

SET NO: \_\_\_\_\_



Municipal Water District

San Diego County, California

**CONTRACT DOCUMENTS  
FOR THE CONSTRUCTION OF:**

**DAVID C. MCCOLLOM WATER TREATMENT PLANT  
PH CONTROL SYSTEM PROJECT**

**September 2021**

**OMWD WO# D120068**

**OLIVENHAIN MUNICIPAL WATER DISTRICT**

San Diego County, California

CONTRACT DOCUMENTS

FOR THE CONSTRUCTION OF

**DAVID C. MCCOLLOM WATER TREATMENT PLANT  
pH CONTROL SYSTEM PROJECT**

OMWD WO# D120068

September 2021



---

GEOFF FULKS  
OPERATIONS MANAGER

## BID FORM CHECKLIST

(To be placed in the Bidder's Contract Documents in front of the Table of Contents)

Bid Form Page	Requirement	Initial
1 of 4	BID NOTICE-Fill in date of the mandatory Pre-Bid Conference attended: _____	
1 of 12	BID FORM- Fill out the form and acknowledge <u>all</u> addenda in the spaces provided at the end of the first paragraph	
2 of 12	BIDDING INSTRUCTIONS- Examination of the site and review of the Contract Documents has been completed	
2 of 12	BIDDING INSTRUCTIONS- Bid Schedule and all Bid forms are to be submitted with this Bid Form Checklist	
3 of 12	BID SCHEDULE- Fill out all items in the Bid Schedule, including dollar amounts in words and in numbers for each item	
4 of 12	DESIGNATION OF SUBCONTRACTORS- Fill in all information required on the form	
5 of 12	LISTING OF MANUFACTURERS- Fill in all information required on the form	
6 of 12	Fill in the type of Bid Bond enclosed in the first paragraph, and list all principals of the company in the third paragraph	
7 of 12	Fill in Bidder's license classification, license number, and all other information required in the fourth paragraph, including signature and date	
8 of 12	CERTIFICATE OF DRUG-FREE WORKPLACE- Fill in Bidder's name at the top and Certification section at the bottom of the page, including signature and date	
9 of 12	CERTIFICATE OF NONDISCRIMINATION- Fill in all information required on the form, including signature and date	
10 of 12	NONCOLLUSION AFFIDAVIT- Fill in all information required on the form including signature and date and provide notarization	
11 of 12	BIDDER'S EXPERIENCE- Fill in all information required on the form and provide signature and date at the bottom	
12 of 12	INSURANCE ACKNOWLEDGEMENT- Fill in all information required on the form and provide signature and date where indicated	
1 of 2	BID BOND- Fill in all required information including dollar amount	
2 of 2	BID BOND- Fill in all required information, provide signatures of the bidder and surety where indicated, provide notarization for principal of bidder and surety, and attach a certified Power of Attorney for surety	
00810 2 of 27	1.04 MARKING AND ADDRESSING BID ENVELOPE- Contract Documents are sealed in an envelope marked and addressed as required in this section	

Dated \_\_\_\_\_ Signature of Bidder \_\_\_\_\_

## TABLE OF CONTENTS

### CONTRACT DOCUMENTS

### PAGE

#### PART I BIDDING AND CONTRACT REQUIREMENTS

##### DIVISION 0 BIDDING AND CONTRACT REQUIREMENTS

NOTICE INVITING SEALED PROPOSALS (BIDS)-----	1 to 4 White
BID FORM-----	1 to 12 Yellow
BID BOND-----	1 to 2 Yellow
AGREEMENT-----	1 to 3 Blue
PERFORMANCE BOND-----	1 to 2 Blue
PAYMENT BOND-----	1 to 2 Blue
CONTRACTOR'S CERTIFICATE REGARDING WORKERS' COMPENSATION-----	1 to 2 Blue
CERTIFICATE OF INSURANCE (WORKERS' COMPENSATION)-----	1 to 3 Blue
INSURANCE ENDORSEMENT (WORKERS' COMPENSATION)-----	1 to 2 Blue
CERTIFICATE OF INSURANCE (LIABILITY)-----	1 to 5 Blue
INSURANCE ENDORSEMENT (LIABILITY)-----	1 to 2 Blue
CERTIFICATE OF INSURANCE (BUILDERS' RISK "ALL RISK")-----	1 to 4 Blue
INSURANCE ENDORSEMENT (BUILDERS' RISK "ALL RISK")-----	1 to 2 Blue
GENERAL PROVISIONS	
TABLE OF CONTENTS-----	1 to 3 Goldenrod
MAIN BODY-----	1 to 42 Goldenrod
SHOP DRAWING SUBMITTAL FORM-----	1 to 1 Goldenrod
PROGRESS ESTIMATE AND PAYMENT FORM-----	1 to 1 Goldenrod
CONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT-----	1 to 1 Goldenrod
CONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT-----	1 to 1 Goldenrod
PROPOSED CHANGE ORDER FORM-----	1 to 1 Goldenrod
PUBLIC CONTRACT CODE SECTION 20104, ET SEQ-----	1 to 4 Goldenrod
SECTION 00810 SUPPLEMENT TO GENERAL PROVISIONS-----	1 to 13 Gray

