 50 through 80; with G60 coating designation; mill phosphatized.
- H. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755/A 755M.
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A 653M, Structural Steel (SS), Grades 33 through 80 or High-Strength Low Alloy Steel (HSLAS), Grades 50 through 80; with G90 coating designation.
 - 2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A7921 A 792M, Structural Steel (SS), Grade 50 or 80; with Class AZ50 coating.

- I. Non-High-Strength Bolts, Nuts, and Washers: ASTM A307, Grade A, carbon-steel, hex-head bolts; ASTM A563 carbon-steel hex nuts; and ASTM F844 plain (flat) steel washers.
 - 1. Finish: Hot-dip zinc coating, ASTM A153/A 153M, Class C.
- J. High-Strength Bolts, Nuts, and Washers: ASTM A325, Type I, heavy hex steel structural bolts; ASTM A563 heavy hex carbon-steel nuts; and ASTM F436 hardened carbon-steel washers.
 - 1. Finish: Hot-dip zinc coating, ASTM A153/A 153M, Class C.
 - 2. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F1852, Type 1, heavy-hex-head steel structural bolts with splined ends.
 - a. Finish: Hot-dip zinc coating, ASTM A153/A 153M, Class C.
- K. High-Strength Bolts, Nuts, and Washers: ASTM A490, Type I, heavy hex steel structural bolts.
- L. Unheaded Anchor Rods: ASTM F1554, Grade 36; ASTM A36/A 36M; ASTM A307, Grade A.
 - 1. Configuration: Straight.
 - 2. Nuts: ASTM A563 heavy hex carbon steel.
 - 3. Plate Washers: ASTM A36/A 36M carbon steel.
 - 4. Washers: ASTM F436 hardened carbon steel.
 - 5. Finish: Hot-dip zinc coating, ASTM A153/A 153M, Class C.
- M. Headed Anchor Rods: ASTM F1554, Grade 36; ASTM A307, Grade A, straight.
 - 1. Nuts: ASTM A563 heavy hex carbon steel.
 - 2. Plate Washers: ASTM A36/A 36M carbon steel.
 - 3. Washers: ASTM F436 hardened carbon steel.
 - 4. Finish: Hot-dip zinc coating, ASTM A153/A 153M, Class C.
- N. Threaded Rods: ASTM A5721 A 572M, Grade 50.
 - 1. Nuts: ASTM A563 heavy hex carbon steel.
 - 2. Washers: ASTM F436 hardened carbon steel.
 - 3. Finish: Hot-dip zinc coating, ASTM A153/A 153M, Class C.
 - 4.

2.03 **PREFINISHED INSULATED METAL ROOF PANELS**

A. Panel Description

- 1. Model: Nucor Metl Span CFR IMP Insulated Metal Roof Panel, R35.
- 2. Thermal Value: R 35 minimum
- 3. Panel thickness: 4 inches

4. Panel width: 42 inch wide
5. Panel length: Roof panels are less than the maximum 52 ft. allowable. Provide panels in single length as shown on the drawings.
6. The side joint shall consist of a 2 inch vertical sidelap, mechanically seamed, with fasteners and thermally broken attachment clip completely concealed within the side joint.
7. Exterior Face of Panel:
 - a. Material:
 - 1) Steel coil material shall be in accordance with ASTM A755: AZ50 Galvalume®/Zincalume® (55 percent aluminum, 45 percent zinc) in accordance with ASTM A792
 - 2) Gauge: 22 gauge
 - 3) Yield: 33 ksi minimum
 - b. Exterior Profile: 2-inch high standing seam with a Mesa profile between the seams
 - c. Texture: Embossed
 - d. Exterior Finish:
 - 1) Color: As selected by the District from Manufacturer's full range of Premium and Standard Colors.
 - 2) Finish System: 1.0 mil. Fluoropolymer (PVDF) Two Coat system: 0.2 mil primer with 0.8 mil Kynar 500 (70 percent) SOLID color coat.
 - 3) Solar Reflective Index (ASTM E1980): 36
 - 4) Solar Reflectivity (ASTM E903, C 1549): .34
 - 5) Emissivity (ASTM C1371): .87
8. Interior Face of Panel:
 - a. Material:
 - 1) Steel coil material shall be in accordance with ASTM A755: [AZ50 Galvalume®/Zincalume® (55 percent aluminum, 45 percent zinc) in accordance with ASTM A792.
 - 2) Gauge: 26 gauge
 - b. Interior Profile: Mesa, nominal 1/8"
 - c. Texture: Unembossed
 - d. Interior Finish:
 - 1) Finish System: PVDF finish, dry film thickness of 1.0 mil including primer
 - 2) Color: Selected from the current Kingspan Insulated Panels stock color chart.

2.04 MISCELLANEOUS MATERIALS

A. Roof Panel Fasteners

1. Self drilling fasteners shall be cadmium plated steel, designed to resist maximum negative pulloff loads and hold the face sheet mechanically to the structural support.
2. Thermally broken attachment clip.
3. Vibration resistant type (anti-backout threads) fasteners. Self-drilling flathead screws with sealing washers and square drives, designed to resist back out by increasing thread friction as screw loosens.

B. Perimeter Trim

1. Sealants: Butyl, non-skinning/curing type as recommended by manufacturer.
2. Butyl Tape: As recommended by manufacturer.

C. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for IS-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

E. Anchor Bolts: Metal building manufacturer shall provide cast-in-place, hot-dip galvanized, ASTM A-307 headed anchor bolts, bolt templates and all building frame to foundation connection hardware.

2.05 **FABRICATION, GENERAL**

A. General: Design components and field connections required for erection to permit easy assembly.

1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of
3. proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.

B. Tolerances: Comply with MBMA's "Metal Building Systems Manual": Chapter IV, Section 9, "Fabrication and Erection Tolerances."

C. Metal Panels: Fabricate and finish metal panels at the factory to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

2.06 **STRUCTURAL FRAMING**

A. General

1. Primary Framing: Shop fabricate framing components to indicated size and section with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.

- a. Make shop connections by welding or by using high-strength bolts.
- b. Join flanges to webs of built-up members by a continuous submerged arc-welding process.

- c. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
 - d. Weld clips to frames for attaching secondary framing members.
 - e. Finish: Hot-dip zinc coating, ASTM A123, after fabrication.
 - f. Column bases shall be pinned base attachments; no moments shall be transferred through the base plates into the foundation.
 - g. Steel corbels shall be attached to metal building columns and not metal building roof, as shown on the drawings.
 2. Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
 - a. Make shop connections by welding or by using non-high-strength bolts.
 - b. Finish: Hot-dip zinc coating, ASTM A123, after fabrication.
- B. Primary Framing: Manufacturer's standard structural primary framing system, designed to withstand required loads and specified requirements. Primary framing includes moment and braced frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
 1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
 2. Single-span Rigid Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
 3. Exterior Column Type: Tapered.
- C. Secondary Framing: Manufacturer's standard secondary framing members, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Fabricate framing from cold-formed, structural-steel sheet or roll-formed, G-90 galvanized standard material, unless otherwise indicated, to comply with the following:
 1. Purlins: C- or Z-shaped sections, built-up steel plates, or structural-steel shapes; minimum 2-1/2-inch- wide flanges.
 - a. Depth: As required to comply with system performance requirements.
 2. Girts: C- or Z-shaped sections, built-up steel plates, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees to flange and with minimum 2-1/2-inch- wide flanges.
 - a. Depth: As required to comply with system performance requirements.

3. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch diameter, cold-formed structural tubing to stiffen primary frame flanges.
4. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
5. Base or Sill Angles: Minimum 3-by-2-by-0.0598-inch zinc-coated (galvanized) steel sheet.
6. Purlin and Girt Clips: Manufacturer's standard sections. Provide galvanized clips where clips are connected to galvanized framing members.
7. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.

D. Bracing: Provide adjustable wind bracing as follows:

1. Rods: ASTM A36/A 36M; ASTM A572/A 572M, Grade 50; or ASTM A529/A 529M, Grade 50; minimum 1-inch diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
2. Cable: ASTM A475, minimum 1/4-inch diameter, extra-high-strength grade, Class B zinc-coated, 7-strand steel; with threaded end anchors.
3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
4. Moment Frames: Fabricate from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
5. Diaphragm Action of Metal Panels: Design metal building to resist wind and seismic forces through diaphragm action of metal panels.
6. Bracing: Provide wind bracing using any method specified above, at manufacturer's option.

E. Bolts: Provide hot-dipped galvanized bolts for structural-framing components that are galvanized.

2.07 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing and inspecting agency to perform the following tests and inspections and to submit reports.
- B. Special Inspector: District will engage a qualified special inspector to perform the following tests and inspections and to submit reports. Special Inspector will verify that manufacturer maintains detailed fabrication and quality-control procedures and will review the completeness and adequacy of those procedures to perform the Work.
 1. Special inspections will not be required if fabrication is performed by a manufacturer registered and approved by authorities having jurisdiction to perform such Work without special inspection.
 - a. After fabrication, submit certificate of compliance with copy to authorities having jurisdiction certifying that Work was performed according to Contract requirements.

C. Tests and Inspections

1. Bolted Connections: Shop-bolted connections shall be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A325 or A 490 Bolts."
 2. Welded Connections: In addition to visual inspection, shop-welded connections shall be tested and inspected according to AWS D1.1 and the following inspection procedures, at inspector's option:
 - a. Liquid Penetrant Inspection: ASTM E165.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E164.
 - d. Radiographic Inspection: ASTM E94.
- D. Correct deficiencies in Work that test reports and inspections indicate do not comply with the Contract Documents.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 1. For the record, prepare written report, endorsed by Erector, listing conditions detrimental to performance of work.
- B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with Erector present, for compliance with requirements and metal building system manufacturer's tolerances.
 1. Coordinate with land surveyor to perform surveying. Surveying services will be performed by a District approved professional surveyor selected and paid for by the Contractor.
- C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.
- B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and

loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place, unless otherwise indicated.

3.03 ERECTION OF STRUCTURAL FRAMING

- A. Erect metal building system according to manufacturer's written erection instructions and erection drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.
- F. Primary Framing and End Walls: Erect framing true to line, level, plumb, rigid, and secure. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist cure grout for no less than seven days after placement.
 - 1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A325 or A 490 Bolts" for type of bolt and type of joint specified.
 - a. Joint Type: Snug tightened or pretensioned.

- G. Secondary Framing: Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary framing to primary framing using clips with field connections using non-high-strength bolts.
1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
 2. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof.
- H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
1. Tighten rod and cable bracing to avoid sag.
 2. Locate interior end-bay bracing only where indicated.
- I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.04 METAL ROOF PANEL INSTALLATION, GENERAL

A. Examination

1. Examine individual panels upon removing from the bundle. Notify manufacturer of panel defects. Do not install defective panels.
2. Examine edges of panels and any slight overfill of insulation shall be carefully removed.
3. Examine primary and secondary framing to verify that structural panel support members and anchorages have been installed within alignment tolerances required by manufacturer. All deviations from structural tolerances shall be corrected prior to the installation of roof panels.
 - a. Supporting steel for roof panels: Support members shall be installed within the following tolerances:
 - 1) In the plane of the roof: 0-inches inward, 1/2-inch outward.
4. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before metal panel installation.

B. General

1. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - a. Utilize power tools having controlled torque adjusted to install fasteners without damage to washer, screw threads, or metal panels. Install screws in predrilled holes.

- b. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
 - c. Install metal panels perpendicular to structural supports, unless otherwise indicated.
 - d. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
 - e. Locate and space fastenings in uniform vertical and horizontal alignment.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal panel manufacturer.

3.05 METAL ROOF PANEL INSTALLATION

A. General

1. Provide metal roof panels of full length from eave to ridge.

B. Panel Installation

1. Remove protective film before installation, or immediately thereafter to prevent sunlight damage.
2. Cut panels, where indicated on shop drawings, using a power circular saw with fine tooth carbide tip blades or a band saw prior to installation. Ventilate area where polyurethane dust is generated. Personnel should wear respiratory and eye protection devices.
3. Apply butyl sealant vapor seal around interior perimeter of roof assembly per panel manufacturer's instructions.
4. Apply butyl tape on panel sidelaps and clip assemblies per panel manufacturer's instructions.
5. Secure units to the steel supports with manufacturer's recommended fastener.
6. Place panel fasteners through predrilled top clip and base clip, concealed within the side joint of the panel.
 - a. Heads of concealed fasteners shall be insulated from the exterior environment to prevent condensation and "ice balling" from occurring on the fastener shaft.
7. Endlap sealing tape and butyl to panel surface: Not required as roof panels will have no endlaps.
8. Endlap panel stitch fasteners to be vibration resistant type. Stitch fasteners are not required as roof panels will have no endlaps.
9. As each panel is installed, crimp hidden clip assembly prior to placement of next panel.
10. Replace metal panels and trim that have been damaged.

C. Trim Installation

1. Place trim to determine the location of the closure strips, sealant and ridge closure trims.
2. Apply butyl tape above and below the foam closure strip and seat the closure strip firmly in the tape to ensure a continuous seal. If any voids exist add butyl caulking and reseal the closure.
3. Place a continuous layer of butyl tape on top of the metal ridge closure trims for the length of the building.
4. Fasten the exterior ridge trim to the metal ridge closure trims, per manufacturer's recommendations, on center with 1/4 inch by 7/8 inch low profile vibration resistant stitch fasteners.

3.06 **ACCESSORY INSTALLATION**

- A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 2. Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- C. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 4 feet o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

- D. Downspouts: Join sections with 1-1/2-inch joints. Provide hangers designed to hold downspouts securely to walls similar to SMACNA Figure 1-35I. Locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
1. Fabricate open downspouts with liner matching downspout color.
 2. Fabricate elbows at base of downspouts to direct water away from building.
 3. Tie downspouts to underground drainage system indicated.
- E. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.07 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified testing and inspecting agency to perform the following tests and inspections and to submit reports to the District.
- B. Special Inspector: Contractor will engage a qualified special inspector to perform the following tests and inspections and to submit reports to the District.
- C. Tests and Inspections
1. High-Strength, Field-Bolted Connections: Connections shall be inspected during installation according to RCSC's "Specification for Structural Joints Using ASTM A325 or A 490 Bolts."
 2. Welded Connections: In addition to visual inspection, field-welded connections shall be tested and inspected according to AWS D1.1 and the following inspection procedures, at inspector's option:
 - a. Liquid Penetrant Inspection: ASTM E165.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E164.
 - d. Radiographic Inspection: ASTM E94.
- D. Correct deficiencies in Work that test reports and inspections indicate do not comply with the Contract Documents.

3.08 REPAIR OF DEFECTIVE GALVANIZED COATING

- A. Where zinc coating has been damaged after cutting, installation or welding, substrate surface shall be first cleaned and then repaired with zinc dust-zinc oxide coating in accordance with ASTM A780. Application shall be as recommended by the zinc dust-zinc oxide coating manufacturer. Coating shall consist of multiple coats to dry film thickness of 8 mils.

- B. Items not physically damaged, but which have insufficient or deteriorating zinc coatings, and items damaged in shipment or prior to installation, shall be removed from the project site for repair by the hot-dip coating method.

3.09 CLEANING AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.
- B. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.
 - 1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning."
 - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 09900.
- D. Metal Panels
 - 1. Remove temporary protective coverings and strippable films, if any, as metal panels are installed.
 - 2. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
 - 3. Only minor scratches and abrasions will be allowed to be touched up. Contractor shall utilize touch up paint supplied by the panel supplier.
 - a. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
 - b. The District will have the final decision as to what will be considered and acceptable or unacceptable repair.
 - 4. Protect finished installation as required to ensure finishes will be without damage at time of final completion of the project.

END OF SECTION

**RANCHO MURIETA COMMUNITY SERVICES DISTRICT
WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
CHLORINE CONTACT BASIN EXPANSION – PHASE 1**

Division 15 – Piping

Section 15060	Piping Systems
Section 15066	Steel Pipe
Section 15068	Ductile Iron Pipe
Section 15070	Plastic Pipe
Section 15104	Ball Valves
Section 15105	Diaphragm Valves
Section 15120	Piping Appurtenances and Specialties
Section 15140	Piping Supports

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SECTION 15060

PIPING SYSTEMS

PART 1 – GENERAL

1.01 SCOPE

The Contractor shall furnish, install, and place into successful operation all piping systems specified herein this Section 15060, PIPING SYSTEMS, and as shown on the plans. A piping system shall include all the pipes, fittings, closure pieces, supports, bolts, nuts, gaskets, jointing materials, and appurtenances as shown and specified.

1.02 QUALITY ASSURANCE

A. References

The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

International Code Conference (ICC) Publications:

UPC *Uniform Plumbing Code*

American National Standards Institute /National Sanitation Foundation (ANSI/NSF)
Standards:

ANSI/NSF Standard 61 *Drinking Water System Components - Health Effects*

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted.

A. Shop Drawings

Detailed, dimensioned piping layout and support shop drawings to scale for all piping systems, including specific locations of all anchors, supports, braces and instrument taps.

Piping layout and support drawings shall be submitted for information only in accordance with Section 01300, SUBMITTALS, a minimum of 4 weeks prior to construction.

B. Manufacturer's Data

1. Manufacturer's data and catalog information for all piping system components including:
 - a. Pipe material identified with ASTM or other conformance standard.
 - b. Flanges, fittings, connections, gaskets.
 - c. Valves and appurtenances.
2. Manufacturer's catalog information, pressure rating and materials of construction for mechanical joint restraints.

C. Flushing Plan

Contractor's plan describing step by step procedures for flushing pipelines.

1.04 OPERATION AND MAINTENANCE INFORMATION

Submit operation and maintenance instructions in accordance with Section 01730, OPERATING AND MAINTENANCE INFORMATION. A copy of Section 01730 with each paragraph check marked to show compliance shall be submitted. O&M instructions shall be submitted after the submittals specified in Paragraph 1.03, Submittals of this section have been returned "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED". O&M instructions shall reflect the approved materials and equipment.

1.05 DEFINITIONS

Terms used in Section 15060, PIPING SYSTEMS and elsewhere in Division 15 are defined as follows:

1. Pressure Terms:
 - a. Maximum: The greatest continuous pressure at which the piping system operates.
 - b. Test: The hydrostatic pressure used to determine system acceptance.
2. Piping Exposure Terms:
 - a. Buried: Pipe, which may be insulated, that is located below grade and in contact with backfill material; or pipe, which may be insulated, that is located below grade and is concrete encased.
 - b. Not Buried: Pipe that does not meet the definition of buried pipe.

PART 2 – PRODUCTS

2.01 PIPING MATERIALS

Unless otherwise specified in the particular piping sections, piping materials including pipe, gaskets, fittings, connections, and joint assemblies, lining and coatings, shall be provided from those listed on the Piping System Specification sheets. Piping materials shall conform to detailed specifications for each type of pipe and piping appurtenances specified in other sections of Division 15. Pipe connection types shall also be provided where shown on the plans and where specified in Division 15.

To assure uniformity and compatibility of piping components, fittings and couplings for grooved end piping systems shall be furnished by the same manufacturer.

All products in contact with potable water shall be: 1) NSF/ANSI Standard 61 certified in compliance with California Code of Regulations, Title 22, Section 64591; and 2) lead-free in compliance with California Health and Safety Code Section 116875.

2.02 PIPING IDENTIFICATION

Plastic markers and directional arrows for coding pipe and valves shall conform to ANSI A13.1. Markers and directional arrows shall be provided bearing the legends and operating pressure on the background colors specified in Part 3.08, Piping System Specification Sheets, Table A, of this section. Markers shall be Seton Setmark, manufactured by Seton Name Plate Corporation, or equal.

Markers shall be provided in the following letter heights:

<u>Outside pipe diameter^a, inches</u>	<u>Letter height, inches</u>
Less than 1-1/2	1/2
1-1/2 through 3	1-1/8
Greater than 3	2-1/4

^a Outside pipe diameter shall include insulation and jacketing.

2.03 DIELECTRIC ISOLATION

A. General

All buried metallic piping shall be dielectrically isolated from all other metal piping, hangers, brackets, steel reinforcing and all other metal structures. All piping shall be dielectrically isolated from piping or other materials constructed from dissimilar metals.

B. Flange Insulators

Flange dielectric insulation sets shall contain full faced gaskets, full length sleeves, and double insulating washers or as specifically indicated on the plans. Insulation material for the flange insulation sets shall be phenolic resin and flange faced gaskets shall be neoprene faced phenolic resin. All insulating materials shall be of a type designated by the manufacturer as suitable for use at the operating and test pressures specified in piping system specification sheets at the end of this section.

C. Wall Penetrations

All penetrations through reinforced concrete walls shall be constructed to prevent metal to metal contact between the pipe and reinforcing steel in the wall. Details shall be as shown on the plans.

D. Insulating Unions

Insulating unions shall meet Fed. Spec. WW-U-532, Class 1 requirements for dimensional, strength, and pressure requirements. Insulation barrier shall limit galvanic current to 1% of the short circuit current in a corresponding metallic joint. The insulating material shall be impervious to water. Each connector shall match the type of material to which it connects.

E. Pipe Supports

Any pipe hangers, supports, brackets and saddles installed on the buried side of dielectric insulators on the protected pipe shall be dielectrically isolated from the pipe by insertion of dielectric insulating material between the hanger and the pipe.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Location

Piping shall be installed as specified except for adjustments to avoid structural and other features and shall be coordinated with electrical construction. Piping sections shall be painted in accordance with Section 09800, PAINTING AND SPECIAL COATING SYSTEMS, prior to installation. Unless specifically shown otherwise on the plans, minimum depth of cover for buried pipe shall be 36 inches over the top of the pipe.

B. Piping Sizes

Where the size of piping is not specified, the Contractor shall provide piping of the sizes required by UPC. Unless specified otherwise, small piping (less than 1 inch in diameter) required for services not described by UPC shall be 1/2 inch.

C. Anchorage for Buried Piping

All plugs, caps, tees and bends in buried pressure piping systems shall be anchored by means of reaction backing or restrained joints as specified in the individual piping sections. Concrete thrust blocks shall be as shown on the plans or as specified in the specifications.