#### PART II TECHNICAL SPECIFICATIONS

##### DIVISION 1 GENERAL REQUIREMENTS

(Division 1 – 17 – White)

SECTION 01000 SUMMARY OF WORK-----	1 to 4
SECTION 01025 MEASUREMENT AND PAYMENT-----	1 to 6
SECTION 01060 SAFETY AND HEALTH-----	1 to 1
SECTION 01118 OWNER-FURNISHED EQUIPMENT-----	1 to 2
SECTION 01300 RECORD DRAWINGS AND SUBMITTALS-----	1 to 2
SECTION 01505 MOBILIZATION / DEMOBILIZATION-----	1 to 2
SECTION 01620 PROTECTION OF MATERIALS AND EQUIPMENT-----	1 to 3
SECTION 01734 OPERATING AND MAINTENANCE INFORMATION-----	1 to 4

TABLE OF CONTENTS		PAGE
CONTRACT DOCUMENTS		
<u>DIVISION 2 SITE WORK</u>		
SECTION 02050	DEMOLITION AND REMOVAL -----	1 to 3
<u>DIVISION 3 CONCRETE</u>		
SECTION 03000	GENERAL CONCRETE CONSTRUCTION -----	1 to 17
<u>DIVISION 4 MASONRY (NOT USED)</u>		
<u>DIVISION 5 METALS</u>		
SECTION 05121	MISCELLANEOUS METAL WORK-----	1 to 5
<u>DIVISION 6 WOOD AND PLASTICS (NOT USED)</u>		
<u>DIVISION 7 THERMAL AND MOISTURE PROTECTION (NOT USED)</u>		
<u>DIVISION 8 DOORS AND WINDOWS (NOT USED)</u>		
<u>DIVISION 9 FINISHES (NOT USED)</u>		
<u>DIVISION 10 SPECIALTIES (NOT USED)</u>		
<u>DIVISION 11 EQUIPMENT</u>		
SECTION 11001	GENERAL EQUIPMENT PROVISIONS-----	1 to 25
SECTION 11430	CHEMICAL FEED SYSTEMS-----	1 to 9
SECTION 11440	HIGH DENSITY CROSS-LINKED POLYETHYLENE CHEMICAL STORAGE TANKS -----	1 to 8
<u>DIVISION 12 FURNISHINGS (NOT USED)</u>		
<u>DIVISION 13 SPECIAL CONSTRUCTION (NOT USED)</u>		
<u>DIVISION 14 CONVEYING SYSTEMS (NOT USED)</u>		

## TABLE OF CONTENTS

### CONTRACT DOCUMENTS

### PAGE

#### DIVISION 15 MECHANICAL

SECTION 15050	GENERAL PIPING REQUIREMENTS-----	1 to 4
SECTION 15080	MISCELLANEOUS PIPING SPECIALTIES -----	1 to 4
SECTION 15122	FLEXIBLE PIPE COUPLINGS -----	1 to 5
SECTION 15141	DISINFECTION OF PIPING -----	1 to 4
SECTION 15144	PRESSURE TESTING OF PIPING-----	1 to 4
SECTION 15220	COPPER PIPE AND TUBE -----	1 to 4
SECTION 15290	POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS-----	1 to 2

#### DIVISION 16 ELECTRICAL

SECTION 16050	BASIC ELECTRICAL MATERIALS AND METHODS-----	1 to 18
SECTION 16080	ACCEPTANCE TESTING -----	1 to 4

#### DIVISION 17

SECTION 17010	INSTRUMENTATION AND CONTROLS-----	1 to 10
---------------	-----------------------------------	---------

**APPENDIX A** - 1550 Gallon Citric Acid Chemical Storage Tank Shop Drawing

**APPENDIX B** - Calculations package for Citric Acid Storage Tank Seismic Anchoring and Concrete Pad

### REFERENCE STANDARDS

Olivenhain Municipal Water District, Standard Specifications and Drawings for the Construction of Water, Recycled Water, and Sewer Facilities, Latest Edition.

Standard Specifications for Public Works Construction, "Greenbook", Latest Edition.

San Diego Regional Standard Drawings (Latest Edition).

### PROJECT PLANS

Construction Drawings for the David C. McCollom Water Treatment Plant pH Control System Project (28 Sheets).

END TABLE OF CONTENTS

## **PART I**

### ***BIDDING AND CONTRACT REQUIREMENTS***

**NOTICE INVITING SEALED PROPOSALS (BIDS)**  
**FOR THE CONSTRUCTION OF**  
**DAVID C. McCOLLOM WATER TREATMENT PLANT pH CONTROL SYSTEM PROJECT**  
**FOR THE**  
**OLIVENHAIN MUNICIPAL WATER DISTRICT**

**NOTICE IS HEREBY GIVEN** that the Board of Directors of said District invites and will receive sealed proposals (bids) up to the hour of **2:00 p.m. on the 21st day of October, 2021** for the furnishing to said District of all transportation, labor, materials, tools, equipment, services, permits, utilities, and other items necessary to construct said work. At said time, said proposals will be publicly opened and read aloud at the office of the Olivenhain Municipal Water District, 1966 Olivenhain Rd. Encinitas, CA 92024, (760) 753-6466.

Bids shall conform to and be responsive to the Contract Documents for the work. Copies of the Contract Documents will be open to public inspection during business hours in the office of the District.

The District will conduct a Pre-Bid Conference at the David C. McCollom Water Treatment Facility, 19090 Via Ambiente Road in Escondido, California at **10:00 a.m. on October 5, 2021**. A field walk of the site will follow the meeting. **It is non-mandatory that bidders attend the Pre-Bid Conference.**

All questions relative to this project prior to the opening of bids shall be directed to the District (see enclosed Pre-Bid Question Form). It shall be understood that no specification interpretations will be made by telephone nor will any "or equal" products be considered for approval prior to award of the contract. Bidders are encouraged to submit their pre-bid questions as early as possible, in writing by fax or mail, so they can be answered in writing through an addendum if necessary. Questions may be taken verbally; however, written questions will be given priority, and verbal questions run the risk of not being answered. Pre-bid questions will be received up to **5:00 p.m. on October 14, 2021**, after which they will not be answered.

Contract Documents consisting of plans, specifications and bidding documents can be downloaded from the "Bids and Planning" link under "About Us" on the home page of the District's website at [www.olivenhain.com](http://www.olivenhain.com). Contract documents are not available at the District. It will be the Bidder's responsibility to download and acknowledge receipt of all addenda. If you wish to be placed on the plan holders list, please send your company name, contact person, contact phone # and email to [prebid@olivenhain.com](mailto:prebid@olivenhain.com).

Each bid shall be submitted on the bid form furnished as part of the Contract Documents and must state the Contractor's applicable license classification, license number, license expiration date, name of license holder, and relationship to Bidder. The license classification required for this project is **Class A General Engineering**. Each bid must be accompanied by cash, a cashier's check, a certified check, or a bidder's bond executed by an admitted surety insurer. This proposal guarantee shall be in an amount of not less than 10 percent of the amount of the bid and made



payable to the order of or for the benefit of the District. Each bid shall be sealed and delivered to District personnel at 19090 Via Ambiente Road, Escondido, CA 92029 on or before the day and hour set for the opening of bids. Bids not marked as being received by District personnel on or before the day and hour of bid opening will be rejected. It is the responsibility of the Bidder to ensure that the bid is received by District personnel on or before the day and hour of bid opening. Said cash, check, or bond shall be given as guarantee that the Bidder will enter into a contract with the District and furnish the required payment and performance bonds and insurance certificates and endorsements if awarded the work, and will be declared forfeited if the Bidder refuses to timely enter into said contract or furnish the required bonds or insurance certificates and endorsements if his bid is accepted. The proposal guarantee of unsuccessful bidders will be returned by the District no later than 60 calendar days following the date of award of contract.

Bidders shall have a minimum of five (5) years of successful prior experience performing the type of work required by this contract. Where the Bidder is a corporation or partnership, the entity must demonstrate at least five (5) years of successful experience with the work required by the contract. Bidders failing to demonstrate this experience may be rejected as nonresponsive at the option of the District.

Under the provisions of the California Public Works Apprenticeship Standards, Sections 1777.5, 1777.6, and 1777.7 of the Labor Code, a copy of the "Extract of Public Works Contract Award" has been included. This document will be filed with the California Department of Industrial Relations at the time of the award of the Contract.

The Board of Directors has obtained from the Director of the California Department of Industrial Relations a determination of the general prevailing rate of per diem, wages, and the general prevailing rate for legal holiday and overtime work in the locality in which said work is to be performed for each craft, classification, or type of worker needed. Not less than the determined rates shall be paid to all workers employed in the performance of the contract. Such rates of wages are on the file with the Department of Industrial Relations and in the office of the District and are available to any interested party upon request.