D. Not Buried to Buried or Encased Piping Material Transitions

Wherever a pipe 2 inches in diameter and larger passes from concrete encasement or structure wall to earth, a flexible sleeve type pipe coupling, or a push-on bell and spigot, shall be installed within 2 feet of the concrete. Particular care shall be taken to ensure a full support of the pipe in the earth between and beyond the joints.

Buried or encased pipe shall pass through wall or floor penetration before making buried or encased to not buried piping transition. Where required for resistance to pressure, sleeve type couplings and bell and spigot joints shall be restrained as specified in the individual piping sections.

E. Takedown Couplings

Takedown couplings shall be screwed unions, flanged or grooved end mechanical coupling type joints and shall be provided as specified. Flanged or grooved end joints shall be employed on pipelines 2-1/2 inches in diameter and larger. Where piping passes through walls, takedown coupling shall be provided within 3 feet of the wall, unless specified otherwise. A union or flanged connection shall be provided within 2 feet of each threaded end valve.

3.02 PIPING IDENTIFICATION

After application of the specified coating and insulation systems, exposed piping, interior and exterior, and piping in ceiling spaces, pipe trenches, pipe chases and valve boxes shall be identified with plastic markers as specified in Part 2.02A, Plastic Coding Markers of this section. Legend markers and directional arrows shall be located at each side of walls, floors and ceilings, at one side of each piece of equipment, at piping intersections, elbows and at approximately 50-foot centers.

3.03 VALVE IDENTIFICATION

For all motor operated valves, stainless steel tags bearing the specified valve number stamped in 1/4-inch high letters shall be attached to the valve stem by stainless steel jack chain. In addition, plastic coding markers in accordance with Paragraph 2.02A, Plastic Coding Markers of this section with the valve number installed on the pipe next to each valve.

3.04 **CLEANING**

A. **General**

Piping systems shall be thoroughly cleaned prior to testing, flushing and connection to operating, control, regulating or instrumentation equipment.

B. **Liquid Systems**

Pipe system cleaning shall take place as the system is constructed and shall be a multiple step process.

First each piece of pipe, fitting, valve, or appurtenance shall be visibly checked for the presence of dirt, debris and contaminants before it is attached to the piping system. If dirt, debris or contaminants are present, they shall be removed prior to incorporation of the piece of pipe, fitting, valve, or appurtenance into the system.

Second, the piping system shall be swabbed. Swabbing shall consist of pulling a tight-fitting cleaning ball or swab through the pipe as the pipe system is assembled. The Contractor shall take care to prevent dirt, debris, or contaminants from entering clean portions of the pipe system. If such materials enter the pipe system, the pipe system shall be re-swabbed at the Contractor's expense.

3.05 **TESTING**

A. **General**

All piping systems shall be tested following installation and cleaning. Testing shall occur prior to the application of insulation to exposed piping, prior to flushing, and prior to operation of any kind. No test shall commence until the pipeline is completely cleaned to the satisfaction of the District.

Testing shall be in accordance with this section and Section 01660, TESTING AND TRAINING. Pressures, media and test durations shall be as specified in the PIPESPEC. Equipment which may be damaged by the specified test conditions shall be isolated. Testing shall be performed using calibrated test gages and calibrated volumetric measuring equipment to determine leakage rates. Each test gage shall be selected so that the specified test pressure falls within the middle one-third of the gage's range. The Contractor shall notify the District 48 hours prior to each test and shall include pipe test procedures and status in the testing log specified in Section 01660, TESTING AND TRAINING. All bulkheads thrust blocks, anchors, pumps, etc. shall be in place prior to issuance of the notice to the District. Tests shall be witnessed by the District. The Contractor shall furnish the District with a written record of all tests.

At the Contractor's option, pipe systems may be tested in segments between convenient isolation points such as valves, structures and equipment. However, in addition to such testing, a final pressure test of the complete pipe system shall be conducted.

Unless otherwise specified, testing, as specified herein, shall include existing piping systems which connect with new pipe systems. Existing pipe shall be tested to the nearest existing valve. Any piping which fails the test shall be repaired by the Contractor at the Contractor's cost. Repair of existing piping will be considered and paid for as extra work.

B. Pressurized Liquid Systems

The testing medium for liquid systems shall be clean water. Leakage shall be zero at the specified test pressure throughout the specified duration for the following systems: exposed piping, buried pressure or insulated piping, through all valves when in the closed position, and buried or exposed piping carrying liquid chemicals. Unless otherwise specified, leakage from other buried liquid piping systems shall be less than 0.05 gallon per hour per inch diameter per 1,000 feet of buried piping.

C. Liquid Systems – Gravity Conveyance

1. **General:** Leakage tests shall be completed after pipelines have been cleaned of obstructions and inspected by the District.
2. **Section Leakage Test:** Each section of pipeline shall be tested by closing the lower end of the pipe to be tested and the inlet pipe of the upper manhole with stoppers and then filling the pipe and manhole with water to a level 5 feet above the crown of the open pipe in the upper manhole or, if groundwater is present, 6 feet above the section's average adjacent groundwater level. The line shall be filled at least 48 hours prior to testing and shall be tested for 6 hours minimum, maintaining the specified head by measured additions of water. The sum of these additions shall be the measured leakage for the test period. The allowable leakage shall be:
 - a. 18 in. Diameter and Larger: 0.02 gallons per hour per inch diameter per 100 feet of buried pipe.
 - b. Less than 18 inch diameter: 0.08 gallons per hour per inch diameter per 100 feet of buried pipe.

D. Drains

Drain systems, operating at atmospheric pressure shall be tested in accordance with UPC. Drains operating under hydrostatic pressure or pumped drain systems shall be tested as specified in this section.

3.06 FLUSHING

A. General

Following completion of pipe system cleaning as specified in Part 3.04, Cleaning, and testing as specified in Part 3.05, Testing, pipe systems for liquids shall be flushed with clean water.

Pipe systems shall be flushed only after they are completely constructed. Where minor exceptions to this requirement are necessary, they are expressly noted on the plans.

Temporary screens as specified below shall be installed prior to flushing to protect equipment.

B. Liquid System Piping

All liquid system piping shall be flushed using means that will produce the specified volume and velocity of flushing water. The actual means and methods used shall be the Contractor's sole responsibility subject to review by the District as described below.

Flushing shall be considered complete for a given pipe when all the following conditions have been met:

1. Velocity of flow has been achieved for the minimum duration or volume of flush water specified in the approved flushing plan.
2. Water exiting the flushed pipe (when visible) is clear and free of debris in the opinion of the District.
3. Temporary screens, where specified, are clean after at least 15 minutes of operation.

C. Temporary Screens

Upon completion of the cleaning and testing, and prior to operation, the Contractor shall connect the piping systems to related process equipment. Temporary screens shall be inserted in the following locations as a minimum:

1. Suction inlet of all pumps, compressors and blowers.
2. Inlet and outlet of all pipe systems between tanks without isolation gates.

Temporary screens shall be sized in accordance with the following table.

<u>Pump suction or piping size, inches</u>	<u>Maximum screen opening, inches</u>
0 – 1	1/16
1 1/4 - 3	1/4
3 1/2 - 6	1/2
Over 6	1

Temporary screens having a maximum screening opening of 1/16 inch shall be inserted in pipelines at the suction of compressors and blowers.

All temporary screens shall be provided with locator tabs which remain visible from the outside when the screens are in place.

Following flushing, as a precaution, the Contractor shall maintain the screens in place during testing, initial start-up, and initial operating phases of the reliability testing process. In special cases, screens may be removed as required for performance tests. The Contractor may remove the temporary screens and make the final piping connections after the screens have remained clean for at least 24 consecutive hours of operation. Systems handling solids are exempted. Screen installation and removal shall be included in the master test log required by Section 01660, TESTING AND TRAINING.

D. Flushing Plan

The Contractor shall submit a detailed flushing plan including disposal of flushing water. The Contractor’s flushing plan shall be incorporated into the piping test plans and log specified under Section 01660, TESTING AND TRAINING.

Flushing means and methods for pipes shall be proposed by the Contractor and submitted in the flushing plan.

3.07 PIPING SYSTEM SPECIFICATION SHEETS (PIPESPEC)

Piping and valves are specified on individual Piping System Specification sheets (PIPESPEC). Piping services specified in the PIPESPECS and shown on the plans are alphabetically arranged by designated service abbreviations as shown in Table A. Table A also indicates the fluid category and pipe marker background color of each service. Existing pipe systems may vary from the PIPESPEC. The Contractor shall field verify the pipe type, location and arrangement required for each connection to existing pipe systems.

Where more than one type of piping and fittings are specified under a pipe size and exposure, the Contractor may use any one of the specified types unless indicated otherwise.

**TABLE A
PIPING SERVICES**

Symbol	Service	Fluid Category	Pipe Marker Background Color	Pipe Marker Letter Color
ALUM	Alum	Chemical	Green	White
NAOCL	Sodium Hypochlorite	Chemical	Yellow	White
PD	Plant Drain	Wastewater	Dark Grey	White

PIPING SYSTEM SPECIFICATION				
SERVICE: ALUM				SYMBOL: ALUM
FLUID: CHEMICAL				
PRESSURE (PSIG)			TEMPERATURE (°F)	
WORK: 50	MAX: 100	TEST: 125	NORMAL: 60	MAX: 120
TEST MEDIUM: Water		TEST DURATION: 120 minutes		

PIPE AND FITTING SPECIFICATION, UNLESS INDICATED OTHERWISE ON PLANS			
SIZE	EXPOSURE	PIPE	FITTINGS
Smaller than 4"	Not buried	CPVC, ASTM D1784, Class 23567-A, NSF certified, ASTM D1785, Schedule 80 per Section 15070	CPVC, ASTM D2467, Schedule 80 couplings and fittings, solvent welded sockets with threaded flange adapters for valves

GENERAL VALVE SPECIFICATIONS, UNLESS OTHERWISE SPECIFIED IN VALVE SCHEDULE				
SIZE	EXPOSURE	DUTY	SPECIFICATION	OPERATOR
2"	Not buried	Isolation	CPVC ball valves per Section 15104	Manual
3"	Not buried	Isolation	CPVC diaphragm valves per Section 15105	Manual
3"	Not buried	Check Valve	CPVC check valves per Section 15120	

REMARKS: All pipes furnished with restrained joints. Expansion joints shall be per Section 15120. Pipe outside of containment sump shall be double walled.

PIPING SYSTEM SPECIFICATION				
SERVICE: SODIUM HYPOCHLORITE (12.5% SOLUTION)				SYMBOL: NAOCL
FLUID: CHEMICAL				
PRESSURE (PSIG)			TEMPERATURE (°F)	
WORK: 50	MAX: 100	TEST: 125	NORMAL: 60	MAX: 120
TEST MEDIUM: Water		TEST DURATION: 120 minutes		

PIPE AND FITTING SPECIFICATION, UNLESS INDICATED OTHERWISE ON PLANS			
SIZE	EXPOSURE	PIPE	FITTINGS
Smaller than 4"	Not buried	CPVC, ASTM D1784, Class 23567-A, NSF certified, ASTM D1785, Schedule 80 per Section 15070	CPVC, ASTM D2467, Schedule 80 couplings and fittings, solvent welded sockets with threaded flange adapters for valves

GENERAL VALVE SPECIFICATIONS, UNLESS OTHERWISE SPECIFIED IN VALVE SCHEDULE				
SIZE	EXPOSURE	DUTY	SPECIFICATION	OPERATOR
2"	Not buried	Isolation	CPVC ball valves with 1/8" vent at upstreamside of bell when closed, Teflon seals and vitan o-rings	Manual
3"	Not buried	Isolation	CPVC diaphragm valves per Section 15105 with 1/8" vent at upstream side when closed	Manual
3"	Not buried	Check Valve	CPVC check valves, true union ends, vitan seals, 150 psi working pressure rated	

REMARKS: All pipes furnished with restrained joints. Expansion joints shall be per Section 15120. Pipe outside of containment sump shall be double walled.
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PIPING SYSTEM SPECIFICATION				
SERVICE: PLANT DRAIN				SYMBOL: PD
FLUID: WASTEWATER				
PRESSURE (in. H ₂ O)			TEMPERATURE (°F)	
WORK: Atmospheric	MAX:	TEST:	NORMAL: 50	MAX: 120
TEST MEDIUM: None		TEST DURATION: None		

PIPE AND FITTING SPECIFICATION, UNLESS INDICATED OTHERWISE ON PLANS			
SIZE	EXPOSURE	PIPE	FITTINGS
18"	Buried	Ductile iron, AWWA C150/C151, cement mortar lined and polyethylene encased, push-on joints per Section 15060	Ductile iron, AWWA C110/C153 push-on joint, lined and encased as pipe per Section 15068

GENERAL VALVE SPECIFICATIONS, UNLESS OTHERWISE SPECIFIED IN VALVE SCHEDULE				
SIZE	EXPOSURE	DUTY	SPECIFICATION	OPERATOR

REMARKS: Pipe installed within steel casing buried below containment bay.

END OF SECTION

SECTION 15066

STEEL PIPE

PART 1 - GENERAL

1.01 **SCOPE**

This section specifies steel pipe, fittings, connections, linings, and coatings.

1.02 **QUALITY ASSURANCE**

A. **References**

The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern, except where a specific date or edition is given below. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

American National Standards Institute (ANSI) Publications:

ANSI/NSF Standard 61	<i>Drinking Water System Components - Health Effects</i>
ANSI B1.1	<i>Unified Inch Screw Threads</i>
ANSI B1.20.1	<i>Pipe Threads, General Purpose</i>
ANSI B16.3	<i>Malleable Iron Threaded Fittings</i>
ANSI B16.5	<i>Pipe Flanges and Flanged Fittings</i>
ANSI B16.9	<i>Factory-Made Wrought Steel Buttwelding Fittings</i>
ANSI B16.11	<i>Forged Fittings, Socket-Welding and Threaded</i>
ANSI B18.2.1	<i>Square and Hex Bolts and Screws</i>
ANSI B18.2.2	<i>Square and Hex Nuts</i>
ANSI B31.1	<i>Power Piping</i>
ANSI B31.3	<i>Chemical Plant and Petroleum Refinery Piping</i>

American Society of Mechanical Engineers (ASME) Publications:

ASME Section IX *Certification and Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators*

American Society for Testing and Materials (ASTM) Publications:

ASTM A47 *Ferritic Malleable Iron Castings*

ASTM A53 *Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*

ASTM A105/A105M *Forgings, Carbon Steel, for Piping Components*

ASTM A106 *Seamless Carbon Steel Pipe for High-Temperature Service*

ASTM A139 *Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4-inch and Over)*

ASTM A182 *Forged or Rolled Alloy- Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service*

ASTM A193 *Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service*

ASTM A194 *Carbon and Alloy Steel Nuts for Bolts for High Pressure or High-Temperature Service, or Both.*

ASTM A197 *Cupola Malleable Iron*

ASTM A234/A234M *Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures*

ASTMA269 *Seamless and Welded Austenitic Stainless Steel Tubing for General Service*

ASTM A312 *Seamless and Welded Austenitic Stainless Steel Pipe*

ASTM A403 *Wrought Austenitic Stainless Steel Piping Fittings*

ASTM A774 *As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperature*

ASTM A778 *Welded, Unannealed Austenitic Stainless Steel Tubular Products*

ASTM F152 *Tension Testing of Nonmetallic Gasket Materials*

American Water Works Association (AWWA) Publications:

AWWA C200	<i>Steel Water Pipe--6 Inches (150 mm) and Larger</i>
AWWA C205	<i>Cement-Mortar Protective Lining and Coating for Steel Water Pipe --4 In. and Larger--Shop Applied</i>
AWWA C206	<i>Field Welding of Steel Water Pipe</i>
AWWA C207	<i>Steel Pipe Flanges for Waterworks Services--Sizes 4 In. Through 144 In.</i>
AWWA C208	<i>Dimensions for Fabricated Steel Water Pipe Fittings</i>
AWWA C209	<i>Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines</i>
AWWA C213	<i>Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines</i>
AWWA C214	<i>Tape Coating Systems for the Exterior of Steel Water Pipelines</i>
AWWA C600	<i>Installation of Ductile-Iron Water Mains and Their Appurtenances</i>
AWWA M11	<i>Steel Pipe --A Guide for Design and Installation</i>

Health and Safety Code (HCS):

HSC Section 116875	<i>Lead Pipes, Plumbing, and Solder</i>
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Steel Structures Painting Council (SSPC) Specifications:

SP-10	<i>Near White Blast Cleaning</i>
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B. Testing

Factory testing shall conform to the requirements of ASTM A53, ASTM A106, or AWWA C200 as applicable.

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted.

A. Shop Drawings

Shop drawings, including details and dimensions of joints and special fittings.

B. Calculations

Pipe design calculations including buried pipe thrust restraint for all locations requiring restraints.

C. Manufacturer's Data

Manufacturer's information and catalog data for all piping systems.

D. Certificates

Affidavits of compliance with AWWA C200, AWWA C205, AWWA C209, AWWA C213, AWWA C214, ASTM A53, ASTM A106, and ASTM A312 as applicable.

1.04 DEFINITIONS

Terms used in Section 15060, PIPING SYSTEMS, and elsewhere in Division 15 are defined as follows:

1. Pipe Joint: The area approximately 12 inches each way from the centerline of the visible gap between pipe lengths.
2. Pipe Length: The pipe between two joints; part of a pipe section.
3. Pipe Section: The reach of pipeline between two successive manholes.
4. Pressure Terms:
 - a. Maximum: The greatest continuous pressure at which the piping system operates.
 - b. Test: The hydrostatic or pneumatic pressure used to determine system acceptance.

5. Piping Exposure Terms:
 - a. Buried: Pipe, which may be insulated, that is located below grade and in contact with backfill material; or pipe, which may be insulated, that is located below grade and is concrete encased.
 - b. Not Buried: Pipe that does not meet the definition of buried pipe.

PART 2 - PRODUCTS

2.01 PIPE

A. ASTM A53

The minimum wall thickness for ASTM A53 pipe shall be Schedule 40 for pipe 10 inch diameter and less, and 3/8 inch for pipe 12 inch through 24 inch diameter. Increased shell thickness shall be provided where specified in Section 15060, PIPING SYSTEMS or shown on the plans.

B. ASTM A106

The minimum wall thickness for ASTM A106 pipe shall be Schedule 40 for pipe 10 inch diameter and less and 3/8 inch for pipe 12 inch through 24 inch diameter. Increased shell thickness shall be provided where specified.

C. ASTM A312

Pipe shall be seamless, Schedule 80, 316 stainless steel in accordance with ASTM A312, and shall be annealed and passivated.

D. ASTM A778

Pipe shall be welded, 304L stainless steel. The minimum wall thickness for pipe 20-inch diameter and less shall be Schedule 80, and 5/16 inch for pipe larger than 20-inch diameter. Pipe shall be passivated.

E. AWWA C200

AWWA C200 pipe shall be straight seam. The minimum wall thickness shall be 3/8 inches. Increased shell thickness shall be provided where specified.

F. Casing Pipe

Steel casing pipe shall be new, smooth-wall, carbon steel pipe conforming to ASTM A139, Grade B, 1/4-inch minimum wall thickness.

2.02 FITTINGS AND APPURTENANCES

Fittings and appurtenances shall be as specified in Section 15060 (PIPESPEC) or as shown on the plans.

Malleable iron threaded fittings and appurtenances shall conform to the requirements of ASTM A47, ASTM A197, or ANSI B16.3.

Steel fittings and appurtenances shall conform to the requirements of ASTM A234 or ASTM A105, ANSI B16.11.

Fabricated steel fittings and appurtenances shall conform to AWWA C208. Fittings shall be smooth radius type. Shell thickness shall be as specified for straight pipe.

Stainless steel fittings for ASTM A312 pipes shall be butt weld type, ASTM A403, Grade WP 316L, dimensions according to ANSI B16.9 or flanged with welding neck and conforming to ANSI B16.5.

Fittings for ASTM A778 pipes shall be manufactured in accordance to ASTM A774 or/an ASTM A403. End configuration shall be flanged or beveled for welding.

Unless otherwise specified, all fittings shall be rated for pressure and loadings equal to the pipe.

2.03 CONNECTIONS

A. Threaded Connections

Pipe thread dimensions and size limits shall conform to ANSI B1.20.1.

B. Flange Connections

1. Flanges: Flanges shall comply with ASME B16.5 or ASME B16.47, Class 150, or AWWA C207, Class D. All flanges shall be flat-faced.
2. Gaskets: Gaskets shall be as follows:
 - a. EPDM: ethylene-propylene-diene-terpolymer.
 - b. Neoprene: neoprene.
 - c. Nitrile: nitrile (Buna N).
 - d. Neoprene CI: neoprene with cloth insert.

- e. Neoprene, oil resistant: neoprene with oil-resisting characteristics.
- f. TFE: noncreeping tetrafluoroethylene (TFE) with insert filler.
- g. Compressed gasketing consisting of organic fibers (Kevlar), fillers and styrene butadiene rubber (SBR) binder.
- h. TFE bonded EPDM: TFE bonded to EPDM in full-face gasket having concentric-convex molded rings.
- i. Nylon gasketing, Garlock Style 3504, 2000 psi (ASTM F152).

Gaskets for plain faced flanges shall be the full face type. Thickness shall be 1/16 inch for pipe 10 inches and less in diameter and 1/8 inch for pipe 12 inches and larger in diameter.

3. **Bolts:** Not buried flange assembly bolts shall be SAE Grade 5, ANSI B18.2.1 hexagon head carbon steel machine bolts with ANSI B18.2.2 hot pressed heavy hexagon nuts. Threads shall be ANSI B1.1, standard coarse thread series; bolts shall be Class 2A, nuts shall be Class 2B. Bolt length shall conform to ANSI B16.5. Flange assembly bolts and nuts for submerged or buried service shall be type 316 stainless steel regardless of any other protective coating. Stainless steel flange bolts shall be 316 stainless steel, ASTM A193, Grade B8M, hex head. Nuts shall be 316 stainless steel, ASTM A194, Grade 8M, hex.

C. Welded Connections for Stainless Steel Pipes

Materials for welded joints shall be as follows:

1. **Filler Metal:** The bare wire to be used for the gas tungsten arc welding (GTAW) root layer shall conform to SFA 5.9 Type F-6.

The covered electrode to be used for the subsequent shielded metal arc welding layers shall conform to SFA 5.4, F-5.

The deposited weld metal for both bare wire and covered electrodes shall conform to Weld Metal Analysis No. A-8 of Table QW-442, Section IX of the ASME Boiler and Pressure Vessel Code.

Filler shall be ER 316L (bare wire) and E316L-15, -16 (covered electrodes).

Bare filler rod shall be free of grease, oil, rust or other foreign matter.

Extreme care must be exercised in handling electrodes. Wet or damaged electrodes shall not be used. Electrodes shall be purchased in sealed metal containers. Handling of weld rods shall be in accordance with manufacturer's recommendations.

2. **Tungsten Electrodes:** The electrodes used for the GTAW process shall be 1% or 2% thoriated tungsten electrodes.

3. Inert Gas: The shielding gas for GTAW welding shall be commercial grade argon at a minimum flow rate of 15 CFH.

The purging gas shall be commercial grade argon.

D. Sleeve-Type Couplings

1. Sleeve-Type Couplings, 30 Inches and Smaller: Couplings shall be ductile iron construction. Standard couplings shall be Powerseal 3501, or equal. Flanged coupling adapters shall be Powerseal 3521, or equal. Insulated couplings shall be fabricated steel, Powerseal 3539, Smith-Blair 416, or equal. Gaskets shall be AWWA C606.

Where restrained joints are required by Section 15060 (PIPESPEC) or shown on the plans, joints using sleeve-type couplings shall be provided with tie bolts and harness lugs. The harnessing system shall be in accordance with Chapter 13 of the AWWA Manual M11 and shall be designed for the test pressure specified in Section 15060, PIPING SYSTEMS. Fasteners shall be type 316 stainless steel.

2. Sleeve-Type Couplings, Greater Than 30 Inches: Unless otherwise specified, couplings shall be fabricated steel construction. Standard couplings shall be Powerseal 3538, Smith-Blair 411, or equal. Reducing couplings shall be Powerseal 3562, Smith-Blair 415, or equal. Flanged coupling adapters shall be Powerseal 3528, Smith-Blair 416, or equal.

Gaskets shall be AWWA C606.

E. Plain End Couplings

Plain end couplings shall be Gustin-Bacon 200, Victaulic Style 99, or equal.

2.04 PIPE LINING

A. Fusion Epoxy Lining

Where specified, pipe (including butt ends) and fittings shall be fusion epoxy lined in accordance with AWWA C213. Surface preparation shall be in accordance with SSPC-SP 10. The application method shall attain 15 mils minimum dry film thickness.

Field welds, connections and otherwise damaged areas shall be patched according to the manufacturer's instructions with 3M Scotchkote 306.

Fusion epoxy lining shall be 3M Scotchkote 206N, or equal.

B. Cement Mortar Lining

Cement mortar lining shall be as specified in AWWA C205.

Where specified in Section 15060 (PIPESPEC), pipe (including butt ends) and fittings shall be lined with double thickness cement mortar as specified in AWWA C205. Fittings and specials larger than 24 inches, not fabricated from centrifugally lined straight sections, shall require 2-inch by 4-inch by 13-gage self-furring wire mesh reinforcement for hand-applied lining.

2.05 PIPE COATINGS

A. Fusion Epoxy Coating

Where specified, pipe and fittings shall be fusion epoxy coated in accordance with AWWA C213. Surface preparation shall be in accordance with SSPC-SP 10. The application method shall attain 15 mils minimum dry film thickness.

Field welds, connections and otherwise damaged areas shall be coated and patched according to the manufacturer's instructions with 3M Scotchkote 206N.

Fusion epoxy coating shall be 3M Scotchkote 203, or equal.

B. Polyethylene Tape Coating

Where specified, pipe and fittings shall be coated with primer and wrapped in accordance with AWWA C214 and AWWA C209. The coating application shall be a continuous step operation in conformance with AWWA C214, Section 3. The total coating thickness shall be not less than 50 mils for pipe 24 inches and smaller and not less than 80 mils for pipe 26 inches and larger.

Polyethylene tape coating system shall be as specified in AWWA C214 and AWWA C209.

C. Mortar Coating

Shop applied in accordance with AWWA C205.

PART 3 – EXECUTION

3.01 PIPE INSTALLATION

A. General

Pipe shall be installed in accordance with AWWA M11, Chapter 12, and as shown on the plans.

B. Support and Anchorage

Support and anchorage shall be provided as shown on the plans.

3.02 FITTING INSTALLATION

Fittings shall be installed in accordance with the manufacturer's recommendations.

3.03 CONNECTION INSTALLATION

A. Threaded Connections

Pipe cutting, threading and jointing shall conform to the requirements of ANSI B1.20.1, and the fitting manufacturer's installation recommendations.

B. Flanged Connections

Flanges shall be installed true and plumb. Raised face flanges shall not be bolted to flat face flanges.

Pipe cutting, threading and jointing shall conform to the requirements of ANSI B31.1, and the fitting manufacturer's installation recommendations.

Where a metallic nonferrous pipe or appurtenance is connected to ferrous pipe or appurtenance, an insulating section shall be provided as specified.

C. Mechanical Coupling Connections

Mechanical couplings shall be installed in accordance with the coupling manufacturer's installation recommendations.

D. Push-On Connections

Push-on connections shall be installed in accordance with the fitting manufacturer's installation recommendations.

E. Welded Connections

Pipe shall be welded by ASME-certified welders using shielded metal arc, gas shielded arc or submerged arc welding methods. Welds shall be made in accordance with the requirements of ASME Section IX, ANSI B31.1, ANSI B31.3, or AWWA C206.

F. Takedown Couplings

Takedown couplings shall be screwed unions, flanged or grooved end mechanical coupling type joints and shall be provided as specified. Flanged or grooved end joints shall be employed on pipelines 2-1/2 inches in diameter and larger. Where piping passes through walls, takedown couplings shall be provided within 3 feet of the wall, unless specified otherwise.

A union or flanged connection shall be provided within 2 feet of each threaded end valve.

G. Flexibility

Unless otherwise specified, piping 2 inches in diameter and larger passing from concrete to earth shall be provided with pipe couplings or flexible joints as specified (1) within 2 feet of the structure and (2) within 3 feet of the first joint. Where required for resistance to pressure, mechanical couplings shall be restrained in accordance with AWWA M11, paragraph 13.10, Tables 13-6 and 13-7, and Figure 13-17.

H. Dielectric Connections

Where a non-ferrous pipe is connected to steel pipe, dielectric unions or insulating connections shall be provided. Dielectric unions shall be EPCO, Capital, or equal.

I. Bonding of Joints

Where indicated all pipe joints, other than welded joints or bolted flange joints, shall be bonded to provide an electrically continuous pipeline. Bonding jumper shall be as shown on the plans.

3.04 LINING INSTALLATION

A. Epoxy Lining

Epoxy linings shall be installed and patched in accordance with the lining manufacturer's recommendations.

B. Cement Mortar Lining

Cement mortar lining shall be installed per AWWA 205. Field apply lining at joints.

3.05 COATING INSTALLATION

A. Epoxy Coating

Epoxy coating shall be installed in accordance with Section 09800, PAINTING AND SPECIAL COATING SYSTEMS and the coating manufacturer's instructions.

B. Mortar Coating

Shop apply per AWWA C205. Field apply mortar at joints.

3.06 PIPELINE ACCEPTANCE

A. Leakage Tests

1. Hydrostatic Testing: Hydrostatic testing shall be in accordance with Section 4 of AWWA C600 except that test pressures and allowable leakage shall be as listed in Section 15060, PIPING SYSTEMS.
2. Factory Testing: Factory testing shall conform to the requirements of ASTM A53, ASTM A106, or AWWA C200 as applicable.

END OF SECTION

SECTION 15070

PLASTIC PIPE

PART 1 - GENERAL

1.01 **SCOPE**

This section specifies polyvinyl chloride pipe and fittings.

A. **Pipe Designations**

For use in Section 15060, PIPING SYSTEMS and in this section, the following plastic pipe designation is defined:

<u>Designation</u>	<u>Definition</u>
PVC	Polyvinyl Chloride
CPVC	Chlorinated Polyvinyl Chloride

1.02 **QUALITY ASSURANCE**

A. **References**

The publications referred to hereinafter form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

American Society for Testing Materials (ASTM) Publications:

ASTM A536	<i>Ductile Iron Castings</i>
ASTM D1784	<i>Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds</i>
ASTM D1785	<i>Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120</i>
ASTM D2241	<i>Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR series)</i>
ASTM D2464	<i>Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80</i>

ASTM D2466 *Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40*

ASTM D2467 *Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80*

ASTM F477 *Elastomeric Seals (Gaskets) for Joining Plastic Pipe*

American Water Works Association (AWWA) Publications:

AWWA C605 *Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water*

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted.

A. Shop Drawings

Contractor's layout drawings.

B. Manufacturer's Data

Manufacturer's name and catalog number of all piping system products.

C. Certificates

Manufacturer's certificates of compliance with the specified standards and experience requirements.

D. Specification Compliance

A copy of this specification section, with addenda updates, and all referenced sections, with addenda updates, with each paragraph check marked to show specification compliance or marked to show deviation.

A copy of the portion of Section 01300, SUBMITTALS, that applies to this submittal shall be neatly and clearly marked by a check mark or circled indicating it has been reviewed and, as a minimum, complies with each requirement outlined or marked to show any deviation.

1.04 DEFINITIONS

Terms used in Section 15060, PIPING SYSTEMS and elsewhere in Division 15 are defined as follows:

1. Pressure Terms:

- a. Maximum: The greatest continuous pressure at which the piping system operates.
- b. Test: The hydrostatic pressure used to determine system acceptance.

2. Piping Exposure Terms:

- a. Buried: Pipe, which may be insulated, that is located below grade and in contact with backfill material; or pipe, which may be insulated, that is located below grade and is concrete encased.
- b. Not Buried: Pipe that does not meet the definition of buried pipe.

PART 2 – PRODUCTS

2.01 PVC PIPE

A. Experience

For all PVC pipe materials, manufacturers shall have manufactured for at least three years with a minimum of 20,000 lf of pipe successfully installed in the United States. Manufacturers shall submit a list of project references including owner contact information to confirm successful experience.

B. Pressure Pipe

PVC material for pipe and fittings shall conform to ASTM D1784, Class 12454-B. Pipe and fittings shall either be in accordance with ASTM D1785 or shall conform to ASTM D2241. for standard dimension ratios: 160 psi pipe--SDR 26; 200 psi pipe--SDR 21; 250 psi--SDR 17; as specified. Pressure rating for pipe shall be in excess of test pressure specified in Section 15060, PIPING SYSTEMS. Neoprene gaskets with push-on joints shall conform to ASTM F477.

Schedule 80 PVC socket type fittings shall conform to ASTM D2467. Schedule 40 PVC fittings shall conform to ASTM D2466. PVC solvent weld cement for socket connections shall meet the requirements of ASTM D2564. Schedule 80 PVC threaded fittings shall conform to ASTM D2464.

C. Mechanically Restrained Joints

1. Restrained Push-on Joints: Where specified in Section 15060 (PIPESPEC) and shown on the plans, PVC pipe joints are to be restrained by a harness restraint device in lieu of a thrust block, tie-rods, and clamps. The restraint shall consist of three major components: the first part being a bell ring that fits behind the bell; the second part being a restraint ring that installs on the spigot; the third part being tie bars to connect parts one and two to facilitate the joint restraint.

All of the components shall be cast of ductile iron conforming to ASTM A536. The restraint ring shall consist of individually activated gripping surfaces to hold the spigot and maximize restraint capability. The harness restraint shall have a working pressure of at least 125 psi with a minimum safety factor of 2:1 and shall be EBBA Iron Megalug, Series 1500, 2800, or equal.

2. Mechanically restrained joints shall be designed to allow separation of the joint after installation. Internal restraints are not acceptable.

2.02 CPVC PIPE

Where indicated, alum and hypochlorite solution piping shall be Schedule 80 CPVC, ASTM D1784, Class 23567-A, NSF certified. Fittings shall be CPVC, ASTM D2467, Schedule 80, with solvent welded sockets with threaded flange adapters for valves.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General

Plastic piping shall be installed as shown on the plans.

B. Connections

Connections to different types of pipe shall be by means of flanges, specified adapters or transition fittings. Where sleeve type couplings are used, both shall be uniformly torqued in accordance with pipe manufacturer's recommendation. Foreign material shall be removed from the pipe interior prior to assembly.

Mechanical joint restraints shall be installed in accordance with the manufacturer's instructions.

3.02 **TESTING**

Hydrostatic testing of plastic piping shall be as specified in Section 7 of AWWA C605 except that test pressures and allowable leakage shall be as listed in Section 15060, PIPING SYSTEMS.

****END OF SECTION****

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SECTION 15104

BALL VALVES

PART 1 - GENERAL

1.01 **SCOPE**

This section specifies ball valves. Refer to Section 11000, GENERAL REQUIREMENTS FOR EQUIPMENT, for additional requirements that apply.

1.02 **QUALITY ASSURANCE**

A. **References**

The publications referred to hereinafter form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

American Society for Testing and Materials (ASTM) Publications:

ASTM D1784 *Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds*

1.03 **SUBMITTALS**

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted:

A. **Manufacturer's Data**

Manufacturer's product data with highlighting to show compliance with specified features.

B. **Certificates**

Letters certifying valve and powered actuator compatibility.

C. Specification Compliance

A copy of this specification section, with addenda updates, and all referenced sections, with addenda updates, with each paragraph check marked to show specification compliance or marked to show deviation.

A copy of the portion of Section 01300, SUBMITTALS, that applies to this submittal shall be neatly and clearly marked by a check mark or circled indicating it has been reviewed and, as a minimum, complies with each requirement outlined or marked to show any deviation.

1.04 OPERATION AND MAINTENANCE INSTRUCTIONS

Submit operation and maintenance instructions in accordance with Section 01730, OPERATION AND MAINTENANCE INFORMATION. A copy of Section 01730 with each paragraph check marked to show compliance shall be submitted. O&M instructions shall be submitted after the submittals specified in Part 1.03 of this section have been returned “NO EXCEPTIONS TAKEN” or “MAKE CORRECTIONS NOTED”. O&M instructions shall reflect the approved materials and equipment.

PART 2 - PRODUCTS

2.01 VALVES

A. General Purpose Ball Valves

1. General: Bronze or brass three-piece general purpose ball valves.
2. Body: The body shall be three-piece bronze or brass construction, with actuator pad. Rated 400 psig WOG.
3. Ball: The ball shall be constructed from chrome-plated bronze or brass. The ball shall provide full bi-directional shutoff capability.
4. Seat: The seats shall be reinforced PTFE or virgin PTFE. Rated 300 degrees F at 400 psig.
5. Stem: The stem shall be constructed from bronze or brass.
6. Stem Seal: The stem seal shall be reinforced PTFE.
7. End Connections: End connections shall be NPT.
8. Flow Way: The valves shall be full port design.

9. Manufacturers: Apollo, Watts, or approved equal.

B. Stainless Steel Ball Valves

1. General: Stainless steel three-piece ball valves.
2. Body: The body shall be three-piece, Type 316, Grade CF8M stainless steel construction, with actuator pad. Rated 1000 psig WOG, minimum.
3. Ball: The ball shall be constructed from Type 316 stainless steel. The ball shall provide full bi-directional shutoff capability.
4. Seat: The seats shall be virgin PTFE. Rated 200 degrees F at 1000 psig.
5. Stem: The stem shall be constructed from Type 316 stainless steel.
6. Stem Seal: The stem seal shall be reinforced PTFE.
7. End Connections: End connections shall be NPT.
8. Flow Way: The valves shall be full port design.
9. Manufacturers: Apollo, Watts, or approved equal.

C. Thermoplastic (PVC and CPVC) Ball Valves

1. General: All thermoplastic ball valves shall be true union type constructed from PVC Type I Cell Classification 12454 or CPVC Type IV Cell Classification 23447 conforming to ASTM D1784. Valves shall be pressure rated at 150 psi for water at 73°F AWWA C504.
2. Body: Valve bodies be true union type, resistant to rust, scale, pitting, and chemical corrosion.
3. Ball: In full open position, full bore shall eliminate pressure drop.
4. Seat: Ball seats shall be PTFE floating seat design.
5. Shaft: The shaft shall incorporate a shear point to control accidental breakage. If over torquing occurs, break shall be above the stem O-ring leaving the seal intact until repair or replacement can be made.
6. O-Rings: All O-rings shall be EPDM or Viton.

7. Manufacturers: Spears, or approved equal.

PART 3 - EXECUTION

3.01 PREPARATION FOR SHIPMENT

Insofar as is practical, the equipment specified herein shall be factory assembled. Parts and assemblies that are of necessity shipped disassembled shall be packaged and tagged in a manner that will protect the equipment from damage and facilitate the final assembly in the field. Generally, machined and unpainted parts shall be protected from damage by the elements with the application of strippable, protective coatings. Provide all lubricant required for initial lubrication.

3.02 INSTALLATION

Ball valves and operators shall be installed in accordance with the manufacturer's recommendations and as shown on the plans.

Manual operators shall be positioned so that they can readily be operated.

Powered operators shall be installed so that the position indicator can be easily read from the floor level.

3.03 FIELD TESTING

Field testing shall demonstrate proper operation of the equipment and compliance with the plans and these specifications. All equipment that fails any test shall be rejected, and complete retesting shall be required at the Contractor's expense after the Contractor makes corrections or modifications to equipment which has previously failed any test. All field tests shall be witnessed by the District. Installation shall be complete; and the units shall be serviced, tested, adjusted, and ready for use before the field tests are scheduled. Written notice of the scheduled dates for the field tests shall be given to the District at least 10 days prior to the field test dates. The notice shall include a written test schedule listing the tests, the test procedure, the criteria for a satisfactory test, and special measurement equipment to be employed. If minor repairs or adjustments are made during the tests, additional testing shall be performed as required by the District.

****END OF SECTION****

SECTION 15105

DIAPHRAGM VALVES

PART 1 - GENERAL

1.01 SCOPE

This section specifies diaphragm valves for 12.5% sodium hypochlorite and alum solution service. Refer to Section 11000, GENERAL REQUIREMENTS FOR EQUIPMENT, for additional requirements that apply.

1.02 QUALITY ASSURANCE

A. References

The publications referred to hereinafter form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

American Society for Testing and Materials (ASTM) Publications:

ASTM D1784 *Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds*

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted:

A. Manufacturer's Data

Manufacturer's product data with highlighting to show compliance with specified features.

B. Shop Drawings

Detailed, dimensional layout drawing to scale confirming specified features and compatibility with piping/valving arrangement shown.

C. Certificates

Letters certifying valve and actuator compatibility.

D. Specification Compliance

A copy of this specification section, with addenda updates, and all referenced sections, with addenda updates, with each paragraph check marked to show specification compliance or marked to show deviation.

A copy of the portion of Section 01300, SUBMITTALS, that applies to this submittal shall be neatly and clearly marked by a check mark or circled indicating it has been reviewed and, as a minimum, complies with each requirement outlined or marked to show any deviation.

1.04 OPERATION AND MAINTENANCE INSTRUCTIONS

Submit operation and maintenance instructions in accordance with Section 01730, OPERATION AND MAINTENANCE DATA. A copy of Section 01730 with each paragraph check marked to show compliance shall be submitted. O&M instructions shall be submitted after the submittals specified in Part 1.03 of this section have been returned “NO EXCEPTIONS TAKEN” or “MAKE CORRECTIONS NOTED”. O&M instructions shall reflect the approved materials and equipment.

PART 2 – PRODUCTS

2.01 DIAPHRAGM VALVES

Diaphragm valves for sodium hypochlorite and alum solution service shall be constructed of CPVC for body and bonnet with molded flange ends or true union ends. Wetted diaphragm shall consist of three unbonded layers of EDPM-PTFE. Valves shall be furnished with position indicator, travel stop to prevent over-tightening, and bonnet O-ring seating arrangement. Valves shall be a weir type with either round or square bonnet body sealing design and ¼-turn bayonet style diaphragm/compressor connection. All PTFE diaphragms shall accept the installation of a PVDF gas barrier between the layers of EPDM and PTFE. The PVDF gas barrier shall prevent against gas migration outside of the valve. All hardware shall be 304 stainless steel and non-wetted. CPVC materials shall comply with ASTM D1784 Cell Classification 23567-A. Valves shall be rated to 150 psi. Valves shall be Type 14 flat-faced flange design by Asahi/America, Inc., or approved equal.

PART 3 – INSTALLATION

3.01 PREPARATION FOR SHIPMENT

Insofar as is practical, the equipment specified herein shall be factory assembled. Parts and assemblies that are of necessity shipped disassembled shall be packaged and tagged in a manner that will protect the equipment from damage and facilitate the final assembly in the field. Generally, machined and unpainted parts shall be protected from damage by the

elements with the application of strippable, protective coatings. Provide all lubricant required for initial lubrication.

3.02 **INSTALLATION**

Diaphragm valves and operators shall be installed in accordance with the manufacturer's recommendations and as shown on the plans.

Manual operators shall be positioned so that they can readily be operated.

3.03 **FIELD TESTING**

Field testing shall demonstrate proper operation of the equipment and compliance with the plans and these specifications. All equipment that fails any test shall be rejected, and complete retesting shall be required at the Contractor's expense after the Contractor makes corrections or modifications to equipment which has previously failed any test. All field tests shall be witnessed by the District. Installation shall be complete and the units shall be serviced, tested, adjusted, and ready for use before the field tests are scheduled. Written notice of the scheduled dates for the field tests shall be given to the District at least 10 days prior to the field test dates. The notice shall include a written test schedule listing the tests, the test procedure, the criteria for a satisfactory test, and special measurement equipment to be employed. If minor repairs or adjustments are made during the tests, additional testing shall be performed as required by the District.