Pursuant to Public Contract Code Section 22300, the Contractor may substitute equivalent securities for retention amounts, which this Contract requires. However, the District reserves the right to solely determine the adequacy of the securities being proposed by the Contractor and the value of those securities. The District shall also be entitled to charge an administrative fee, as determined by the District in its sole discretion, for substituting equivalent securities for retention amounts.

The Contractor agrees that the District's decision with respect to the administration of the provisions of Section 22300 shall be final and binding and not subject to subsequent litigation or arbitration of any kind as to acceptance of any securities being proposed, the value of these securities, the costs of administration and the determination of whether or not the administration should be accomplished by an independent agency or by the District. The District shall be entitled, at any time, to request the deposit of additional securities of a value designated by the District, in the District's sole discretion, to satisfy this requirement. If the District does not receive satisfactory securities within 12 calendar days of the date of the written request, the District shall be entitled to withhold amounts due Contractor until securities of satisfactory value to the District have been received.

Pursuant to Section 995.710 of the Code of Civil Procedures, the Contractor may substitute any of the instruments specified in Code of Civil Procedure Section 995.710 for the performance and payment bonds required by the Contract Documents. All such substitutions shall be subject to review and approval by the District. Contractor agrees to pay all attorney's fees and all other fees, costs, and expenses incurred by the District in reviewing substitutes proposed by the Contractor and in preparing and implementing any agreements determined appropriate by the District to adequately protect District.

All bidders shall agree to obtain and maintain in full effect all required insurance with limits not less than the amounts indicated. Bidders who fail to comply with the insurance requirements of this contract may have their bids rejected as nonresponsive at the election of the District.

Pursuant to California Labor Code Section 6705, the cost of sheeting, shoring, and bracing of trenches, or equivalent method, where part of the job, shall constitute a separate bid item under these contract documents.

The Board of Directors of the District reserves the right to select the schedule(s) under which the bids are to be compared and contract(s) awarded, to reject any and all bids, and to waive any and all irregularities or defects in any bid.

OLIVENHAIN MUNICIPAL WATER DISTRICT

Dated: 09-14-2021

  
\_\_\_\_\_  
Geoff Fulks  
OPERATIONS MANAGER

Prior to the opening of bids, all questions relative to this project **shall be directed to Olivenhain Municipal Water District, Attn: Geoff Fulks, [prebid@olivenhain.com](mailto:prebid@olivenhain.com)** . Bidders are encouraged to submit their pre-bid questions as early as possible, in writing to [prebid@olivenhain.com](mailto:prebid@olivenhain.com) so they can be answered in writing through addendum, if necessary. Questions may be taken verbally; however, **written questions will be given priority**, and verbal questions run the risk of not being answered. **Pre-bid questions will be received up to 5:00 p.m., October 14, after which no questions will be taken or answered.**

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

**BID FORM**

**PROPOSAL TO  
OLIVENHAIN MUNICIPAL WATER DISTRICT  
SAN DIEGO COUNTY, CALIFORNIA**

**FOR THE CONSTRUCTION OF**

**DAVID C. McCOLLOM WATER TREATMENT PLANT pH CONTROL SYSTEM PROJECT**

Name of Bidder: \_\_\_\_\_

Business Address: \_\_\_\_\_

\_\_\_\_\_ Phone No.: \_\_\_\_\_

**TO THE GOVERNING BODY OF THE OLIVENHAIN MUNICIPAL WATER DISTRICT**

Pursuant to and in compliance with your Notice Inviting Sealed Proposals (Bids) and the other documents relating thereto, the undersigned Bidder, being fully familiar with the terms of the Contract Documents, local conditions affecting the performance of the Contract, the character, quality, quantities, and scope of the work, and the cost of the work at the place where the work is to be done, hereby proposes and agrees to perform within the time stipulated in the Contract, including all of its component parts and everything required to be performed, and to furnish any and all of the labor, material, tools, equipment, transportation, services, permits, utilities, and all other items necessary to perform the Contract and complete in a workmanlike manner, all of the work required in connection with the construction of said work all in strict conformity with the Plans and Specifications and other Contract Documents, including Addenda Nos. \_\_, \_\_ and \_\_ for the prices hereinafter set forth.

The undersigned as Bidder, declares that the only persons or parties interested in this proposal as principals are those named herein; that this proposal is made without collusion with any person, firm, or corporation; and he proposes and agrees, if the proposal is accepted, that he will execute a Contract with the Owner in the form set forth in the Contract Documents.

**BIDDING INSTRUCTIONS**  
**FOR THE CONSTRUCTION OF**

**DAVID C. McCOLLOM WATER TREATMENT PLANT pH CONTROL SYSTEM PROJECT**

Prior to the opening of bids, all questions relative to this project shall be directed to the Owner. Bidders are encouraged to submit their pre-bid questions as early as possible, in writing by fax or mail, so they can be answered in writing through addendum, if necessary. Questions may be taken verbally; however, written questions will be given priority, and verbal questions run the risk of not being answered. Pre-bid questions will be received up to **5:00 p.m., October 14, 2021**, after which they will not be answered.

Bidders shall have a minimum of five (5) years of successful prior experience performing the type of work required by this Contract. Bidders failing to demonstrate this experience may be rejected as nonresponsive at the option of the Owner.

Bidders agree to obtain and maintain in full effect all required insurance with limits not less than the amounts indicated. Insurers must be authorized to do business and have an agent for service of process in California, have an "A" policyholder's rating and a financial rating of at least Class VI in accordance with the most current rating by A.M. Best Company. Bidders who fail to comply with the insurance requirements of this Contract may have their bids rejected as nonresponsive at the election of the Owner.

The Bidder's attention is directed to Article 3-1 "Award of Contract or Rejection of Bids" in the General Provisions concerning the above conditions.

**If the bid schedule is not completely filled in, the bid will be determined to be non-responsive and will be rejected. The Owner reserves the right to reject any and all bids, to waive any irregularity in the bids received and to award the Contract on the basis of the responsive bids.**

Bidders must satisfy themselves as to the character of the work to be performed by examination of the site and review of the Contract Documents. After bids have been submitted, the Bidder expressly waives the right to assert that there was a misunderstanding concerning the nature of the work to be done. Any bid protests must be submitted within three (3) calendar days of the bid.

The Contract Documents contain the provisions required for the construction of the Project. Information obtained from an officer, agent, or employee of the Owner or any other personnel shall not affect the risks or obligations assumed by the Contractor, or relieve him from fulfilling any of the conditions of the Contract.

Bids shall be submitted on the Bid Form and Bid Bond included within these Contract Documents. Bidders shall designate the subcontractors and list the manufacturers of materials to be used in the Project on the Designation of Subcontractors form included with these Contract Documents. All subcontractors listed to perform any of the work must be licensed in the State of California. No single subcontractor may perform more than 25% of the work listed in the Bid Schedule unless specifically approved in advance by the District prior to the submission of bids. The Owner reserves the right to find a bid non-responsive in its sole discretion if a Bidder lists any unlicensed subcontractors to perform any of the work. Submit with the bid the completed Certificate of Drug-Free Workplace, Certificate of Nondiscrimination, Noncollusion Affidavit, Designation of Subcontractors, Bidder's Experience, and Insurance Acknowledgment included in the Bid Form. Completely fill out the one page Bid Form Checklist included in front of the Table of Contents and include it with the bid. The Owner reserves the right to find a bid non-responsive in its sole discretion if a Bidder fails to complete or include any of the aforementioned certificates or acknowledgements.

## BID SCHEDULE

### DAVID C. McCOLLOM WATER TREATMENT PLANT pH CONTROL SYSTEM PROJECT

The pay items listed in each Bid Schedule are described in Specification Section 01025 – Measurement and Payment.

## BID SCHEDULE

Item	Item Description	Quantity	Unit	Amount
1.	General requirements	1	LS	\$_____
2.	Citric Acid System Improvements	1	LS	\$_____
3.	Caustic Feed System Improvements	1	LS	\$_____
4.	Removal and Reinstallation of Chemical Storage Area Roof	1	LS	\$_____
5.	Chemical Storage Area Site Improvements	1	LS	\$_____
6.	Raw Water Chemical Injection Containment Vault Improvements	1	LS	\$_____
7.	Chemical Feed Systems Electrical and Instrumentation Improvements	1	LS	\$_____
8.	Start-up, Commissioning, and Operator Training	1	LS	\$_____
Bid Schedule Total				\$_____

### TOTAL AMOUNT OF BID SCHEDULE (IN FIGURES)

---

---

### TOTAL AMOUNT OF BID SCHEDULE (IN WORDS)

---

---

**DESIGNATION OF SUBCONTRACTORS**

In compliance with the provisions of Section 4100-4114 of the Public Contract Code of the State of California, and any amendments thereof, each Bidder shall set forth below, the name, license number, and location of the mill, shop or office of each subcontractor who will perform work or labor, or render service to the Contractor in an amount in excess of one-half (1/2) of one (1) percent (0.5%) of the total bid, and the portion of the work which will be done by each subcontractor. All subcontractors listed must be licensed to perform the subcontract work in the State of California. No single subcontractor may perform work in excess of 25% of the total work listed in the Bid Schedule unless specifically approved by the District in advance of submission of the Bid. Bidders who list any unlicensed subcontractors on this form may have their bid rejected as non-responsive in the sole discretion of Owner.