****END OF SECTION****

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SECTION 15120

PIPING APPURTENANCES AND SPECIALTIES

PART 1 – GENERAL

1.01 SCOPE

The Contractor shall furnish, install and test piping appurtenances and specialties as shown on the plans, specified herein, and as referred to in Section 15060, PIPING SYSTEMS.

Specific piping materials, valves, testing requirements and other pertinent information is summarized for each piping system in Paragraph 3.08, of Section 15060, PIPING SYSTEMS (PIPESPEC). Each piping system is designated on the plans by a two-element code, the first representing the nominal pipe diameter and the second an abbreviation indicating the pipeline service.

1.02 QUALITY ASSURANCE

A. References

The publications referred to hereinafter form a part of this specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

American National Standards Institute (ANSI) Publications:

ANSI B16.5 *Pipe Flanges and Flanged Fittings*

ANSI Z358.1 *Standard for Emergency Eyewash and Shower Stations*

American Society of Testing Material (ASTM) Publications:

ASTM D2996 *Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe*

National Fire Protection Association (NFPA) Publications:

NFPA 54 *National Fuel Gas Code*

NFPA 211 *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*

1.03 SUBMITTALS

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following specific information shall be submitted.

- A. Manufacturer's data
- B. Materials of construction

1.04 OPERATION AND MAINTENANCE INFORMATION

Submit operation and maintenance instructions in accordance with Section 01730, OPERATING AND MAINTENANCE INFORMATION. A copy of Section 01730 with each paragraph check marked to show compliance shall be submitted. O&M instructions shall be submitted after the submittals specified in Paragraph 1.03, Submittals of this section have been returned "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED." O&M instructions shall reflect the approved materials and equipment.

PART 2 – PRODUCTS

2.01 GENERAL

Pipe sizes are nominal inside diameter unless otherwise noted. All sizes of pipe shall be as called out on the plans and specified herein. All pipe appurtenances and specialties delivered to the jobsite shall be clearly marked to identify the material, class, thickness, and manufacturer. All material shall be new and free of blemishes.

Materials of like kind shall be one manufacturer.

2.02 EMERGENCY SHOWER AND EYEWASH

The Contractor shall furnish and install a combination floor-mounted, foot-activated emergency shower and eye/face wash as shown on the plans. The combination emergency shower and eye/face wash shall meet the following requirements:

- A. All type 316 stainless steel fixture
- B. Stainless steel eye-face wash sprayhead with electro-polished finish
- C. Complies with ANSI Standard Z358.1
- D. Universal identification sign and inspection tag included
- E. Drench shower exceeds minimum water flow of 20 gpm at 30 psi

- F. Eye-face wash exceeds minimum water flow of 3 gpm at 30 psi
- G. Pulldown arm for shower operation

2.03 **IN-LINE BASKET STRAINERS**

Basket strainers shall be constructed of fiberglass reinforced plastic and shall be designed for continuous contact with 12.5% sodium hypochlorite solution. Strainer requirements shall be as follows:

- A. Strainer type shall be flanged basket.
- B. Configuration shall be in-line.
- C. Flanges shall be ASME/ANSI B16.5 Class 150.
- D. Drain flange shall be a minimum of 1/2-inch diameter.
- E. Basket material shall be PVDF with 1/4-inch perforation on 3/8-inch centers.
- F. Basket shall have handle attached to body, capable of holding 50 lbs of debris.
- G. Basket shall be able to withstand 5 psi pressure drop across the perforated wall.
- H. Basket open area shall be 10 times greater than influent cross-section area.
- I. The basket access lid shall be a coated FRP blind flange. External coating shall match the body coating.
- J. Basket shall be suspended to ensure basket seals with basket flange.
- K. Gaskets shall be EPDM.
- L. Resin shall be Vinyl Ester: Derakane 41, Hetron 922, or approved equal.
- M. Strainers shall have a shell fabricated from FRP filament wound pipe per ASTM D2996 or be constructed with hand layup process per PS-15-69 to meet a pressure rating of 150 psi at a fluid temperature of 220°F.
- N. The body shall have a 100 mil chemical resistant liner with 10% glass content, an anti-wicking layer of chopped mats with 25% glass content, and a structural filament wound layer with up to 65% glass content.
- O. Exterior coating shall have a minimum 10 mil layer of unsaturated polyester resin based, high-quality gel coat with UV protective inhibitors to maximize service life.

P. Manufacturer shall be Fluidtrol Process Technologies, Inc., or approved equal.

2.04 **BALL CHECK VALVE**

Ball check valves shall be of solid thermoplastic construction and shall be designed with an elastomeric uniseat/seal for tight shut-off under pressure. Valve shall be of single union design. The same seal shall function as both the ball seal and the union seal. Valve shall be constructed of CPVC conforming to ASTM D1784, Cell Classification 23567A. Valve shall be rated at 100 psi at 70°F. Valve shall be manufactured by Asahi-America, Inc., or approved equal.

2.05 **EXPANSION JOINTS**

Expansion joints shall be provided where shown and shall be compatible for sodium hypochlorite and alum service. Expansion joints shall be a double-arch type with 316 stainless steel rings and limit rods. Expansion joints shall be Proco Series 262R or approved equal.

2.06 **VENT CAP/RAIN CAP**

Vent cap shall be installed as shown, constructed of 316 stainless steel with Viton O-ring gasket, conforming with NFPA Standards No. 54 and 211. Vent cap/rain cap shall be furnished by DuraVent or approved equal.

PART 3 – EXECUTION

3.01 **GENERAL**

All piping appurtenances and specialties shall be installed in accordance with Section 15060, PIPING SYSTEMS. In addition, each item shall be installed in accordance with manufacturer's recommendations.

3.02 **TESTING**

Testing at all piping appurtenances and specialties shall be in accordance with Section 15060, PIPING SYSTEMS. Failure of a test due to improperly installed or defective specialties or appurtenances shall necessitate repair or replacement of that item and retesting at the Contractor's expense.

****END OF SECTION****

SECTION 15140

PIPING SUPPORTS

PART 1 – GENERAL

1.01 **SCOPE**

This section includes the requirements for furnishing and installation of all fiberglass and stainless steel piping supports and hangers.

1.02 **SUBMITTALS**

The Contractor shall submit information in accordance with Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following shall be submitted:

- A. Detail drawings indicating types of supports/hangers and their location. Assembly drawings necessary to install support/hanger systems in compliance with the plans.
- B. Catalog cuts of proposed products.
- C. Legend including contract drawing number, pipe services, pipe weight (in service), support type, support material or finish, distance to floor, support spacing and maximum vertical load.
- D. Seismic loading of support shall also be included (i.e., seismic spacing, seismic load and allowable load).
- E. Seismic calculations signed by a professional engineer.
- F. Structural calculations for hangers including design criteria, stress/deflection analysis, selection basis for framing members for system to support vent piping as shown.

PART 2 – PRODUCTS

2.01 **GENERAL**

All piping shall be supported against sag and lateral and vertical movement in a manner which will prevent undue strain on any valve, fitting, pipe, or piece of equipment. Unless otherwise indicated on the plans, exposed piping shall be supported at the base of all risers, at intervals not to exceed 5 ft on all horizontal runs of pipe 2-in and smaller, at intervals not to exceed 8 ft on all horizontal runs of pipe 2½-in through 4-in, and at intervals not to exceed 12 ft on all horizontal runs of pipe larger than 4-in.

Plastic piping (Schedule 80 CPVC at 100°F) less than 4-in diameter shall be supported at intervals not to exceed 5 ft; 4-in to 6-in diameter may be supported at intervals not exceeding 7 ft, pipe 8-in and above at intervals not to exceed 10 ft. (For other plastics, other schedules, and temperatures over 100°F, pipe support spacing shall be reduced as recommended by the pipe manufacturer.)

In addition, unless shown otherwise, pipe supports shall be provided at changes in direction or elevation, adjacent to flexible couplings, and at pipe connections to equipment. Pipe supports and hangers shall not be installed in equipment access areas.

Pipe support system components shall be designed to withstand the dead loads imposed by the weight of pipes filled with water and shall have a minimum factor of safety of 5. In addition, all piping 2½-in inside diameter and larger shall be braced for Seismic Design Category D forces in accordance with Section 1613 of the current *California Building Code* and Chapter 13 of *ASCE 7-05 - Minimum Design Loads for Buildings and Other Structures*.

Piping shall be supported as described hereinafter or as shown by the pipe support details on the plans. Manufacturer's catalog figure numbers are typical of the types and quality of standard pipe supports and hangers to be employed. Special support and hanger details are shown for locations where standard catalog supports are not applicable.

No attempt has been made to indicate all required pipe supports on the plans. The absence of pipe supports and details on any plans shall not relieve the Contractor of the responsibility for providing a satisfactory piping support system in conformance with the functional and specific support spacing requirements of these specifications. Where a specific type of support or anchorage is shown on the plans, however, only that type support shall be furnished.

No use shall be made of wire, straps, chains, or such for supporting piping. Expansion shields may only be used for anchoring support brackets to existing walls. No pipe shall be supported from the pipe below it or hung from the pipe above it unless approved in writing by the District.

2.02 HANGERS AND SUPPORTS FOR CHEMICAL PIPING

Pipe support framing system shall be constructed of fiberglass materials Series V (vinyl/glass) as shown. Channel framing system shall be Unistrut, Aickinstrut flange style, or approved equal. Channel framing and pipe straps shall be furnished as a system which includes all the necessary fasteners, channel nuts, channel splice plates, brackets, sealants, hangers, pipe clamps, etc. Nonmetallic fasteners shall be manufactured from long glass fiber reinforced polyurethane to ensure maximum strength and corrosion resistance. All components of the channel framing system shall be nonmetallic except where Type 316 stainless steel hardware is used as part of the assembly.

Glass reinforced channel shall have a synthetic surfacing veil applied on exterior surfaces to improve weatherability and inhibit ultraviolet (UV) degradation. A UV stabilizer shall be incorporated into the resin formulation to further inhibit UV degradation. Channel shall incorporate flange profile design which allows full and positive interlocking contact of channel accessories and prohibits premature flange failure from torqued accessories.

Channel profile dimensions shall be:

1-5/8-in x 1-5/8-in x 1/4-in
OR
1-1/2-in x 1-1/8-in x 1/8-in

All 1-5/8-in x 1-5/8-in channel profiles shall have a minimum pull out resistance of 1,000 pounds when load is applied over a 3/8-in long section of the inside flanges. Channel section lengths shall be applied in 10 ft or 20 ft lengths (+/- 1/2-in).

Pipe clamps shall have full interlocking contact with interior channel flanges to maximize pull-out resistance and be adjustable to accommodate a minimum 3/4-in variance in piping or conduit OD sizes.

Channels shall have a flame spread rating of 25 or less when tested per ASTM E84 and meet the requirements of UL 94V0, thereby qualifying the channels as Class 1 material in the Uniform Building Code. Channels shall comply with the requirements of ASTM D3917 and ASTM D4385 which govern the dimensional tolerance and visual defects of pultruded shapes.

2.03 **PIPE HANGERS FOR STORAGE TANK VENT PIPING**

Pipe hangers for storage tank vent piping shall be installed as shown. Hanger system and components shall be Unistrut or approved equal. Hanger assemblies shall be constructed of 304 stainless steel in accordance with ASTM A240. Hanger assembly shall include hinged beamed clamps, J-hanger, hanger rods, channel sections, and hardware. Hanger assemblies shall be installed in strict conformance with the manufacturer's recommendations.

PART 3 – EXECUTION

3.01 **PAINTING**

Supports shall be field primed and painted as specified in Section 09800, PAINTING AND SPECIAL COATING SYSTEMS. Colors shall match pipe service color, wall, or ceiling color or as directed by the District.

3.02 **INSTALLATION**

Nonshrink grout shall be used under the floor flanges to give level bearing; and floor flanges shall be bolted to the floor with four stainless steel bolts cast in the concrete, if possible, or using stainless steel concrete anchors.

Where concrete supports are used under piping, the supports shall be placed 1-in low, then, not earlier than 1 day later, the piping grouted in place with nonshrink grout.

Valves in plastic pipelines shall be secured and anchored so there will be no apparent movement in the valve body and pipe during normal operation of the valve.

****END OF SECTION****

**RANCHO MURIETA COMMUNITY SERVICES DISTRICT
WASTEWATER TREATMENT FACILITY
SODIUM HYPOCHLORITE IMPROVEMENTS/
CHLORINE CONTACT BASIN EXPANSION – PHASE 1**

Division 16 – Electrical

Section 16010	Electrical General Requirements
Section 16110	Conduit, Raceways, Fittings, and Supports
Section 16120	Wire And Cable - 600 Volt And Below
Section 16130	Junction or Device Boxes
Section 16140	Wiring Devices
Section 16452	Grounding System
Section 16600	Control Sensor Switches and Auxiliaries
Section 16710	Process Instrument and Control Systems
Section 16800	Remote Terminal Units and Associated Equipment
Section 16880	Process Control Strategy
Section 16900	Electrical Equipment Testing

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SECTION 16010

ELECTRICAL GENERAL REQUIREMENTS

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. General

Work shall include all the required labor, project equipment and materials, tools, construction equipment, safety equipment, test equipment, transportation, and services, and all required bonds, insurance, licenses, permits and inspections, taxes, fees, and utility charges required to satisfactorily complete all the electrical work shown on the drawings, included in this division of these specifications, or both. In addition, provide electrical work, as necessary, for the equipment that will be provided under other Divisions of these specifications.

Provide all electrical materials and equipment required for a complete and fully operating facility.

Provide all required conduits, conductors, and cables including those specified; shown on the drawings; and those not shown or specified but required for satisfactory inter-connection and operation of all electrical, mechanical, and instrumentation equipment shown on the respective drawings, specified in the respective portions of the specifications, or which is otherwise required for a complete and fully operating facility.

B. Auxiliary Devices

Provide conduit and wire for power control for all auxiliary devices such as panels, solenoid valves, pressure switches, instruments, etc. This requirement applies to auxiliary devices: shown on the electrical drawings; specified in either Division 11, 15, or 16; required by favorably reviewed shop drawings; or as necessary for a complete and operable system. As a minimum and unless otherwise noted, provide and install 3/4-inch conduit with three No. 12 conductors for discrete systems or with one #16 AWG twisted shielded pair and one No. 12 grounding conductor for analog systems.

C. Outages

Arrange, schedule, and coordinate all outages required to expand, upgrade, or extend existing utility services with the District.

Lockout and tagout procedure shall be coordinated with the District. Live/energized work is not allowed without prior approval of the District.

1.02 CONTRACT DRAWINGS

A. General

The plan drawings are generally diagrammatic and the location of outlets and equipment terminals are approximate unless detailed or dimensioned. The exact locations and routing of cables and conduits shall be governed by structural conditions, physical interferences, and the location of electrical terminations on equipment.

The Contractor shall examine the architectural, structural, and mechanical plans, and shop drawings for the various equipment in order to determine exact routing and final terminations for all conduits and cables. Conduit shall be stubbed up as near as possible to equipment terminals.

1.03 SUBMITTALS

A. General

Submittals shall be made in compliance with these specification sections prior to performance of any related work.

B. Material List

Within 10 days after receiving notice to proceed, the Contractor shall submit for review the name of manufacturer, identifying trade name and/or model designation, and catalog cuts for all material proposed under this section. The Contractor shall not submit catalog cut sheets unless they are certified for the parts and ratings of the equipment being supplied.

Proposed material or equipment which has not been previously listed on the drawings or in the specifications shall require satisfactory evidence of adequacy. Where two or more names are listed and a substitution is offered, the District shall have sole discretion in evaluating the adequacy of the proposed substitution and will not find the substitution acceptable unless it is in every respect equal to the specified item and/or the proposed substitution will be of advantage to the District.

C. Shop Drawings

Complete full shop drawings shall be submitted for review for all power distribution, instrumentation, and control equipment. As a minimum, shop drawings shall include bill of materials, front views, assembly drawings, elementary diagrams, and connection diagrams. Overall dimensions and minimum clearance dimensions shall be shown for all equipment. Diagrams for electrical control equipment shall be in compliance with JIC. Reduced size reproductions will not be acceptable.

D. Interconnection Diagrams

The Contractor shall provide and submit for review inter-connection diagrams which shall show terminal blocks of all distribution, instrumentation and control assemblies, all power, control and signal raceways, junction and pull boxes, all field devices, and all interconnecting wiring and tubing. Diagrams shall show conduit and wire numbers, conduit sizes and power wire sizes. Interconnection diagrams shall be prepared in a neat and legible manner on full size bond (22-inch x 34-inch).

In addition to the hard copy interconnection diagrams submittal, the final approved interconnection diagrams shall be submitted in both hard copy form on full size 22-inch x 34-inch bond, and as graphic output files prepared in AutoCAD (latest release) and provided on USB flash drive in PDF format.

PART 2 - PRODUCTS

2.01 MATERIALS

The Contractor shall use only prime quality, new materials, apparatus, and equipment. Electrical materials shall be UL approved and shall bear a UL label where a UL listing has been established for the materials or devices in question.

2.02 ENCLOSURES, HOUSINGS AND WIRING METHODS

A. General

All equipment, materials and wiring methods shall be suitable for the types of locations in which they are located, as defined in Paragraph 2.02B, Definitions of Types of Locations, herein.

B. Definitions of Types of Locations

1. Dry Locations – Non-Process: All indoor, climate-controlled, non-process areas such as general office, and training and laboratory areas unless otherwise designated on the drawings. Minimum equipment enclosure type in these areas shall be NEMA Type 1 unless otherwise indicated.
2. Dry Locations - Process: All indoor, climate-controlled, process areas such as the electrical and control rooms of individual process areas, unless otherwise designated on the drawings. Minimum equipment enclosure type in these areas shall be NEMA Type 12 (NEMA Type 1 gasketed for MCCs and switchboards unless otherwise indicated).

3. Damp Locations: All indoor process location, non-climate controlled, whether ventilated or non-ventilated; and all spaces wholly or partially underground, not completely enclosed, or having a wall or ceiling forming part of a channel or tank, unless otherwise designated on the drawings. Minimum equipment enclosure type in these areas shall be NEMA Type 4X unless otherwise indicated.
4. Wet Locations: All locations exposed to the weather, whether under a roof or not, unless otherwise designated on the drawings. Minimum equipment enclosure type in these areas shall be NEMA Type 4X (NEMA Type 3R – walk-in enclosures for MCCs) unless otherwise indicated.
5. Corrosive Locations: Areas where chlorine, or other corrosive chemicals are stored or processed, all pump wet and dry well interiors, and all exterior areas of a plant are considered corrosive locations. Minimum equipment enclosure type in these areas shall be NEMA Type 4X unless otherwise indicated.
6. Hazardous Locations: All areas in which fire or explosion hazards may exist, normally or accidentally, due to flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flying. Hazardous locations shall include a wet well and any other areas shown as such on the drawings. Hazardous location areas, together with the appropriate Class and Division designations as defined in the NEC, shall determine the enclosure types and wiring methods required. Minimum equipment enclosure type in these areas shall be NEMA Type 7.

2.03 NAMEPLATES

A. Electrical Equipment

All electrical equipment and related controls shall be identified with a rigid laminated engraved phenolic nameplate. Nameplates shall be engraved with the inscriptions indicated on the drawings and, if not so indicated, with the equipment name. Nameplates shall be securely fastened in place using two stainless steel screws or, where acceptable to the District, with epoxy cement. Nameplates for which no inscription is indicated on the drawings shall be furnished with an appropriate inscription furnished by the District upon prior request by the Contractor.

B. Integral Legend Plate/Nameplate

Each device which indicates the operation of the equipment, or which may be operated to affect the equipment shall have an integral legend plate or nameplate indicating the device function. These shall be inscribed as indicated on the plans or as approved by the District.

2.04 SUPPORTS AND FASTENERS

A. Channels

Channels shall be cold rolled and stainless steel 316. One side of the channel shall have a continuous slot. On both sides of the slot, the edges shall turn inward and form a guide for the spring nuts. The fittings shall be fabricated from steel and attached to the channel with bolts and spring nuts. The channel, fittings and hardware shall be hot-dipped galvanized and manufactured by Unistrut, Power-Strut, Kindorf, or approved equal.

B. One-Hole Clamps

One-hole clamps shall be malleable iron, galvanized for steel conduits and equipped with clamp-backs. The clamps shall be Efcor, Thomas and Betts, Appleton, or approved equal.

C. Beam Clamps

Beam clamps shall be malleable iron, galvanized, right angle, and parallel types. The clamps shall be manufactured by Efcor, Thomas and Betts, Appleton, or approved equal.

D. Spacers

Spacers, provided to support underground conduits in concrete encasements, shall be plastic. The spacers shall be Carlon, Johns-Manville, Underground Products, or approved equal.

E. Stainless Steel Anchors

Stainless Steel anchors shall be sleeve and stud types for securing equipment to concrete foundations, floors, and walls. The anchors shall be Phillips “Red Head,” Diamond, or approved equal.

F. Toggle Bolts

Toggle bolts shall be steel, spring wing type for securing equipment to hollow walls and ceilings. Toggle bolts shall be Phillips “Red-Head,” Diamond, or approved equal.

G. Stanchions

Stanchions shall be structural steel as shown on the plans, shop-fabricated, and galvanized.

H. Conduit Hangers

Conduit hangers shall be heavy gauge formed steel, galvanized and then PVC coated and equipped with carriage bolts, 1/4-inch rods and nuts. The hangers shall be Efcor, Kindorf, Appleton, or approved equal.

I. U-Bolts

U-bolts shall be heavy gauge steel, galvanized and equipped with two hexagon steel nuts. The U-bolts shall be Efcor, Kindorf, or approved equal.

J. Fixture Hangers

Fixture hangers shall be cast iron alloy, cushion type, equipped with cover, screw terminal blocks, and permits the pendant to swing 20 degrees from perpendicular in any direction. Hangers shall be Crouse-Hinds Type ALT, Appleton Type ALT, Pyle-National Type A-2152M, or approved equal.