If the Bidder fails to specify a subcontractor for any portion of the work in excess of one-half (1/2) of one (1) percent (0.5%) of the total bid to be performed under the Contract, he shall be deemed to have agreed to perform such portion himself, and he shall not be permitted to subcontract that portion of the work except under conditions permitted by law.

Subletting or subcontracting any portion of the work as to which no subcontractor was designated in the original bid shall only be permitted in case of public emergency or necessity, or otherwise permitted by law, and then only after a finding is reduced to writing as a public record of the Owner.

Trade	% of Work To Be Done	Name of Subcontractor	License Number	Address

## LISTING OF MANUFACTURERS

The Contractor shall submit this sheet with his bid, completed, to list the manufacturers of materials he intends to use. It shall be understood that where the Contractor elects to not use the material manufacturers called for in the Specifications, he will substitute only items of equal quality, durability, functional character, and efficiency as determined and approved by the Owner. The Contractor should ascertain the acceptability of substitutes prior to bidding. Only one manufacturer shall be listed for each item.

[illegible]

Substitutions shall be allowed only if requested in accordance with Article 5-10 of the General Provisions within 35 calendar days of the date the Contract is awarded. Should a substitution be allowed, there will be no increase in the amount of the bid originally submitted.



**ACCOMPANYING THIS PROPOSAL IS**

(insert the words "cash", "a cashier's check", "a certified check", or "a Bidder's bond" as the case may be) in an amount equal to at least 10 percent of the total amount of the Bid, payable to the

**OLIVENHAIN MUNICIPAL WATER DISTRICT**

The undersigned deposits the above-named security as a proposal guarantee and agrees that it shall be forfeited to the Owner as liquidated damages in case this proposal is accepted by the Owner and the undersigned fails to execute a contract with the Owner as specified in the Contract Documents or fails to furnish the required payment and performance bonds, and insurance certificates and endorsements. Should the Owner be required to engage the services of an attorney in connection with the enforcement of this bid, Bidder promises to pay Owner's reasonable attorneys' fees, incurred with or without suit.

The names of all persons interested in the foregoing proposals as principals are as follows: (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 general partnership, state true name of firm, also names of all individual partners composing firm; if a limited partnership, the names of all general partners and limited partners; if Bidder or other interested person is an individual, state first and last names in full; if the Bidder is a joint venture, state the complete name of each venturer).

---

---

---

---

---

The Owner has determined the license classification necessary to bid and perform the subject contract. In no case shall this Contract be awarded to a specialty contractor whose classification constitutes less than a majority of the project. When a specialty contractor is authorized to bid a portion of the work of this contract, all work to be performed outside of the contractor's license specialty, except work specifically authorized by the Owner, shall be performed by a licensed subcontractor in compliance with the Subletting and Subcontracting Fair Practices Act commencing with Section 4100 et seq., of the Public Contract Code. See Business and Professions Code Section 7059.

The Contractor's license classification(s) required for this project are as follows:

**CLASS A – GENERAL ENGINEERING**

---

---

---

It is the Owner's intent that "plans," as used in Public Contract Code Section 3300, is defined as the construction Contract Documents, which include both the Plans and the Specifications.

Bidder warrants and represents that it has at least five (5) years of successful experience performing the type of work required by this Contract.

Bidder warrants and represents, under penalty of perjury, that license(s) required by California State Contractor's License Law for the performance of the subject project are in full effect and proper order. Bidders must state, under penalty of perjury, the Contractor's applicable license classification, license number, license expiration date, name of license holder, and relationship to Bidder. Any bid not containing this information may be considered nonresponsive and may be rejected by the Owner.

Bidders relying upon licenses of Responsible Managing Employees (RME) or Responsible Managing Officers (RMO) agree to provide the Owner with all information it determines necessary to verify that the Bidder complies with California State Contractor's License Law.

License Classification: \_\_\_\_\_

License Number: \_\_\_\_\_

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

Name of License Holder: \_\_\_\_\_

Relationship to Bidder: \_\_\_\_\_

Name of Bidder: \_\_\_\_\_

Signatures: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Dated: \_\_\_\_\_, 20\_\_\_\_

**NOTE:** If Bidder is a corporation, the legal name of the corporation shall be set forth above, together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation and the corporate seal; if Bidder is a partnership, the true name of the firm shall be set forth above, together with the signature of the partner or partners authorized to sign contracts on behalf of the partnership; if the Bidder is an individual, his signature shall be placed above; if the Bidder is a joint venture, the name of the joint venture shall be set forth above with the signature of an authorized representative of each venturer.