K. Hardware

Hardware for corrosive areas shall be 316 stainless steel.

L. Fasteners

Fasteners for securing equipment to walls, floors, and the like shall be either hot-dipped galvanized after fabrication or stainless steel. Stainless steel fasteners shall be provided in corrosive areas and where they are in contact with dissimilar metals, such as aluminum.

2.05 FINISH REQUIREMENTS

A. Equipment

Refer to each electrical section of these specifications for painting requirements of equipment enclosures. Any final paint finish which has been damaged or is otherwise unsatisfactory shall be repaired to the satisfaction of the District.

PART 3 - EXECUTION

3.01 INSTALLATION OF EQUIPMENT

All equipment shall be located and installed so that it will be readily accessible for operation and maintenance. The District reserves the right to require minor changes in location of outlets or equipment prior to roughing in without incurring any additional costs or charges. Electrical work shall be performed in cooperation with all other trades in order to secure the best arrangement of the work as a whole. No changes in the work shall be made without the written approval of the District.

Allowances have been made in the design for the number of conduits, cables and conductors, which the District considers adequate for feeding the various drives and equipment. These circuits are based on available data pertaining to a particular design of equipment. If the Contractor provides equipment, which differs in connection requirements from the unit shown, the District's acceptance of the substitution does not relieve the Contractor of his obligation to provide the necessary diagrams, services, and connections to the equipment at no additional cost to the District.

The Contractor shall not install any electrical equipment or devices in any newly constructed areas without permission by the District. All operations involving grinding of concrete, sweeping and similar activities shall have been completed prior to installation under controlled conditions of ventilation and other protection as may be required to protect the equipment from contamination by cement dust and any other particles.

3.02 **CODES AND STANDARDS**

The completed installation shall comply with all applicable requirements of the National Electrical Code, the Basic Electrical Regulations of the State of California, the Occupational Safety and Health Act (OSHA) and the requirements of any local codes effective at the site. Codes and standards of the following organization may be referenced in this section and shall be considered as minimum acceptable. A reference herein to any portion of a standard or code shall not be considered as negating any other portion of the standard or code.

- American National Standard Institute, Inc. (ANSI)
- Association Edison Illuminating Companies (AEIC)
- California Administrative Code, Title 24, Part 3, Basic Electrical Regulations (BER)
- Institute of Electrical and Electronics Engineers, Inc. (IEEE)
- Instrument Society of America (ISA)
- Insulated Power Cable Engineers Association (IPCEA)
- Joint Industrial Council (JIC)
- National Electrical Code (NEC)
- National Electric Manufacturers Association (NEMA)
- Occupational Safety and Health Act (OSHA)
- Sacramento Municipal Utility District (SMUD)
- State of California-Public Utilities Commission-General Order #95 'Rules for Overhead - Electric Line Construction'
- Underwriters Laboratories, Inc. (UL)

3.03 **TEMPORARY INSTALLATIONS**

Temporary installations used during construction shall conform to the requirements of NEC, BER, and OSHA.

3.04 MECHANICAL EQUIPMENT

Equipment provided by the Contractor that has electrical power of control devices attached to or forming a part of the unit shall be as a minimum conform to JIC, Electrical Standards for Mass Production Equipment.

3.05 CIRCUIT ARRANGEMENT

Alternating current control circuits shall be grounded and one terminal of each current consuming device shall be connected to the grounded conductor. All control contacts, including overload device contacts, shall be installed in the ungrounded side of the circuit.

Thermal overload relays shall be installed in all ungrounded conductors supplying a motor.

3.06 AS-BUILT DRAWINGS

A. Plans

The Contractor shall maintain a neatly marked set of record drawings showing the installed location and/or routing of conduits, cables, pull boxes, junction boxes, and outlets. Drawings shall be kept current with the work and subject to inspection by the District at any time.

B. Diagrams and Drawings

All diagrams and drawings required under Paragraph 1.03 SUBMITTALS shall be corrected to the final as-built state of all equipment and delivered to the District both on bond and electronically as PDF.

In addition to the hard copy, all drawings required under SUBMITTALS to be provided as graphic output files shall be corrected to final 'as-built' status and submitted on USB flash drive in AutoCAD (latest release) format.

Copies of these diagrams shall be incorporated in the appropriate locations in the "Equipment Manuals."

3.07 EQUIPMENT MANUALS

The Contractor shall furnish operating and maintenance information. Manuals shall include all approved "as-built" data and drawings listed under Paragraph 1.03 SUBMITTALS, except the data on raceways, raceway fittings, wire, cable and conductors may be omitted.

Other data required for all materials used shall include the following:

1. Catalog cuts for visual identification.

2. Catalog data showing complete parts ordering information.
3. Name and address of sales representatives.
4. Installation instructions/operating instructions.
5. Repair and maintenance instructions.

Drawings shall be placed in manila envelopes not to exceed 3 per envelope and drawing numbers and titles neatly and permanently marked on the outside of the envelopes. Data and drawing envelopes shall be punched and assembled in "Levelox" 3-post notebook binders without crowding. Data shall be separated by manufacturer and specification section numbers using heavy manila notebook divider with marked tabs. Each divider section shall be provided with an index sheet listing drawings and publications contained therein by title and number. At the front of each book a composite index shall be provided consisting of copies of all of the divided individual indexes. The back of each binder shall have a large permanent label reading:

ELECTRICAL EQUIPMENT MANUAL

SET NO.

BOOK ___ OF

One preliminary set of manuals shall be submitted for review and comments to the District at least 30 days prior to the completion of the work. All 4 sets shall be acceptable and delivered to the District prior to the Acceptance of the Work.

3.08 CONDUCTOR MARKINGS

All conductors except single speed motor leads, lighting circuits and electric printed circuit boards, and other similar devices shall be marked at each end with wire marker letters and numbers in accordance with the drawings. Conductors shall be marked at locations in both panel and field mounted devices. Markers shall consist of plastic sleeves, heat shrunk or otherwise firmly anchored with indelible ink machine printed characters. Circuit identification prefix letters may be omitted only in starter cubicles but the numbers shall be retained.

3.09 MATERIAL

All material of a given type shall be of a single manufacturer throughout the work. All material shall bear a UL label where such is available for the class of equipment involved. Galvanized equipment and appurtenances shall not be shop primed or painted but shall be field cleaned, pickled, primed, and painted with durable enamel finish.

3.10 INSPECTION

The Contractor shall cooperate with the District and shall provide assistance at all times for the inspection of the electrical work performed under this contract. He shall remove covers, operate machinery or perform any reasonable work which, in the opinion of the District, will be necessary to determine the quality and adequacy of the work.

3.11 MANUFACTURER'S NAME

Where manufacturers are named for a particular item of equipment, it is intended as a guide to acceptable quality and performance and does not exempt such equipment from the requirements of these specifications or plans.

3.12 EQUIPMENT SHIPMENT AND STORAGE

A. Shipment

All equipment shall be carefully protected for shipping. All openings shall be protected by plywood securely fastened to the framework of the equipment. Equipment shall be adequately covered during local delivery.

B. Storage

1. General:

From the time of receipt until the equipment is energized for constructive plant operations unless such equipment is being worked on, equipment shall be considered in storage. While in storage, a 120V, one-phase source of power shall be available and connected to space heaters in all items of equipment so equipped.

Unless stored indoors, it shall be at least 1 foot above grade covered with at least two layers of heavy polyethylene plastic sheets and anchored to prevent damage by high winds. All equipment shall be protected from dust and moisture prior to and during construction. The Contractor is cautioned that concrete finishing and painting, etc., in the vicinity of the equipment shall not proceed if unprotected equipment is installed.

2. Responsibility:

The Contractor shall bear complete responsibility for the protection of District-supplied and Contractor-supplied equipment prior to final acceptance by the District of the work. When all the other work in the area is complete, and after electrical equipment testing is complete, the Contractor shall repair by spray painting, after properly preparing the surface, all scratches or defects in the finish of the equipment. Only identical paint furnished by the equipment manufacturer shall be used for such purposes.

3.13 EXCAVATION AND BACKFILL

A. General

Provide the excavations for electrical equipment foundations and trenches for conduits as shown on the plans, or required to complete field installation.

B. Caution

Exercise caution during all excavation work and avoid damage to existing underground pipes and conduits. Exercise extreme caution when working near existing electrical conduits and facilities. Field verify the location of all electrical facilities in the area before proceeding with any work.

3.14 CONCRETE

A. Encasements, Foundations, Etc.

Where shown on the plans or specified, provide the required concrete installations for conduit encasement, equipment foundations, bases, supports, etc.

B. Specifications

Refer to Section 03300, CAST-IN-PLACE CONCRETE, of these Specifications for all concrete work.

3.15 INSTALLING EQUIPMENT

A. General

Provide the required inserts, bolts, and anchors, and securely attach all equipment and materials to their supports.

B. Concrete Floors

All floor-mounted electrical panels, switchboards, motor control centers, transformers, and similar equipment located in rooms with concrete floors shall be installed on 4-inch high reinforced concrete equipment pads.

C. Freestanding Equipment

All freestanding electrical equipment located outdoors shall be installed on reinforced concrete equipment pads. Pad dimensions shall be as shown on the contract drawings or, for utility equipment, as required by the serving utility. Where not otherwise called out or required, minimum pad dimensions shall be eight-inches high with sufficient length and width to

accommodate the equipment and provide 24-inches of clear pad space in the direction(s) of access to the equipment's operating components, renewable parts, and terminations.

Reinforcing shall be as required to meet equipment loading, but as a minimum shall consist of #4 bar, 12-inches on center, both ways, at top and bottom of pad.

D. National Electrical Code Requirements

All electrical equipment shall be installed so as to meet (as a minimum) National Electrical Code Requirements for working space clearances to equipment. In addition, equipment under the jurisdiction of a serving utility shall be located to provide the clearances and guarding required by the utility.

3.16 CUTTING, DRILLING, AND WELDING

A. Electrical Construction

Provide all required cutting, drilling, tapping, and welding that is necessary for the electrical construction work.

B. Structural Members

Structural members shall not be cut or drilled, except upon approval by the District. A core drill shall be used whenever it is necessary to drill through concrete or masonry.

C. Welding

Provide required welding for equipment supports. Conduits and fittings shall not be welded to structural steel.

D. Patch Work

Perform patch work with the same materials as the surrounding area and finish to match, as specified in Specification Section 03300, CAST-IN-PLACE CONCRETE of these specifications.

3.17 EQUIPMENT GUARDING

A. General

Freestanding electrical equipment located outdoors in vehicle traffic areas shall be protected by four-inch diameter, galvanized rigid steel, schedule 40, capped, pipe removable bollards. Bollards shall be set in 42-inch-deep minimum concrete footings, inside 5-inch diameter galvanized rigid steel schedule 40 pipe sleeves, which are 32-inches minimum in length.

Removable floor mounted guard railing shall be installed around freestanding electrical equipment located outdoors in vehicle traffic areas.

3.18 **WALL-MOUNTED PANELS**

All metal panels mounted on concrete walls shall be mounted 1/8 inch from the wall, and backsides of the panels shall be painted with Mobil Hi-Bituminous Coating 35-J-10; Koppers Bitumastic Super Tank Solution; or equal. Coating thickness shall be 10 mils minimum.

3.19 **SEISMIC REQUIREMENTS**

All equipment installed on this project shall be anchored, tied, restrained, or attached to the structures in compliance with the equipment manufacturer's recommendations and in such a manner that such equipment will remain in place when subjected to the seismic forces outlined in the California Building Code (CBC) – latest edition. Direct all subcontractors and suppliers to furnish and install equipment and to provide anchorage in a manner that will conform to these requirements.

Shop drawings for the following equipment shall in detail show anchorage provisions which comply with these seismic requirements:

1. Control and instrument panels

Contractor shall provide structural calculations for the approved submitted equipment.

3.20 **COMPLETE INSPECTION**

Before request for final walk-through by the District is made, the Contractor shall submit to the District in writing that the Contractor has made his own through inspection of the entire project and that the installation is completed and in conformance with applicable codes, and the plans and specifications.

3.21 **FINAL CLEANUP**

A. **General**

The Contractor shall be responsible for the removal and legal disposal of all debris and temporary equipment or devices, which he/she introduces to the project site during the execution of his/her contract.

B. **Interiors**

The Contractor shall vacuum clean the interior of all motor control centers, panelboards, junction boxes, and other enclosures supplied under the project containing electrical equipment

to remove all dirt, metal clips, stripped insulation, etc., from the enclosures. This cleaning shall be done prior to energizing the device initially and a second time immediately prior to the final acceptance inspection.

C. Trace Removal

The Contractor shall remove all traces of soil, grease, oil, and other foreign matter using only the type of cleaner recommended by the manufacturers.

D. Factory Baked-On Enamel Paint

Switchgear, motor control centers, switchboards, generators, starters, disconnects, panelboards, and other equipment which has factory baked-on enamel paint (or similar approved painting techniques) will not be field painted with the exception of sprayed touch-up paint to nicks and scratches caused during shipment of installation.

E. Lamps

The Contractor shall replace lamps of all lighting fixtures that were used during the construction with new lamps at his expense.

*** END OF SECTION ***

SECTION 16110

CONDUIT, RACEWAYS, FITTINGS, AND SUPPORTS

PART 1 – GENERAL

1.01 DESCRIPTION

A. General

1. Furnish all labor, materials, tools, equipment and services for all conduits, raceways, cable trays and wireways as indicated in accordance with provision of Contract Documents.
2. Completely coordinate with work of all other trades.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

B. Conduit

Conduit runs are diagrammatic. Verify locations in field.

C. Raceways

All aboveground raceways shall be galvanized rigid steel pipe dimension conduit unless otherwise indicated. All raceway material delivered to the job site shall bear the UL label and shall be stored so as to be protected from physical damage and weather elements. Underground raceways, whether encased or direct buried, shall be rigid nonmetallic conduit. All conduit transitions from below ground to above ground shall be PVC coated rigid conduit (this includes PVC-coated rigid 90s and PVC-coated rigid risers). Final raceway runs to electrical equipment on machinery requiring flexibility or subject to vibration shall be jacketed liquid-tight flexible metal conduit.

1.02 SUBMITTALS

Submit in accordance with Section 01300, SUBMITTALS.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Galvanized Rigid Steel Conduit

Shall conform to ANSI 1 C80.1. Zinc coating shall be applied inside and out by hot-dip galvanizing after threading. Unless specifically noted, minimum conduit size shall be $\frac{3}{4}$ inch.

B. Non-Metallic Conduit

Shall be Schedule 40 high impact polyvinylchloride, UL approved for direct burial or concrete encasement for cables operating at 90°C. Minimum size shall be $\frac{3}{4}$ inch. Fittings used with PVC conduit shall be PVC solvent weld type.

C. Liquid-Tight Conduit

Shall be formed from spirally wound galvanized steel strip with successive convolutions securely interlocked and jacketed with liquid-tight plastic cover. Minimum size shall be $\frac{1}{2}$ inch. Fittings for liquid-tight conduit shall have cadmium-plated malleable iron body and gland nut, brass grounding ferrule threaded to engage conduit spiral and O-ring seals around the conduit and box connection and insulated throat. Forty-five and 90° fittings shall be used where applicable.

D. Not Approved Conduit

Intermediate rigid metal conduit, electrical metallic tubing, and non-jacketed flexible metallic conduit shall not be used.

E. PVC Coated Rigid Conduit

PVC coated galvanized rigid conduit with urethane interior coating. Electrical continuity is maintained across assembled joints, and unless specifically noted, minimum conduit size shall be $\frac{3}{4}$ inch. The PVC coated rigid conduits shall be Plasti-Bond, Perma-Cote, CalBond, or equal.

F. Wireways and Auxiliary Gutters

Shall not be used unless specifically shown on the drawings. Where shown, they shall be of the class and type specified on the drawings.

G. Liquid-Tight Hubs with Insulated Throats

Shall be installed for all conduit entries to sheet metal enclosures. Nut and locknut assemblies will not be acceptable.

Expansion fittings in exposed conduit runs shall be weatherproof units with external bonding jumpers.

Expansion fittings in concealed conduit runs shall be specially designed as required using galvanized ¼ inch steel plate covers, frames, and structures to allow 1-inch relative movement of adjoining structures in any direction.

Conduit unions shall be similar to Crouse-Hinds Type UNF or UNY.

Conduits making bottom entry to free standing panels shall be fitted with appropriate insulating bushings or bell fittings to avoid damage to insulation during pulling in of cables. Bushings for metallic conduit shall be malleable iron with insulating collars.

H. Conduit Identification Plates

Shall be of Type 316 stainless steel, which are fastened with Type 316 stainless steel ties at both ends of the plate. The plates shall be 3/8-inch wide and 3-1/2 inch long. The conduit numbers shall be stamped on each plate with 3/16-inch high characters.

The plates shall be Panduit MMP350W38-C316 or equal and ties shall be Panduit MLT-S316 or equal.

I. Explosion-Proof Couplings

Shall have a flexible brass inner core and outer bronze braid covering attached to threaded fittings, and shall be rated for the particular hazardous area. The metallic braid and fittings shall be shipped completely factory assembled. The couplings shall be capable of withstanding internal explosive pressures. Couplings shall have conductivity on a similar length basis, equal to rigid steel conduit. Manufacturers of flexible couplings shall be Crouse-Hinds, Appleton, O-Z/Gedney, or approved equal.

Sealing fittings shall be Crouse-Hinds, type 'EYS' or approved equal. Ceramic or other non-asbestos fiber materials and sealing compound (UL listed to match the fitting) shall be provided for completing the seal.

J. Conduit Wall Seals

Shall consist of a synthetic rubber sealing ring between two pressure rings or a series of synthetic rubber links between pressure plates held together with corrosion resistant bolts, nuts and washers. When the bolts are tightened, the synthetic rubber shall expand to provide a watertight seal between the outer surface of the entering conduit, and the inner surface of the wall penetration. The synthetic rubber shall resist aging, ozone, sunlight, water, chemicals, and

extreme temperature variations. The seals shall be Thunderline “Link-Seal,” O-Z/Gedney Type CSM, FSK, WSK, or approved equal.

K. Raceway Supports

1. General:

Raceway support systems shall be designed to provide a factor of safety of not less than 5.

2. Conduit Clamps:

Conduit clamps and backs shall be one-hole design of cadmium-plated malleable iron, except in corrosive environments where clamps and support hardware shall be plastic-coated steel.

PART 3 – EXECUTION

3.01 INSTALLATION

Exposed conduit installation is only permitted as required for the final service connection of wall, structure, or platform-mounted outdoor light fixtures, receptacles, switches, junction boxes, control stations and control panels. Exposed conduit installation shall also be used in interior areas where specifically shown on the plans. All exposed conduit shall be galvanized rigid steel conduit.

All conduits in vaults and other below ground exposed applications shall be PVC coated galvanized rigid steel, except for final connection to equipment subjected to vibration, where the conduit shall be liquid tight flexible conduit (3 feet maximum length).

Conduit routing shall not be altered from exposed to concealed or vice versa without express written permission of the District.

Conduits within switchboard, MCC, and control panels that are routed to exterior locations shall be sealed with duct seal. All annular space around pneumatic tubing entering such panels shall be sealed with duct seal.

Welding, brazing or otherwise heating of the conduit will not be allowed. Plumber's perforated hanger iron shall not be used for any purpose.

Conduit constructed in concrete which is in contact with earth or water shall be adequately separated from the earth or water by at least 4 inch of concrete. PVC conduit shall be used for underground runs. Vertical risers to equipment including the bottom 90° bend shall PVC-coated rigid steel conduit joined to the PVC conduit below ground or in concrete. Concrete encasement shall extend 4 inch above finished grade. Minimum cover requirements for underground conduit shall comply with NEC Article 300-5.

Conduit rising through a slab shall be protected by a dry pack concrete pad approximately 6 inch in diameter and 3 inch above the finished floor or the conduit shall come up through the equipment pad. Clearances equal to the conduit trade diameter but not less than 1½ inch shall be maintained between conduits encased in slabs. Clearances of less than 1½ inch at conduit crossings and terminating locations may be allowed at the discretion of the District.

Where required for ease of pulling and as necessary to meet code, the Contractor shall supply and install junction or pull boxes even though not shown on the plans. In all cases, however, the Contractor shall limit the number of directional changes of the conduit to total not more than 270 degrees in any run between pull points. Bends and offsets shall be avoided where possible, but where necessary shall be made with an approved hickey or conduit bending machine. Turns shall consist of fittings or symmetrical bends. Secure all conduits and fittings on exposed work by means of clamp backs and channels or struts. Spacing of conduit supports shall be as required by the National Electrical Code, but shall not exceed 4 ft. Run all conduits on exposed work at right angles to and/or parallel with the surrounding walls and conform exposed conduit runs to the form of the ceiling. No diagonal runs will be allowed. Provide concentric bends for parallel conduit runs. Where two or more conduit runs use the same pull box the conduits shall be adequately separated. Install conduit wall seals for all conduits penetrating walls. Install expansion and deflection fittings where conduits cross building expansion joints. Make all roof penetrations watertight with weatherproof metal flashing caps utilizing hot-dipped galvanized sheet metal for the caps.

Explosion-proof flexible couplings shall be used for connections at motors, solenoid valves, instrument devices and other devices where vibration is encountered in Class 1, Division 1, Groups C and D hazardous areas. Couplings shall be complete with flexible vinyl plastic protective coating.

Install explosion-proof seals as detailed on the plans and as required by the National Electrical Code and plug with fiber and sealing compound in accordance with the fitting manufacturer's recommendations.

All conduit-entering cabinets shall be secured. The conduit shall have an insulating bushing constructed in the conduit end. All conduit entering non-cast metallic NEMA boxes shall be terminated with a raintight hub having an insulated liner. All surface-mounted cast boxes and plastic enclosures shall have threaded hubs. All joints shall be made with standard couplings or specified unions. Metal parts of plastic control stations and coated boxes shall be bonded to the conduit system. Running threads shall not be used in lieu of conduit nipples nor shall excessive thread be used on any conduit. The ends of all conduit shall be cut square, reamed and threaded with straight threads. Rigid steel conduit shall be made up tight and without thread compound. Exposed threads shall be cleaned, primed and painted.

Liquid tight flexible conduit shall be used for all motor connections as detailed. Where flexibility is required for electrical raceways on equipment, liquid tight flexible conduit shall be used in accordance with JIC standards, these specifications, and the local inspection agency. The maximum length of this conduit shall be 24 inch for conduits 1½ inch or smaller and 36 inch for conduits 2 inch or larger.

Underground conduit installation shall comply with the following:

1. Trench bottoms shall be free from rocks, clods, and foreign material.
2. Trench bottoms shall be compacted and leveled before conduit installation.
3. For runs with two or more conduits, install molded plastic spacers every six feet to provide a separation of three inches.
4. Unless otherwise indicated on the plans, install conduits so that top of conduit will be a minimum of 24 inches below finish grade for circuits 600 volt and below, and 36 inches below finish grade for all circuits above 600 volts.
5. Unless otherwise indicated on the plans, encase the conduit runs in concrete for the entire length for protection. Concrete shall be three-sack, 'lean mix' and shall contain 10 lbs. of red oxide pigment per cubic yard.
6. Provide reinforcing steel in concrete encased conduit runs of three or more conduits. Reinforcing steel shall be #4 bar, continuous, run linearly with the conduit. Reinforcing steel shall be placed at all four corners with three inches of concrete cover. Additionally, reinforcing steel shall be installed as required to assure a maximum spacing of 12 inches, on center, between adjacent reinforcing steel lengths. Number 4 bar shall also be placed circumferentially around the duct cross-section, with three inches of concrete cover, at intervals not exceeding 24 inches along the length of the duct run.
7. Slope uniformly all outdoor underground conduits away from buildings and underground structures toward pull boxes or manholes.
8. Avoid and/or prevent damage to existing underground piping, conduits and cables. All such repair of damage to existing facilities shall be at the expense of the Contractor.
9. If existing pavement or concrete slabs are required to be removed under this project or are damaged by underground electrical work, install and repair the pavement and concrete slabs in accordance with other sections of this Specification.

The Contractor shall exercise the necessary precautions to prevent the lodging of dirt, concrete or trash in the conduit, fittings and boxes during the course of construction.

Contractor shall install a pull rope in each empty conduit run. Rope shall be the polypropylene type at least 3/16 inch in diameter.

Identify all conduits with conduit identification plates at all terminations, enclosures, wall and floor penetrations, etc., in accordance with the conduit number listed in the conduit schedules.

Provide the minimum separation for instrumentation conduit runs from the power conduits as follows (except at crossings):

<u>Voltage</u>	<u>Separation (inches)</u>
120 volts	12
240 volts	12
480 volts	24
Above 600 volts	36

Install continuous copper ground conductors in all conduit runs. Size ground conductor per National Electrical Code Table 250-95 except minimum size shall be No. 12 AWG.

After installation of all conductors, all conduit ends shall be sealed with 'Fire Stop' duct seal.

END OF SECTION

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SECTION 16120

WIRE AND CABLE - 600 VOLT AND BELOW

PART 1 – GENERAL

1.01 DESCRIPTION

A. General

1. Furnish all labor, materials, tools, equipment and services for all wire and cable (600V and below) as indicated in accordance with provision of Contract Documents.
2. Completely coordinate with work of all other trades.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

1.02 SUBMITTALS

Submit in accordance with Section 01300, SUBMITTALS.

PART 2 – PRODUCTS

2.01 MATERIAL

A. Low Voltage (through 600V except instrument signals)

1. General:

Low voltage conductors shall be used for power, control, lighting and miscellaneous circuits and shall conform to NEMA standards WC3 and WC5 and UL requirements. Unless otherwise noted, conductors shall have Class B stranding. Conductors shall be copper. Solid conductors shall not be used. Insulation for cables in raceways shall be NEC Type THHN/THWN, unless otherwise noted on the conduit schedule. Minimum size for field wiring shall be No. 12 AWG and panel wiring shall be No. 14 AWG. Labeling of conductors shall be in accordance with Specification Section 16110, CONDUIT, RACEWAYS, FITTINGS, AND SUPPORTS.

2. Color Coding:

Insulated conductors routed in raceways shall be color coded as follows:

<u>System</u>	<u>Service</u>	<u>Color</u>
480/277 VAC Power	Phase A	Brown
	Phase B	Orange
	Phase C	Yellow
480/ 277 VAC Neutral		Gray
240/120 VAC Power	Line 1	Black
	Line 2	Red
208/120 VAC Power	Phase A	Black
	Phase B	Red
	Phase C	Blue
120VAC Neutral		White
120VAC Control		Red
120VAC Digital Inputs		Red
120VAC Digital Outputs		Red
24VDC Power		Pink
24VDC Control		Light Blue
24VDC Digital Inputs		Light Blue
24VDC Digital Outputs		Light Blue
24VDC Common		Black/White
12VDC Power		Dark Blue
12VDC Control		Dark Blue
12VDC Common		Black/White
4-20mA Control Positive		Clear
4-20mA Control Negative		Black
Unspecified Foreign		Yellow
Chassis Ground		Green

The same color shall be connected to the same phase throughout the plant. On cable No. 4 AWG and larger, black may be used with colored 3/4 inch vinyl plastic tape for 6 inches at each end at all terminations and in all pull boxes. Internal MCC and Control Panel single conductors wiring shall be SIS wire, color code gray.

B. Instrument Signal Conductors

Various special cables may be required for different field instrument input measurements. Such cable shall be installed in accordance with the instrument vendor's recommendation as approved. Instrument measurements from field to panel or panel to panel shall be with appropriately rated signal cables. Signal cables shall be single or multiple pair cables with overall outer PVC jacket and overall outer ground. Each twisted pair shall be No. 16 AWG stranded

copper conductor with polyethylene chloride insulation for 300V service. Each pair shall be provided with an individual ground (shield) and be insulated from every other pair. Signal cables shall be Beldon or equal.

C. **Portable Cords**

Cord shall be NEMA Type SO or STO with NEMA Class G copper stranding. Cords larger than No. 2 AWG shall be National Bureau of Mines Type G. All cords shall contain an equipment-grounding conductor.

Fittings for terminating the cords shall provide a watertight seal between the cord and the terminator and between the terminator and mounting hub. The cable terminator shall be provided with a neoprene liner which grips the cord jacket when the back-nut applications are called for. A stainless steel wire mesh cord grip shall be provided as an integral part of the cord terminator.

E. **Connectors, Splicing Materials, and Terminations**

1. Cable Connectors: Lugs and splices shall be 1 piece tubular compression type. Connectors for copper cable shall be tinned electrolytic copper.
2. Terminal Blocks: Terminal blocks shall be barriered and of ample size and capacity to handle the required loads and shall be solderless type pressure lugs. All terminals shall be numbered and shall be provided with white fiber marking strips. The numbering shall be hand printed with black India ink in a neat and legible manner or shall be machine printed with black India ink. All control terminal boards shall be of ample size to accept two No. 12 AWG field conductors per point and shall have pressure type conductor clamps. Terminal blocks for instrument and signal circuits shall be screw type for use with ring lugged conductors.
3. Isolating Terminal Blocks/Foreign Potentials: Isolating terminal blocks shall be used in instrument and station control panels and other locations as required to isolate foreign station potentials of 50V or greater. These blocks shall be of the pull-apart type with disconnecting handles. Miniature individual knife type switches or door operated limited switches will not be acceptable. Isolating terminal blocks shall have marking strips and identification of points the same as terminal blocks hereinbefore specified.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Cable

Care shall be exercised in pulling cables into conduit or trays so as to avoid kinking, putting undue stress on the cables or otherwise abrading them. No grease will be permitted in pulling

cables. Soapstone, talc or UL approved pulling compound only will be permitted. The raceway constructed shall be complete and protected from the weather before cable is pulled into it.

Incoming cables in panels and motor control center, No. 6 AWG and smaller, shall be bundled and laced at intervals not greater than 6 inch and neatly spread into trees and connected to their respective terminals. Sufficient slack shall be allowed in cables for alterations in terminal connections. Lacing shall be done with plastic cable ties. Where plastic panel wiring duct is provided for cable runs, lacing is not necessary when the cable is properly constructed in the duct.

Cables crossing hinges shall be made up into groups not exceeding 12 and shall be so arranged that they will be protected from chafing when the hinged member is moved.

Cables shall be numbered at both ends using the numbering system shown on the plans.

All data and communication cables shall be installed in strict compliance with their manufacturer's requirements and recommendations.

B. Wire and Cable Termination and Splicing

1. **General:** Power and control conductors shall be terminated in terminal blocks with solderless box lugs. Signal leads shall be terminated in terminal blocks with saddle type pressure connectors capable of receiving two No. 16 AWG, or smaller, conductors on each point.

Solid wire shall not be used nor shall electric spring connectors be used on any wiring. Lugs and connectors shall be installed with a compression tools. Compression tool may be indent type for conductors to No. 2 AWG but shall be diamond or hexagon multiple indents for all larger conductors.

Controls circuit conductors shall be tagged at each end in motor control centers, control panels and control stations with a legible permanent coded wire-marking sleeve. Markings shall be in accordance with the wire numbers and prefixes as shown in the diagrams.

Field control conductors shall be similarly tagged at each end.

2. **600V Splice and Terminations:** All splices and termination for No. 1/0 AWG cable and larger shall be inspected by the District prior to and after insulation is applied. Terminations at 460V motors shall be made by bolt connecting the lugged conductors and then applying 1/2 lapped layers of Scotch No. 33 tape to equal or exceed the thickness of conductor insulation. One 1/2 lapped layer of Scotch No. 70 shall be carefully applied as a protective cover and shall not be stretched during wrapping.
3. **Instrument Cable Shield Termination:** Particular care is required to assure proper shield connections and grounding. Shield conductors shall be grounded at one end only. Shields shall be grounded at the control panel terminal strip unless grounding is specifically required by the instrument supplier to be at the transmitter/ transducer location. Shield conductors

shall be landed on terminal strips for bonding or grounding. Ungrounded end shall be neatly taped to avoid inadvertent grounding.

C. Portable Cords

Portable cord feeding permanent installations such as sump pumps, cranes, hoists, and portable equipment shall have a wire mesh cord grip of flexible stainless steel wire to take the tension for the cable termination. Weatherproof strain relief fittings shall be used where applicable to prevent unnecessary strain on cords.

Flexible cords feeding submersible motors shall be similarly protected but the cord shall be of a non-wicking neoprene construction.

D. Grounding

All grounding surfaces shall be thoroughly cleaned before connecting the grounding electrodes. All conduit shall be grounded directly or through equipment frames and ground busses to the grounding system.

Ground connections to water supply pipe shall be provided where local codes require such connections. Except for this connection to the water pipe, all connections in the grounding system shall be bolted or welded by the thermite process as shown.

In addition to the conduit system, all equipment having a 240 or 480V supply shall be grounded to the supply source ground bus by a green insulated cable installed in the conduit with the phase cables. Ground cable for small panels and equipment shall be No. 8 AWG unless otherwise required for compliance with NEC 250-94.

END OF SECTION

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SECTION 16130

JUNCTION OR DEVICE BOXES

PART 1 – GENERAL

1.01 DESCRIPTION

A. General

1. Furnish all labor, materials, tools, equipment and services for all junction or device boxes as indicated in accordance with provisions of the Contract Documents.
2. Completely coordinate with work to all other trades.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

1.02 SUBMITTALS

Submit in accordance with Section 01300, SUBMITTALS.

PART 2 – PRODUCTS

2.01 MATERIALS

All boxes and box fittings shall be provided with covers of the same material as the box and shall be furnished with full body neoprene gaskets. Covers and/or devices shall be secured with 316 stainless steel screws. Electrogalvanized sheet steel general-purpose boxes shall not be used. All device boxes shall be provided with a laminated phenolic nameplate, stainless steel screw fastened with 3/16 inch legend completely identifying functions and equipment controlled. All metal boxes shall have threaded conduit entries. Non-metallic boxes shall have appropriate bosses to receive and terminate conduit and maintain their watertight integrity.

Indoor dry location, junction boxes in non-corrosive locations shall be NEMA 4 cast iron hot-dip galvanized. Device boxes for receptacles, push buttons, switches, etc., in indoor dry location, non-corrosive locations shall be type FS or FD cast ferrous metal device boxes.

All outdoor and wet, damp, or corrosive location indoor junction boxes shall be rated NEMA 4X of stainless steel construction. All metal hardware shall be of stainless steel.

Device boxes for these areas shall be PVC bonded, galvanized, cast ferrous metal FS or FD type device boxes with matching gasketed cover or device plate.

Device and junction boxes for hazardous locations shall be PVC bonded, galvanized, cast ferrous metal, explosion-proof type suitable for Class 1, Division 1, C and D locations.

2.02 PRECAST PULL BOXES AND MANHOLES

Precast concrete pull boxes shall be provided as shown on the plans and shall be Brooks products, Associated Concrete products, 'Quikset' or approved equal.

- A. Pull box shall be reinforced for HS-20 traffic loading.
- B. Concrete sections for the bottom, center and top shall be provided.
- C. Knockouts in the walls shall permit underground conduit connections. Provide a 14-inch diameter sump and two 1-inch diameter ground rod knockout in the bottom.
- D. Accessories shall include angle iron inserts, cable racks, bolts, pulling eyes or irons opposite and below each duct bank entrance and all other required hardware.
- E. Covers shall be rectangular, hinged, galvanized steel, traffic rated for HS-20 loading and mounted on a steel frame cast into the top ring section. The cover shall be marked to identify the system as indicated and shall also be marked with the pull box identification.

PART 3 – EXECUTION

3.01 INSTALLATION

Junction and device boxes shall be located to provide ample clearance between fixtures and pipes, beams and ducts. The location of all boxes shown is approximate. The exact location shall be verified on the job to avoid conflict with other work. Boxes shall be accurately placed and independently and securely supported. Wooden plugs inserted in masonry or concrete shall not be used as a base to secure boxes nor shall welding or brazing be used for attachment. Boxes shall be secured by galvanized brackets, expansion bolts, toggle bolts or machine or wood screws depending on the type of construction.

Conduit outlet bodies, boxes, fittings, gaskets, covers and supports for lighting outlets, lighting switches, receptacles, control stations, alarm, switch and thermostat outlets, etc. shall be installed as indicated, specified and required, and shall be of sufficient size to provide free space for all conductors that shall be enclosed.

Precast concrete pull boxes and manholes shall be installed in excavations as shown on the plans and as required. Precast concrete pull boxes and manhole installation shall conform to the following requirements:

- A. Pull box or manhole shall be placed on six inches, minimum, of crushed rock or compacted sand.
- B. Install all accessories, which shall include, but not be limited to, cable racks, pulling irons and other hardware.
- C. Install ground rod in each pull box that contains power conductors 150 volts or greater, whether or not shown on plans, and bond to all grounding conductors entering pull box.
 - 1. Existing pull boxes containing power conductors 150 volts or greater that are utilized on this project that do not have ground rods installed shall have the ground rod installed as a part of this project.
 - a. If ground rod knockout is not present, verify correct drilling location with pull box manufacturer.
- D. Ground conductor shall be looped around the entire circumference of the pull box. Install above all insulated cables.
- E. Covers shall be installed on all pull boxes.
- F. Volume of sumps shall be 10% of the volume of the pull box and filled with gravel.
- G. Existing pull boxes that are utilized on this project that do not have the pull box identification on the cover shall be marked with the pull box identification as a part of this project.

Precast pull boxes and manholes shall be installed level and flush with surrounding surfacing in paved areas and 1-1/2 inch above final grade in unpaved areas.

****END OF SECTION****

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SECTION 16140

WIRING DEVICES

PART 1 – GENERAL

1.01 **DESCRIPTION**

A. **General**

1. Furnish all labor, materials, tools, equipment and services for all wiring devices as indicated in accordance with provisions of the Contract Documents.
2. Completely coordinate with work of all other trades.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

1.02 **SUBMITTALS**

Submit in accordance with Specification Section 01300, SUBMITTALS.

PART 2 – PRODUCTS

2.01 **MATERIAL**

A. **General**

Wiring devices shall be UL listed for current and voltage indicated and shall comply with NEMA standard publication WD-1. They shall be specification grade with provision for back wiring and side wiring with captively held binding screws. All receptacles shall be grounding type.

B. **Receptacles and Plugs (non-hazardous areas)**

1. Duplex and/or Single Receptacles: Duplex or single receptacles shall be NEMA 5-15R or 5-20R and shall use NEMA 1-15P or 5-20P plug caps. Where shown, general purpose, duplex receptacles shall be of the ground fault circuit interrupter (GFCI) type, NEMA 5-15R or 5-20R as appropriate. Single receptacles shall be NEMA 6-20R or 6-30R and shall use NEMA 6-20R to 6-30R caps. Duplex or single receptacles for use in corrosive locations shall be corrosion resistant rated. All general-purpose receptacles shall be specification grade manufactured by General Electric Company, Hubbell, or approved equal.

2. Special Receptacles: Duplex receptacles for use in dry non-process locations areas of minimum wall depth, shall be NEMA 5-15R or 5-20R, specification grade, minimum depth type as manufactured by Wiremold or approved equal.
3. Plug Caps: Plug caps shall be of the cord grip armored type with heavy phenolic housing similar to General Electric GE3463 series or approved equal and shall be of the same configuration and manufacture as the receptacles. One plug shall be supplied for each 4 receptacles installed of a given configuration, figured to the next larger standard carton (minimum of 1 plug per receptacle type). Plugs shall be delivered to the District in original sealed cartons.

C. Switches

Switches shall be press switch type as follows:

	Hubbell or Approved Equal	
	<u>15 amp,</u>	<u>20 amp, 120V</u>
	<u>120V</u>	<u>I</u>
Single	1277 I	1297 I
3-Way	1278 I	1298 I
4-way	1284 I	1284 I

In weather exposed areas and inside below finish grade, the press switch shall be mounted in cast iron device mounting boxes and with weather-proof Hypalon cover plates, Hubbell Catalog No. 1740 or approved equal.

D. Device Plates

Device plates shall conform to requirements of Section 16130, JUNCTION OR DEVICE BOXES. Receptacles shall be provided with weatherproof corrosion resistant spring-loaded lift covers.

E. Device Plate Legends

Where a switch is used to control a ventilation fan, the fan service (i.e., "pump room exhaust, Ckt. A3") shall be engraved in 3/16 inch letters on the device plate or laminated phenolic nameplate attached thereto with 316 stainless steel screws.

PART 3 – EXECUTION

3.01 INSTALLATION

Outlet boxes shall be located to provide ample clearance between fixtures and pipes, beams and ducts. The location of all outlets shown is approximate. The exact location shall be verified on the job to avoid conflict with other work. Boxes shall be accurately placed and independently and securely supported. Wooden plugs inserted in masonry or concrete shall not be used as a base to secure boxes, nor shall welding or brazing be used for attachment. Boxes shall be secured by galvanized brackets, expansion bolts, toggle bolts, or machine or wood screws depending on the type of construction. Unless otherwise indicated, receptacle boxes shall be mounted 12 inch above the floor in offices and similar areas and 48 inch above the floor in all other areas.

Switch boxes shall be mounted 48 inch above the floor. Blank covers shall be provided for all unused openings.

****END OF SECTION****

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SECTION 16452

GROUNDING SYSTEM

PART 1 – GENERAL

1.01 DESCRIPTION

A. Provisions

All applicable provisions of Specification Section 16010, ELECTRICAL GENERAL REQUIREMENTS, are incorporated by this reference into this section of the specification.

B. Work Included

Furnish and install a complete grounding system in accordance with Article 250 or the National Electric Code and all applicable building and local codes as shown on the plans.

1.02 REFERENCE STANDARDS

A. Underwriters Laboratories (UL) Standards

467 Electrical Grounding and Bonding Equipment

1.03 SUBMITTALS

A. Shop Drawings

The Contractor shall submit information in accordance with Specification Section 01300, SUBMITTALS, to substantiate compliance with this specification. In addition, the following information and drawings shall be submitted to delineate the specific characteristics of the products supplied:

1. Bare copper conductors
2. Ground rods
3. Terminators
4. Exothermic weld connections
5. Ground rod boxes

PART 2 – PRODUCTS

2.01 BARE COPPER CONDUCTORS

Conductors shall be of the AWG size as shown on the plans and shall be of annealed, soft drawn copper with conductivity of 98%. Conductors shall conform to ASTM specification for concentric-lay-stranded copper type.

2.02 GROUND RODS

- A. Ground rods shall be 3/4-inch diameter and 8 foot long and shall be of the copper clad type. The non-rusting copper exterior shall be molecularly welded to the high strength steel core.
- B. Rods shall have chamfered top to prevent mushrooming and shall have pointed end to penetrate all types of soil, including hard ground and shale.

2.03 TERMINATORS

- A. Terminators shall be made with compression type connectors with lug hole(s) using the tool and die as recommended by the connector manufacturer. Bolt-clamp type ground terminators may be used if the compression types are not available from the manufacturers and are approved by the District.
- B. Terminators shall be approved for grounding installation and shall be suitable for terminating copper-grounding conductors.

2.04 EXOTHERMIC WELD CONNECTIONS

- A. Weld connections shall be made with weld metals, graphite cubicle mold unit and copper oxide and aluminum powered metals which are ignited to produce exothermic reaction for welding.
- B. Connections shall include, but not be limited to, all cable-to-cable splices, tees, Xs, etc., all cable to ground rods, cable to steel and cast iron.
- C. All material used including molds, weld metals, tools and accessories shall be of the same manufacturer. Procedures shall be followed in strict accordance with the manufacturer's instructions.

2.05 GROUND ROD AND BOXES

- A. Ground rod boxes shall be of Precast concrete with a suitable hot-dip galvanized traffic cover at grade level, shall permit access for the connection and removal of any pressure connectors and shall be as shown on the plans. Boxes shall be Christy Type G5 with cast-iron lid, Brooks No. 1-RT, or equal.