## CERTIFICATE OF DRUG-FREE WORKPLACE

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

The Bidder named above hereby certifies compliance with Government Code Section 8355 in matters relating to providing a drug-free workplace. The above named Bidder will:

1. Publish a statement notifying employees that unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited and specifying actions to be taken against employees for violations, as required by Government Code Section 8355(a).
2. Establish a Drug-Free Awareness Program as required by Government Code Section 8355(b), to inform employees about all of the following:
  - (a) The dangers of drug abuse in the workplace,
  - (b) The person's or organization's policy of maintaining a drug-free workplace,
  - (c) Any available counseling, rehabilitation and employee assistance programs, and
  - (d) Penalties that may be imposed upon employees for drug abuse violations.
3. Provide as required by Government Code Section 8355(c), that every employee who works on the proposed contract or loan:
  - (a) Will receive a copy of the company's drug-free policy statement, and
  - (b) Will agree to abide by the terms of the company's statement as a condition of employment on the contract or loan.

---

### CERTIFICATION

I, the official named below, hereby swear that I am duly authorized legally to bind the Bidder to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.

OFFICIAL'S NAME: \_\_\_\_\_

DATE EXECUTED: \_\_\_\_\_ EXECUTED IN COUNTY OF: \_\_\_\_\_

OFFICIAL'S SIGNATURE: \_\_\_\_\_

TITLE: \_\_\_\_\_

## CERTIFICATE OF NONDISCRIMINATION

1. During the performance of this contract, Bidder and its subcontractors shall not unlawfully discriminate against any employee or applicant for employment because of race, religion, color, national origin, ancestry, physical handicap, medical condition, marital status, age (over 40) or sex. Bidders and subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free of such discrimination. Bidder and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Government Code Section 12900 et seq.) and the applicable regulations promulgated thereunder (California Administrative Code, Title 2, Section 7285.0 et seq.). The applicable regulations of the Fair Employment and Housing Commission implementing Government Code, Section 12900, set forth in Chapter 5 of Division 4 of Title 2 or the California Administrative Code are incorporated into this contract by reference and made a part hereof as if set forth in full. Bidder and its subcontractor shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.
2. This Bidder shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the contract.

THE UNDERSIGNED CERTIFIES THAT THE BIDDER WILL COMPLY WITH THE ABOVE REQUIREMENTS.

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

CERTIFIED BY:

NAME: \_\_\_\_\_ TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

**NONCOLLUSION AFFIDAVIT**

State of \_\_\_\_\_ )  
 ) ss.  
County of \_\_\_\_\_ )

I, \_\_\_\_\_, being duly sworn,  
deposes

and says that he or she is \_\_\_\_\_ of

\_\_\_\_\_, the party making the  
foregoing

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

Signature of Bidder: \_\_\_\_\_

Subscribed and sworn to before me on this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_

## BIDDER'S EXPERIENCE

Name of Bidder: \_\_\_\_\_

License Number: \_\_\_\_\_

List a minimum of five (5) similar projects successfully completed by the Bidder during the last five (5) years. Projects not similar in scope, fee, and complexity will not be considered as representative of this project.

Project Name and Location	Project Owner's Name, Address & Telephone No.	Date Completed
------------------------------	--	-------------------

I declare, under penalty of perjury, that the foregoing is true and correct.

Dated: \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
(Signature of Bidder)

## INSURANCE ACKNOWLEDGMENT

On behalf of the Bidder making this proposal, the undersigned warrants and represents that the Bidder has carefully read and understood all of the insurance requirements of the Contract Documents and has included the full cost of providing insurance meeting all requirements of the Contract Documents in the bid.

Upon request by Owner prior to the time of Award, the Bidder agrees to promptly provide Owner with letters from insurance companies meeting the requirements of the Contract Documents verifying that they are prepared to issue insurance to Bidder meeting all requirements of the Contract Documents. The failure of Bidder to provide Owner with this proof of insurance prior to the time of Award shall entitle Owner to reject the Bidder's bid as nonresponsive and to Award the bid to the next lowest Bidder at the sole discretion of Owner.

The failure of Bidder to provide Owner with insurance meeting all requirements of the Contract Documents within 15 calendar days after the Award, shall constitute a material breach of the Contract, entitling Owner to terminate the Contract and call the bid bond.

By dating and executing this Insurance Acknowledgment, Bidder hereby accepts all terms and conditions of this Insurance Acknowledgment and agrees to be bound by all of its terms.