- B. Provide a box for each ground rod.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Unless otherwise indicated on the plans, size conduit and equipment grounding wire in accordance with Table 250-95 of the National Electrical Code, except use a minimum wire size of No. 12 AWG. Service grounding electrode conductor at incoming service and all separately derived system voltage points shall be sized in accordance with Table 250-94 of the National Electrical Code.
- B. Ground rods shall be installed at all services, pull boxes, manholes, medium-voltage transformers, motor control centers, and other locations shown on the plans.
- C. For conduits stubbed up from below a motor control center or an enclosure, connect grounding conductors directly to the MCC ground bus (ground lug for an enclosure). In addition, bond conduits directly to the MCC bus or enclosure ground lug with grounding conductors and nylon insulated threaded bonding and grounding bushings. Do not bond with one grounding conductor bonded or multiple bushing.
- D. Provide nylon insulated threaded bonding and grounding bushings and grounding conductor to ground the conduits with the enclosure grounding lugs.
- E. Employ the foregoing service bonding techniques for grounding throughout the length of a continuous path from the conduit and equipment in a classified (hazardous) location all the way back to the service or transformer grounding electrode conductor.
- F. Install grounding wires in liquid tight flexible metal conduits for bonding jumpers.
- G. Ground equipment enclosures, motor and transformer frames, metal conduit systems, cable armor, exposed structural steel, and similar items.
- H. Provide grounding terminators for exposed connections. Seal exposed connections with compound which improves conductivity and prevents oxidation. Make buried connections with exothermic welds.
- I. Remove non-conductive protective finishes or coatings before the connection is made to insure good electrical contact.
- J. Install all underground conductors used for system grounding at a minimum depth of 24 in. below the finished grade.

K. Exercise care to provide good ground continuity, in particular between the conduit system and equipment frames and enclosures. Where necessary or required by the District, install jumper or bonding wires.

L. Shield Grounding

1. Shielded instrumentation cable shall have its shield grounded at one end only unless shop drawings indicated otherwise:
 - a. The grounding point shall be at the control panel or at the power source end of the signal carried by the cable.
2. Terminate the shield drain wire on a dedicated terminal block.
3. Use terminal block manufacturer terminal block jumpers to interconnect ground terminals.
4. Connection to the panel main ground bus shall be via a green No. 12 conductor to the main ground bus for the panel.

M. Provide a separate grounding conductor for each motor and connect at motor terminal box. Do not use bolts securing motor box to frame or cover for grounding connectors:

1. When grounding motors driven by Variable Frequency Drives (VFD) comply with the requirements of the VFD manufacturer.

3.02 TESTING

Determine the ground resistance of the grounding system in accordance with Specification Section 16900, ELECTRICAL EQUIPMENT TESTING. Provide all test equipment which shall be approved prior to the test by the District. Unless otherwise indicated, dry season resistance of the system shall not exceed 5 ohms. If such resistance cannot be obtained with the system as shown, provide additional grounding as directed by the District.

3.03 ADJUSTING

Under the direction of the District, add additional parallel connected ground rods and/or deeper driven rods until the ground resistance measurement meets the specified resistance requirements.

Use of salts, water, or compounds to attain the specified ground resistance is not acceptable.

****END OF SECTION****

SECTION 16600

CONTROL SENSOR SWITCHES AND AUXILIARIES

PART 1 – GENERAL

1.01 DESCRIPTION

A. General

1. Furnish all labor, materials, tools, equipment and services for all control sensor switches and auxiliaries as indicated in accordance with provisions of the Contract Documents.
2. Completely coordinate with work of all other trades.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
4. Control sensor switches and auxiliaries shall be coordinated and furnished by the Instrumentation System Supplier (ISS) as described in Section 16710, PROCESS INSTRUMENT AND CONTROL SYSTEMS.

1.02 SUBMITTALS

Submit in accordance with Specification Section 01300, SUBMITTALS.

PART 2 – PRODUCTS

2.01 MATERIALS

A. General

These switches include various level, flow, pressure, or temperature sensor switches and their auxiliary relays. Devices for control of heating, ventilating, and air conditioning shall be as shown on the plans or specified in other sections of these contract documents.

B. Float Switch

1. The float switch shall be the direct acting non-mercury, float type, containing a single pole throw steel switch which actuates when the longitudinal axis of the float is horizontal and deactuates when the liquid level falls 1 in. below the actuation level. The float housing shall be a chemical resistant, watertight plastic casing. Each unit shall be supplied with sufficient

cable to extend to a junction box without splices and all necessary stainless steel mounting brackets and hardware. The switch shall comply with NSF-61 certifications.

2. The float switch shall be APG FT-100 or approved equal.

C. Flow Switch

Flow switches for clean water or compressed air in 1 1/4-inch through 8-inch nominal pipe sizes shall be multiple layer vane type with stainless steel and brass wetted parts and an explosion-proof housing. Flow switch shall be Anderson V4-2-U, or approved equal.

Installation shall be coordinated for vertical ($\pm 5^\circ$) orientation in a horizontal pipe run with unobstructed pipe diameters.

Flow switch enclosures shall, as a minimum, be NEMA 4X rated. Where applied in hazardous locations flow switch enclosures shall be NEMA 7 rated.

PART 3 – EXECUTION

3.01 INSTALLATION

Control sensor switches attached directly to concrete shall be spaced out from the mounting surface not less than 1/2 inch by use of phenolic spacers or framing channel. Expansion shields or cast-in-place inserts shall be used for securing equipment or supports to concrete surfaces.

Unless otherwise noted control sensor switches shall be mounted between 48 and 60 inches above the finished floor or work platform.

****END OF SECTION****

SECTION 16710

PROCESS INSTRUMENT AND CONTROL SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION

A. General

1. Furnish all labor, materials, tools, equipment and services for all process instrument and control systems as indicated in accordance with provisions of the Contract Documents.
2. Completely coordinate with work of all other trades.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

B. Instrumentation System Supplier (ISS)

The Contractor shall cause the complete process instrumentation and control systems to be furnished and installed by a single company. The Instrumentation System Supplier (ISS) shall be regularly engaged in the manufacture and installation of pneumatic, electronic and process instrumentation systems. These requirements shall not, however, be construed as relieving the Contractor of his responsibility for this part of the work.

The ISS shall provide all materials, labor, engineering, as required, per:

Section 16600, CONTROL SENSOR SWITCHES AND AUXILIARIES

Section 16700, CONTROL PANELS

Section 16710, PROCESS INSTRUMENT AND CONTROL SYSTEMS

Section 16800, PROGRAMMABLE LOGIC CONTROLLERS AND ASSOCIATED
EQUIPMENT

Section 16880, PROCESS CONTROL STRATEGY

The ISS shall be responsible for the satisfactory operation of the entire system. The ISS shall produce detailed drawings (panel schematics, interconnection, and loop diagrams) for the complete coordination and installation of the various system components. The ISS shall perform coordination and field investigation as required to interconnect new and existing controls, and to interface with other trades and package control vendors, so as to provide a complete, documented, and properly operable system.

The ISS shall provide the services of a qualified Commissioning Engineer to perform and/or supervise the installation, calibration, start-up procedures, pre-operational testing, RTU programming modification and generation, SCADA screen modification and generation, and commissioning of each system.

Functional system data is shown on instrumentation diagrams and is augmented by accompanying schedules and details. All elements shall be provided as shown and/or other such elements as may be required to complete the system shall be provided even though not shown.

C. Qualifications of Instrument System Supplier (ISS)

The ISS shall be the following vendor:

- Tesco, Sacramento, CA

1.02 SUBMITTALS

Submit in accordance with Specification Section 01300, SUBMITTALS.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Signal Transmissions and Signal Conditioners

Unless otherwise indicated, electric or electronic signal shall be 4-20mA (milliamps) DC. Signal conditioners and/or isolators shall be provided as required and shall be by AGM or approved equal.

B. Electronic Equipment

Electronic equipment shall be all solid-state construction. Components shall be substantially derated to assure dependability and long-term stability. Printed circuit boards shall be glass epoxy of ample thickness, wave soldered, and heavily varnished for moisture resistance. Alignment and adjustments shall be non-critical, stable with temperature changes and aging, accomplished with premium grade potentiometers. Selected components shall not be required to obtain specified performance.

C. Ultrasonic Level Transmitter (LT-1, LT-2, LT-3, & LT-4)

Operation: Transmitter shall be a 24VDC sonic-pulsed device with microprocessor electronics. The transmitter shall communicate with the RTU through a continuous cable permanently installed on the ultrasonic sensor by the manufacturer. The transmitter shall also have the

following features:

- Measuring range: up to 12m.
- Output the liquid level with a 4-20mA/DC output with Bluetooth communications.
- Physical Description: The electronics shall be enclosed in a PVDF body suitable for mounting to the top of chemical storage tanks.

Ultrasonic transmitter shall be Endress+Hauser Prosonic S FMR10-11V0/0 model #: FMR10-CAQBMWDEVEE2 or approved equal.

D. Chlorine Residual Analyzer (AIT-1 & AIT-2)

Chlorine residual analyzer shall consist of a transmitter and remote sensor. Chlorine residual analyzer transmitter shall be microprocessor-based, suitable for wall mounting, with backlit display, and menu-driven calibration limit and control settings. All settings, including calibration data shall be retained in non-volatile memory. The analyzer shall incorporate a sensor diagnostic monitor to alarm on sensor failure. Analyzer shall provide both programmable alarm and limit alarm contact outputs. The chlorine residual analyzer shall provide a 4-20mA DC output proportional to total chlorine concentration in mg/Liter. The chlorine residual analyzer transmitter shall be utilized with a remote chlorine sensor measuring total chlorine concentration with a 0-10 mg/L range. Chlorine residual analyzer transmitters shall match the existing chlorine residual analyzer employed by the District at the Chlorine Contact Basin.

E. Digital Panel Indicators

Digital panel indicators shall be 4-20mADC digital readout, NEMA 4X rated, panel-mounted meters. The digital indicators shall have wide rangeability, in engineering units, through digital zero and span adjustments programmed from the front of the meter, and selectable decimal point location. After calibration, the indicator shall be secured against tampering by locking out the front panel controls. Indicator readout shall be with 1.2" high, 4 digit, red, light emitting diode (LED) type. Accuracy of the digital panel indicator shall be 0.05% of calibrated span. The indicator shall be supplied in a standard horizontal 1/8 DIN case suitable for panel mounting, and shall be furnished for 120 VAC input power. The indicator shall provide two (2) SPDT relays rated 3A at 30 VDC or 3A at 120 VAC capable of switching 1/14 HP at 120 VAC. The indicator shall provide 24 VDC for transmitter 4-20mADC signal. The indicator shall provide one (1) 4-20mA output for connection to the RTU. The indicators shall have custom faceplates with no manufacturer or trade name shown. Digital indicators shall be Precision Digital #PD765-6X5-10 or approved equal.

F. I TO I Isolator

1. Isolators shall be of the electronic, solid-state type for inside the enclosure mounting and shall complete input/output isolation. It shall accept a 4-20mA DC signal and shall output a similar 4-20mA DC signal. The output shall have a suitable resistor which can be removed

in the future. It shall be provided with a NEMA 1 cover, flexible cord plug-in connector, and gold flash jack.

2. Isolators shall have an accuracy of 0.1% and a temperature variation of 0.0025%/°F. The input impedance shall be 50 ohms and the output impedance shall be 1,500 ohms. The input power shall be 115V AC, 60 Hz. Fuse protection shall be provided.
3. Isolators shall be AGM or equal.

G. Terminal Blocks (TBs)

Terminal blocks shall be 12-point, 600 volt, 50 amp-rated, Buchanan B112 or approved equal. Terminal blocks to be used with current transformers shall be shorting type, 12-point, 600 volt, 50 amp-rated, Buchanan S112 or approved equal.

H. Fuse Blocks (FB)

Fuse blocks for potential or control circuit protection shall be 30 amp, 600 volt-rated with number of poles and fuse ratings supplied as required. Fuse blocks shall be Cooper Bussmann Class CC, Little Fuse Class CC, or approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION

Instruments attached directly to concrete shall be spaced out from the mounting surface not less than 1/2 inch by use of phenolic spacers or framing channel. Expansion shields or cast-in-place inserts shall be used for securing equipment or supports to concrete surfaces. Unless otherwise noted, field instruments shall be mounted between 48 and 60 inches above the floor or work platforms and oriented for optimal display orientation and accessibility.

Each device shall be carefully installed and commissioned in accordance with the Contract Documents, the plans, the Manufacturer's O&M documentation, and as required for a complete and fully functional instrumentation system.

All analog instruments shall be installed such that taps and ports, etc. are available for in-place calibration and test without removal. For those instruments where such in-site calibration is not feasible other calibration methods shall be provided subject to approval by the District.

All instrumentation shall be field calibrated using calibration standards at least 4 times more accurate than the instrument under test. Calibration standards shall be recently calibrated, with certification traceable to NIST. Calibrate each instrument at no less than five (5) points (0, 25, 50, 75, and 100%) of calibration. Complete test reports shall be submitted for District's review and approval.

Final instrument loop commissioning shall include injection of 4-0mA signal into the loop from the connections to the signal transmitter, at five (5) points (0, 25, 50, 75, and 100%) of calibration. At each injected value, record the readings of all receiving instrument including digital panel meters, videographic recorder, PLC analog input value and HMI readout. Perform corrections as required to achieve displays corrected to within 0.1% of full scale. Complete test reports shall be submitted for District's review and approval.

Analysis instruments shall be compared each with the other for consistency and with plant laboratory methods.

****END OF SECTION****

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SECTION 16800

REMOTE TERMINAL UNITS AND ASSOCIATED EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included

1. The instrumentation system supplier (ISS), shall furnish all labor, materials, equipment, software, appurtenances, and incidentals required to install, program, function test, and operate the existing Remote Terminal Unit (RTU) and auxiliaries as specified herein, and as shown on the plans.

The ISS shall furnish engineering and technical expertise as required for complete modification and integration of the RTU system for proper control, data storage, and communications. Control logic shall be generally as described herein and as shown but shall be adjusted by the ISS and approved by the District as required for safe and satisfactory automatic operation, including controlled process start-up and shutdown sequences.

The complete proven and documented system shall meet the highest standards for this type of service.

2. Existing RTU systems modified by the ISS shall include Control Room RTU-1 and Control Room RTU-2.
3. Modifications to the RTUs shall be integrated into the existing plant communication network by the ISS as described and as required for a complete and properly operable system.

B. Description of System

1. RTU systems as shown on the plans shall be modified under this contract. RTUs shall monitor and control local functions, as shown on the plans and described in these specifications.
2. The ISS shall completely integrate all RTU systems for a complete and properly operable automatically controlled facility.
3. No erratic operation of any RTU output device shall be allowed during operation, start-up, shutdown, loss of power, or restoration of power.

4. Provide alarms for newly added instrumentation and programming as shown and as follows:
 - a. Except as noted alarms shall be in RTU logic.
 - b. All analog inputs (AIs) shall have “analog signal failure alarm” for an out-of-range signal. For 4-20mADC AIs, failure alarm shall be for signal below 3.9mA or above 20.1mA.
 - c. All analog signals shall be provided with “high” and “low” alarms with setpoint Operator adjustable from SCADA (with password access). Provide “high-high” and/or “low-low” alarms with Operator adjustable setpoint as indicated or as requested by the District.
 - d. Analog signals of process variables under PID or other modulation strategy shall have “deviation from setpoint alarms” with deviation setpoint Operator adjustable from SCADA. For example: “Pump #1 Flow deviation” or “Pump #2 Control Valve Position Control Failure”.
 - e. The RTU shall monitor the availability of its controlled equipment. All command outputs shall be coordinated with sensing inputs and logic to determine whether the desired action actually occurred. For example: “Pump XXX-##-## Fail To Start,” “Pump XXX-##-## Fail To Stop,” “Valve XXX-##-## Fail To Open,” Valve XXX-##-## Fail To Close.”
6. Any hardware required to be added to the existing RTU network shall be furnished as a package by the ISS. All necessary programming for additional instrumentation and control methodologies as shown on the drawings and in these specifications shall be performed by the ISS. Integration of the modified RTUs and their status, alarms, monitoring, and controls with the instrumentation and equipment shall be performed by the ISS. The SCADA system and screens shall be modified by the ISS to display all status, alarm, monitoring, and control associated with its operation for all added instrumentation and control methodologies under this project.
7. The SCADA system programming and screens shall be modified as shown and as required for complete local monitoring and control of the associated equipment under this project. Systematically organized tabular display of all area status indications analog values and controls shall be provided, segmented into screens as required. Provide access for Operator adjustment of alarm threshold and PID setpoints with password protection. Provide alarm and event logging with time and date-stamp. Provide trend charts display of analog values scaled to display last 12 hours of operation.

1.02 QUALITY ASSURANCE

A. Reference Standards

NEMA ICS 1	<i>General Standards for Industrial Control and Systems</i>
NEMA ICS 1.1	<i>Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control</i>
NEMA ICS 3	<i>Industrial Systems</i>
NEMA/EIA 232-D	<i>Interface Between Data Terminal Equipment and Data Communications Equipment Employing Serial Binary Data Interchange</i>
ANSI/TIA/EIA-568-A	<i>Commercial Building Telecommunications Cabling Standard</i>
ANSI/TIA/EIA-568-B.1	<i>Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements</i>
ANSI/TIA/EIA-568-B.2	<i>Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components, 2001</i>

B. Qualifications

1. The RTU components shall be supplied and integrated by the Instrumentation System Supplier (ISS). The ISS shall perform all work necessary to select, furnish, supervise installation, connect, program, test, and place into operation a complete RTU system as specified herein.
2. The ISS's technicians performing the programming and start-up of the RTU System shall have at least three years experience on similar projects. The technicians' full resumes shall be available upon request.

C. Drawings and Specifications

1. The RTU System Drawings and Specifications include:
 - a. RTU Layout Diagram
 - b. RTU Typical I/O Connection Diagrams
 - c. RTU Logic Diagrams
 - d. RTU I/O Point Lists
 - e. RTU Comm Diagram
 - f. RTU Loop Diagrams
2. The RTU layout typical I/O connection diagrams are intended to show the basic interconnections required for the communications bus and the various I/O modules.

3. The RTU logic diagrams are intended to show the basic control logic rather than a complete RTU program description. All programming required for a complete and operating system including controlled start-up and shutdown sequences shall be provided.
4. The RTU I/O points lists are intended to indicate the minimum number of points required to achieve the basic control logic indicated. Other points shall be provided as needed to achieve a complete and operable system as described herein.

D. Submittals

1. A material list shall be submitted containing the name of the manufacturer, model number, and description of all material proposed under this section and in compliance with Specification Section 01300, SUBMITTALS.
2. Shop drawings, schematics, and wiring diagrams, submitted shall include:
 - a. Product or item names as used herein and on the drawings.
 - b. The manufacturer's model or other designation for each item.
 - c. Bill of materials listing all items included in the system.
 - d. System block diagram showing all major hardware components with locations and code designations indicated.
 - e. Connection diagrams showing all wiring between RTU modules, auxiliary devices and interfacing items. All items shall be identified as named herein or in the drawings. RTU logical address and tag name shall be shown adjacent to each input and output connection. All termination points shall be shown and labeled. DC polarities shall be shown.

All cables shall be identified by the wire labeling code shown on the drawings and to be installed at each end of each wire. All device and equipment labeling codes shall be shown. All wire sizes, color codes, and special cable types shall be shown.
 - f. Index with proper identification and cross-referencing.
 - g. Exceptions to the specifications or drawings shall be clearly indicated. The shop drawing submittal shall contain sufficient details so that the District may make a proper evaluation.
 - h. Proposed factory and field-testing forms.
3. Equipment test forms for factory and field testing and commissioning.

E. Operation and Maintenance (O&M) Manuals

1. Operation and Maintenance Manuals shall include:
 - a. A comprehensive index.
 - b. A complete "As Constructed" set of favorably reviewed shop drawings.
 - c. System schematic drawings "As Constructed", illustrating all components and electrical connections of the system supplied under this Section.
 - d. A complete list of equipment supplied, including serial numbers, ranges, and pertinent data.
 - e. Full specifications on each item.
 - f. Detailed operation, maintenance, and service instructions including a step-by-step trouble-shooting guide for each item supplied.
 - g. Special maintenance requirements particular to this system.
 - h. The operating instructions shall also incorporate a functional description of the entire system, with references to the system's schematic drawings and instructions applicable to this project.
 - i. Complete parts list with stock numbers.
 - j. Recommended spare parts list.
 - k. Factory and field-testing data in approved forms.

A draft O&M manual shall be submitted for review three weeks prior to equipment scheduled factory testing. Four (4) copies of the approved O&M manual including factory test result on the approved test forms shall be supplied in indexed, subdivided, Levelox three-post notebook binders at the time of shipment of the equipment. O&M manuals and documents shall be provided to the District electronically in unlocked and editable form (Word, CAD).

F. Software Submittals

1. All RTU software as described below shall be submitted for approval prior to RTU system testing and start-up.
2. SCADA programming and screens shall be submitted for review and approval prior to system startup and testing.

3. RTU/SCADA programs shall be presented in ladder logic and function block programming which shall be fully documented with all device codes and cross references, function descriptions, I/O codes, register addresses, etc. Adequate comments shall be provided to thoroughly explain the program functions. Inputs and outputs shall be tabulated with address number, I/O type, device description, and function description. All I/O and internal addresses shall be shown with address, type, contents, and description. All ladder logic and function block programming shall be consistent with recommended best practices of Tesco L2000 RTU Programming Software.

Ladder logic printout shall be carefully formatted to print one network per page showing register addresses, descriptions, and numerical content. Network titles and long comments shall be included. Landscape mode printing is recommended. Font size shall not be less than size 8.

4. During start-up all changes shall be carefully and completely documented with hard copy printout and revised program storage on thumb drive. The most current printout and thumb drive shall remain on site at all times.
5. All software to be supplied with default username and password.

G. As-Built Drawings

All drawings and software submittals described above shall be corrected to the final as-built state of the equipment and delivered to the District prior to final acceptance of the work. Copies for inclusion in all equipment manuals shall be provided. All drawings shall be provided to the District electronically in an unlockable and editable format (AutoCAD).

1.03 SITE CONDITIONS

A. General Environment

The RTU shall withstand anticipated environmental conditions of 5 to 50°C temperature and 10 to 95% humidity. Electro-magnetic interference (EMI) and radio frequency interference (RFI) as may be anticipated in a typical industrial environment shall not impede proper functioning of the RTU systems. EMI and RFI are expected from two-way radios, lightning strikes, motors, transformers, contactors, relays, etc.

B. Power Source

Normal fluctuations of the 120VAC 60 Hz power supply shall not cause improper operation of the RTU system. Normal fluctuations are voltage excursions between 100 and 130V, or surges caused by switching of electrical loads. Battery power shall be supplied at 24VDC.

On loss of station AC power the RTU shall initiate an orderly shutdown of its control functions. On restoration of power the RTU shall restart the system in an orderly and controlled sequence.

No erratic operation of any RTU output device is allowed during start-up, shutdown, operation, or on loss or restoration of power.

C. **Surge Protection**

RTU power supply, CPU and all I/O devices shall have built-in surge withstand capacity to prevent damage from electrical surges on any connected line.

Additional surge protection shall be provided on any 4-20mA DC signal loops which extend beyond the perimeter of the building housing the RTU Control Panel. Surge protection shall be properly applied devices, Bournes/Joslyn #1820-28-A3 or equal by Alan Scientific.

PART 2 - PRODUCTS

2.01 **GENERAL**

The ISS shall furnish equipment which is of one manufacturer to the maximum possible extent. Where this is not practical, all equipment of a given type shall be the product of one manufacturer.

2.02 **RTU COMPONENTS**

- A. The RTUs shall be Tesco L2000 hardware as shown.
- B. Components shall be HDIO Card with associated HDIO Terminal Board and HDIO Cable.

2.03 **RTU INPUT OR OUTPUT (I/O) MODULES**

A. **General**

- 1. All RTU I/O shall be Tesco L200 series modules.
 - a. HDIO Card (16 DI, 8 DO, 6 AI, and 2 AO)
- 2. All I/O internal circuits shall be electrically isolated from external circuits.

PART 3 - EXECUTION

3.01 CONSTRUCTION

- A. Components shall be installed in accordance with the manufacturer's instructions and located as shown on the plans or as approved by the submittal process.
- B. The ISS shall be responsible for coordinating the equipment and ensuring a fully operable and function tested system.
- C. Any spare points available on the furnished I/O modules shall be wired out to panel terminal strips.
- D. RTU I/O modules shall be connected with module specific ribbon cables. RTU AI and AO modules shall be connected with #16 shielded twisted pair, Belden #2127A or approved equal.
- E. 24VDC control, analog signal, and communication wiring shall be carefully segregated from 120VAC power wiring. Cross low voltage and AC power wiring at right angles only as necessary.

3.02 TESTING

A. General

This specification subsection shall define factory testing requirements for the equipment supplied herein.

B. Test Forms

Equipment shall be tested as described herein. Test forms for the factory and field testing shall be submitted for review and approval per Specification Section 16800 Part (1.02)D, Submittals.

C. Witness Testing

The District shall send a representative to witness factory testing. The equipment supplier shall make all reasonable efforts to accommodate scheduling for the factory test. Completed test forms shall be supplied to the District at completion of the factory testing.

The District's representative will be present for witnessing field testing.

D. Retest

Any equipment, material, workmanship, or programming found defective during testing shall be immediately replaced/corrected and all necessary retesting shall be satisfactorily completed and documented in the testing forms.

E. Test Equipment

All necessary test equipment to perform the testing described herein shall be supplied by the equipment supplier. All test forms shall include a listing of the test equipment used in obtaining the test results contained on that form. Test instrument information shall include manufacturer, model number, and serial number.

F. Factory Tests

The following factory tests as a minimum shall be performed:

1. Point-to-point testing for all modified RTU I/O.
2. Continuity testing of all wiring.
3. Yellow line all schematics and wiring drawings against wiring checks.
4. Verify proper programming of all modified RTU I/O points.
5. Verify proper setting of all set-points, timers, and alarm functionality.
6. Verify registration and scaling for all analog values.
7. Verify all logical function blocks.
8. Verify completed program implements all functionality of the control narrative and the contract logic drawings, P&IDs, and I/O listing.
9. Provide testing of discrete and analog RTU inputs and outputs from the field terminal connections by simulated contact closure and analog signal injection to verify proper RTU control system programming.
10. Verify proper operation of RTU I/O for all conditions from normal operation to startup, shutdown, loss of power, and restoration of power.
11. Simulate RTU communication error and demonstrate detection and recovery of system.

Successful completion and documentation of the above factory tests are required for equipment release for shipment. Acceptance of factory test results does not relieve the equipment supplier for the requirement of conforming to the contract documents.

G. Field Testing

1. General

The ISS shall provide all labor, tools, test equipment, software, material and technical supervision to perform the field testing under this specification section, unless specifically noted otherwise.

The onsite electrical contractor shall be responsible for installing and terminating field wiring and communication cable to the equipment supplied under this contract from field devices and other equipment. The ISS field technicians shall coordinate with the electrical contractor and his onsite testing agency in verifying proper input, registration, and scaling of I/O to the RTUs and SCADA.

2. Start-up Testing

The ISS shall perform thorough start-up testing in close co-ordination with the District. The designated ISS Commissioning Engineer shall be responsible for submittal of test procedures, test scheduling and coordination, and documentation and submittal of test results. Start-up tests shall include:

- a. Point-to-point wire checking of all modified RTU I/O circuits.
- b. Verification of proper functioning of all analog I/O loops. Verify proper scaling in RTU registers and proper display on SCADA. Verify “signal out of range” and all “high” and/or “low” alarms.
- c. Verify proper registration, functioning, and display/logging of all alarms.
- d. With all outputs disabled, manually activate each input device and check for status change at the appropriate input point.
- e. Without causing any undesirable actions to occur, use “forcing” to verify that each discrete and analog output is properly addressed. and wired.
- f. Verify proper data exchange, and control functionality with other RTUs and SCADA system. Programming of these other systems for transmission/reception of data, set-points and control functionality will be by others. ISS shall cooperate in the verification of end-to-end functionality and integration of these systems. ISS shall integrate all aspects of this interface onto a complete and properly operable process control system.
- g. Verify proper operation of control system to loss of communication and detection, alarming, and recovery from communication failure.

- h. Schedule and perform demonstration testing of all I/O to be witnessed by designated District's representative.
- i. Check program for proper logic, I/O and internal register address assignments, and timer, counter, and setpoint values.
- j. Perform pre-operational tests including thorough testing and debugging of auto mode operation in close coordination with facility operations.
- k. Provide test procedures, scheduling, and coordination of operational tests to demonstrate for each subsystem complete operability to be witnessed by designated District's representative for certification of system "substantially complete" and initiation of in-service commissioning period. Demonstration shall include full functionality, operability, and display of SCADA controls, trends, alarms, and status indication.
- l. Provide close monitoring of systems and coordination with District staff, during the commissioning (acceptance test) period with subsystem in "auto" under RTU control. Provide all necessary modifications to programming and control loop tuning to establish stable operation in execution of all control algorithms.
- m. Provide training for the District Operations staff for each subsystem during its commissioning period. Training shall include review of the process, operation via local and manual controls, operation and monitoring via SCADA.
- n. All RTU and SCADA programs shall be documented thoroughly. Back-up copies on disc shall be made promptly. Printout of final SCADA screens and RTU ladder logic shall be included in O&M manual submittal.

H. Commissioning

After all startup testing is complete, with all test results submitted and approved, the ISS shall commence a commissioning period of five consecutive 24-hour days with the system operating in full automatic mode. The District shall have full operational control over the system during this period. Any failures, misoperation, communication issues, or programming errors shall be promptly corrected, and the commissioning period restarted. Only after five consecutive 24-hour days of automatic operation will the commissioning period be considered as satisfactorily completed.

3.03 TECHNICIAN TRAINING

The ISS shall provide three (3) days of instruction to train two (2) of the District's Technicians for the operation and maintenance of all RTU systems. Training shall include:

- RTU, SCADA and related hardware diagnostics
- RTU programming basics and network configuration

- RTU data table and logic organization
- Uploading and downloading programs from laptop to RTU
- SCADA graphics configuration
- RTU wiring and network troubleshooting

3.04 **ADDITIONAL PROGRAMMING**

The ISS shall provide 5 additional days of on site RTU and SCADA programming for customization, additions and modifications to these as directed by the District. These services shall be provided after acceptance and operation of the system by the District, and after all noted deficiencies and non-conformances of the required contract programming work have been completed and approved by the District. The ISS shall provide fully annotated hard and soft copies of all final programming, SCADA screens, and shall update all O&M manuals with the updated versions.

****END OF SECTION****

PROCESS CONTROL STRATEGY

PART 1 – GENERAL

1.01 PUMP STATION OPERATION AND CONTROL STRATEGY

A. General Description

The Rancho Murieta Community Services District operates an existing Wastewater Treatment Facility (WWTF) which utilizes two (2) Tesco L2000 RTUs, a Tesco SCADA system, and associated I/O hardware to facilitate control and monitoring of the WWTF. The District is adding new instrumentation and replacing existing instrumentation under this project. The Contractor shall make any and all modifications to the RTUs, SCADA system and appropriate hardware changes necessary to carry out the modification to the control and monitoring system as described in the Contract Drawings and Specifications.

B. Existing Configuration Downstream of the Chlorine Contact Basin

The WWTF consists of two (2) process trains, each including a dissolved air flotation unit (DAF) and sand filters. Stored secondary effluent is conveyed to these process trains by the tertiary pump station. Secondary effluent is dosed with chlorine at the tertiary pump station and is monitored for chlorine residual via an existing chlorine residual analyzer at the outlet of the chlorine contact basin. Secondary effluent is also dosed with alum upstream of the DAF units. Flow from the tertiary pump station is metered. Downstream of these two process trains, the filter effluents are combined, dosed with chlorine and routed through a chlorine contact basin. Tertiary effluent is then shunted to an equalization pond and pumped offsite to a recycled water distribution system. Flow rate through the plant is set by the operator depending on the desired recycled water production rate.

C. Control Modifications

Existing sodium hypochlorite tanks and their level transmitters will be demolished under this project. Sodium hypochlorite will be stored in two new tanks within the new chemical tank facility. Liquid level in these tanks will be monitored at the new chemical truck unloading station (LT-3 & LT-4) and through SCADA at the plant control center.

Existing Alum storage tanks and their level transmitters will also be demolished under this project. Alum will be stored in two (2) new tanks within the new Chemical Tank Facility. Liquid level will be monitored at the new Chemical Tank Unloading station (LT-1 & LT-2) and through SCADA at the plant control center. Low tank level (less than 1 ft depth from any tank) will trigger an alarm at the plant control center. Four (4) new emergency eye-wash stations will be installed at the new chemical truck unloading station, each with a flow switch

to provide indication of eye-wash activation. Activation of any emergency eye wash at the new chemical tank facility shall trigger an alarm at the plant control center.

Chemical spills within these containment bays will be routed to two (2) sumps. Each sump will be outfitted with a level detector (float switch) to provide indication of the presence of liquid within the sumps through SCADA at the plant control center. High liquid level (float switches installed such that a depth greater than 6 inches) will trigger an alarm at the plant control center.

Sodium hypochlorite solution will be routed from the storage tanks to two (2) existing metering pump skids by gravity. Each metering pump skid consists of two (2) metering pumps. Each skid is dedicated to one (1) chlorine dosing location. Skid No. 1 doses chlorine at the tertiary pump station. Skid No. 2 doses chlorine upstream of the chlorine contact basin. A new third skid shall be installed under this contract and will serve as a backup to Skid No. 2. Skid No. 2 metering pump and the third backup skid shall have programming modified in the RTU to provide dosing in the event of low chlorine residual (less than 6 ppm) as reported by the existing chlorine residual analyzer at the chlorine contact basin. The dosing amount shall be Operator Adjustable. The nature of this reading requires a transit time. The time the RTU shall wait for additional reading will be initially set at 30 minutes and shall be Operator Adjustable.

Alum solution will be routed to the storage tanks to three (3) existing alum metering pumps. These pumps will be relocated from the chemical room to the chlorination room. Two pumps are dedicated to each of two (2) existing DAF units, with the third plumbed as a backup to Pump No. 1 and Pump No. 2. RTU programming shall be modified to provide flow-pacing to each alum metering pump. Alum pumps shall be flow-paced based on the existing tertiary pump station flow meter.

RTU programming shall be modified to provide new flow-pacing to the sodium hypochlorite skids. Skid No. 1 and Skid No. 2 shall be flow-paced based on existing tertiary pump station flow meter. Two (2) new chlorine residual analyzers – installed adjacent to DAF 1 & DAF 2 – shall be used to monitor chlorine residual in the existing dissolved air flotation units' effluent line. Chlorine residual in the dissolved air flotation units' effluent lines shall be monitored at the plant control center.

Contractor shall modify the RTU program to utilize an existing chlorine residual analyzer located at the tertiary effluent at the outlet of the chlorine contact basin to provide monitoring and control as follows:

1. Low Chlorine Residual

Should the tertiary effluent residual fall below a pre-selected/adjustable value set by the operator, a low chlorine residual alarm shall be triggered at the plant control center, and the following controls shall be implemented:

- a. Existing tertiary effluent/equalization pond influent valve shall be commanded to CLOSE.

- b. Existing diversion valve to the secondary effluent storage pond shall be commanded to OPEN.
- c. Existing sodium hypochlorite Skid No. 2 metering pump shall be commanded to increase the chlorine dosing speed.

2. High Chlorine Residual

Should the existing tertiary effluent chlorine residual rise above a pre-selected/adjustable value set by the operator, the following controls shall be implemented:

- a. Existing tertiary effluent/equalization pond influent valve shall be commanded to OPEN.
- b. Existing diversion valve to the secondary effluent storage pond shall be commanded to CLOSE.
- c. Existing sodium hypochlorite Skid No. 2 metering pump chlorine dosing shall be flow-paced by the RTU.

****END OF SECTION****

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SECTION 16900

ELECTRICAL EQUIPMENT TESTING

PART 1 – GENERAL

1.01 **SUMMARY**

A. **Work Included in this Section**

Testing of electrical equipment.

1.02 **REFERENCES**

A. The inspections and tests shall be in accordance with the following applicable codes and standards except as provided otherwise herein.

1. International Electrical Testing Association (NETA), ATS-2003 Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
2. National Electrical Manufacturer's Association – NEMA.
3. American Society for Testing and Materials – ASTM.
4. Institute of Electrical and Electronic Engineers – IEEE.
5. American National Standards Institute – ANSI.
6. State and Local Codes and Ordinances.
7. Insulated Cable Engineers Association – ICEA.
8. Illuminating Engineering Society – IES.
9. OSHA Part 1910; Subpart S, 1910.308.
10. National Fire Protection Association – NFPA.

B. Power Producers Interconnection Handbook – Pacific Gas and Electric Company.

1.03 **SUBMITTALS**

A. **Pre-test Submittals**

1. Qualifications of Testing Service Company.
2. Test personnel qualifications (resumes).
3. Equipment testing schedule.
4. Sample Test and Report forms.

B. **Post-test Submittals (Test Report)**

1. Summary of project testing for project.
2. Description of equipment tested.
3. Description of test and test procedure.

4. Test results.
5. Conclusions and recommendations.
6. Appendix, including appropriate completed test forms, including witness' signature.
7. List of test equipment used and calibration date.

1.04 **QUALIFICATIONS**

- A. The Testing Service shall meet federal OSHA criteria for accreditation of testing laboratories, Title 29, Part 1907. Full membership in the International Electrical Testing Association constitutes proof of meeting such criteria.
- B. Testing Service shall submit proof of the above qualifications to the District.

1.05 **SYSTEM DESCRIPTION**

- A. The Contractor shall engage the services of a recognized Testing Service for the purpose of performing inspections and tests for equipment safety and operability, and functionally verify the control system operates in accordance with the contract documents.
- B. The Testing Service shall provide all material, equipment, labor and technical supervision to perform such tests and inspections.
- C. The intent of these tests is to assure that all electrical equipment is operational within industry and manufacturer's tolerances and to functionally test all systems.
- D. Upon completion of the tests and inspections noted in these Specifications, a label shall be attached to all devices tested. These labels will indicate date tested and the service company responsible.
- E. The tests and inspections shall determine suitability for continuous reliable operation.
- F. The Contractor and the Electrical Testing Service shall resolve any deficiencies and retest in a timely manner to facilitate the project start-up and commercial operation.
- G. The inspections and tests shall utilize the following references.
 1. Project design Specifications.
 2. Project design Drawings.
 3. Manufacturer's instruction manuals applicable to each particular apparatus.
 4. Contractor-generated drawing and documents.
 5. Contract Drawings submitted by manufacturers and vendors.
- H. All instruments used to evaluate electrical performance shall meet Specifications for Test Instruments (refer to Part 2 of this Specification).

- I. Electrical testing shall include the following:
 - 1. Cables – Low Voltage.
 - 2. Circuit Breakers – Low Voltage.
 - 3. Grounding Systems.
- J. The Contractor shall perform routine insulation resistance, continuity and rotation tests for all distribution and utilization equipment prior to and in addition to tests performed by the Testing Service specified herein.
- K. The Contractor shall notify the District when equipment becomes available for electrical tests. Work shall be coordinated to expedite project scheduling.
- L. The Contractor shall supply a set of electrical plans, specifications and any pertinent change orders to the Testing Service prior to commencement of testing.
- M. The Contractor shall notify the District prior to commencement of any testing.
- N. The Testing Service shall be responsible for implementing the final settings and adjustments on protective devices and electrical equipment in accordance with approved values.
- O. Set points shall be noted on all calibration stickers.
- P. Any system material or workmanship which is found defective on the basis of electrical tests shall be replaced and retested at no additional cost to the District.
- Q. The Testing Service shall maintain a written record of all tests and upon completion of the project, assemble and certify a final test report.

PART 2 – PRODUCTS

2.01 TEST INSTRUMENT TRACEABILITY

- A. The Testing Service shall have a calibration program, which maintains applicable test instrumentation within rated accuracy.
- B. The accuracy shall be traceable to the National Institute for Standards and Technology in an unbroken chain.
- C. Instruments shall be calibrated in accordance with the following frequency schedule:
 - 1. Field instruments – 6 months maximum.
 - 2. Laboratory instruments – 12 months.
 - 3. Leased specialty equipment – 12 months. (Where accuracy is guaranteed in writing by the lessor.)

- D. Dated calibration labels shall be visible on all test equipment.
- E. Records must be kept up to date, which show date and results of all instruments calibrated or tested.
- F. An up-to-date instrument calibration instruction and procedure will be maintained for each test instrument.

PART 3 – EXECUTION

3.01 SAFETY AND PRECAUTIONS

- A. Safety practices shall include, but are not limited to, the following requirements:
 - 1. Occupational Safety and Health Act of 1970-OSHA.
 - 2. Accident Prevention Manual for Industrial Operations, Seventh Edition, National Safety Council, Chapter 4.
 - 3. Applicable State and local safety operating procedures.
 - 4. NETA Safety/Accident Prevention Program.
 - 5. National Fire Protection Association – NFPA 70 (NEC).
 - 6. National Fire Protection Association – National Electrical Safety Code.
- B. All tests shall be performed with apparatus de-energized except where otherwise specifically required herein.
- C. The Testing Service’s lead test engineer for the project shall be a designated safety representative and shall be present on the project and supervise testing operations and safety requirements.
- D. Power circuits shall have conductors shorted to ground by a hotline-grounding device approved for the purpose.
- E. In all cases, work shall proceed only when the safety representative has determined that it is safe to do so.
- F. The Testing Service shall have available sufficient protective barriers and warning signs to conduct specified tests safely and shall post safety personnel as necessary while dangerous tests are being performed.
- G. The District’s safety procedures shall be reviewed and understood by the Contractors and Testing Service personnel.

3.02 TEST PROCEDURES

A. Cables – Low Voltage, 600V Maximum

1. Perform all tests, including any optional tests, listed in section 7.3.2 of NETA ATS-2003.
2. Equipment to be tested is listed in Paragraph 1.05I.

B. Circuit Breakers

1. Low Voltage, Insulated Case/Molded Case 100 amp Trip and Larger:
 - a. Perform all tests, including any optional tests, listed in section 7.6.1.1 of NETA ATS-2003.
 - b. Equipment to be tested is listed in Paragraph 1.05I.

C. Grounding Systems

1. Perform all tests, including any optional tests, listed in section 7.13 of NETA ATS-2003.
2. Equipment to be tested is listed in Paragraph 1.05I.

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ATTACHMENT 1

**PRODIGY ELECTRIC
ELECTRICAL/INSTRUMENTATION/CONTROL SYSTEM SCOPE OF
WORK**

ATTACHMENT 1

PRODIGY ELECTRIC SCOPE OF WORK

Electrical contractor scope:

1. Demo old equipment, conduits, wiring etc., that are listed to be removed. Retain items for District that they request.
2. Install all electrical and control equipment provided by others according to plans and specifications.
3. Provide testing where necessary.
4. Provide as builds with changes in red ink.
5. Electrical contractor shall provide all trenching and backfill for their portion of the project including pads for the 2 cl2 sample points.
6. Asphalt patching and repair shall be under the general contractor's portion of the work.
7. Assist with start-up.

ATTACHMENT 2

TESCO SCADA INTEGRATION SCOPE OF WORK

ATTACHMENT 2

TESCO SYSTEM INTEGRATOR SCOPE OF WORK

Control integration contractor scope:

1. Provide updated drawings with new equipment, control diagrams, connections, and landing points.
2. Program existing PLCs, SCADA, add HDIO boards, etc., to complete the project to the satisfaction of the District.
3. Set-up, calibrate new and moved devices.
4. Provide start-up for all equipment and operation of the new system control scheme.
5. Provide a two-year warranty for all work and equipment.