Dated: \_\_\_\_\_, 20\_\_\_\_

---

(Name of Bidder)

---

(Signature)

---

(Typed Name and Title)

## **BID BOND**

We, \_\_\_\_\_ as Principal, and  
\_\_\_\_\_ as Surety, jointly and severally, bind  
ourselves, our heirs, representatives, successors and assigns, as set forth herein, to the

### **OLIVENHAIN MUNICIPAL WATER DISTRICT**

(herein called Owner) for payment of the penal sum of \_\_\_\_\_ Dollars  
(\$\_\_\_\_\_), lawful money of the United States. Principal has submitted the accompanying  
bid for the construction of

### **DAVID C. McCOLLOM WATER TREATMENT PLANT pH CONTROL SYSTEM PROJECT**

If the Principal is awarded the Contract and enters into a written contract, in the form prescribed by the Owner, at the price designated by his bid, and files two bonds with the Owner, one to guarantee payment for labor and materials and the other to guarantee faithful performance, in the time and manner specified by the Owner, and carries all insurance in type and amount which conforms to the Contract Documents and furnishes required certificates and endorsements thereof, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

Forfeiture of this bond, or any deposit made in lieu thereof, shall not preclude the Owner from seeking all other remedies provided by law to cover losses sustained as a result of the Principal's failure to do any of the foregoing.



Principal and Surety agree that if the Owner is required to engage the services of an attorney in connection with the enforcement of this bond, each shall pay Owner's reasonable attorney's fees incurred with or without suit.

Executed on \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
PRINCIPAL

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

(Seal if Corporation) Title: \_\_\_\_\_

(Attach Acknowledgment of Authorized Representative of Principal)

Any claims under this bond may be addressed to:

\_\_\_\_\_ (name and address of Surety)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (name and address of Surety's  
agent for service of process in  
California, if different from above)

\_\_\_\_\_

\_\_\_\_\_ (telephone number of Surety's  
agent in California)

(Attach Acknowledgment) \_\_\_\_\_  
SURETY

By: \_\_\_\_\_  
(Attorney-in-Fact)

**NOTICE:**

No substitution or revision to this bond form will be accepted. Sureties must be authorized to do business in and have an agent for service of process in California. A certified copy of the Power of Attorney must be attached.

## AGREEMENT

**THIS AGREEMENT**, made and entered into by and between the

### **OLIVENHAIN MUNICIPAL WATER DISTRICT**

hereinafter referred to as "OWNER" and

\_\_\_\_\_ ;

a corporation under the laws of the state of \_\_\_\_\_ ;

a partnership composed of \_\_\_\_\_

\_\_\_\_\_ ;

a joint venture composed of \_\_\_\_\_

\_\_\_\_\_ ;

an individual doing business as \_\_\_\_\_ ;

hereinafter referred to as "CONTRACTOR."

OWNER and CONTRACTOR agree as follows:

- (1) **SCOPE OF WORK:** CONTRACTOR will furnish all materials and will perform all of the work for the construction of the

### **DAVID C. McCOLLOM WATER TREATMENT PLANT pH CONTROL SYSTEM PROJECT**

in accordance with the plans and specifications and other contract documents therefor.

- (2) **TIME OF COMPLETION:** The work shall be completed within the times set forth in the Special Provisions. Time is of the essence.
- (3) **CONTRACT SUM:** OWNER will pay CONTRACTOR in accordance with the prices shown in the Bid Form.
- (4) **PAYMENTS:** Monthly progress payments and the final payment will be made in accordance with the General Provisions as modified by the Special Provisions. The filing of the notice of completion by OWNER shall be preceded by acceptance of the work made only by an action of the Governing Body of OWNER in session.
- (5) **COMPLIANCE WITH PUBLIC CONTRACTS LAW:** OWNER is a public agency in the State of California and is subject to the provisions of law relating to public contracts. It is agreed that all provisions of law applicable to public contracts are a part of this Contract to the same extent as though set forth herein and will be complied with by CONTRACTOR.

- (6) **CONTRACT DOCUMENTS:** The complete contract includes all the contract documents set forth herein, to wit: Notice Inviting Sealed Proposals (Bids), Bid Form, Bid Bond, Agreement, Performance Bond, Payment Bond, Contractor's Certificate Regarding Workers' Compensation, Certificate of Insurance (Workers' Compensation and Employer's Liability), Insurance Endorsement (Workers' Compensation and Employer's Liability), Certificate of Insurance (Liability), Insurance Endorsement (Liability), Certificate of Insurance (Builders' Risk "All Risk"), Insurance Endorsement (Builders' Risk "All Risk"), General Provisions, Special Provisions, Standard Specifications, Standard Drawings, Referenced Permits, Drawings, Plans, and also addenda thereto and supplemental agreements.

This Agreement is executed by the OWNER pursuant to an action of its Governing Body in session on \_\_\_\_\_, 20\_\_\_\_, authorizing the same, and CONTRACTOR has caused this Agreement to be duly executed.

Dated: \_\_\_\_\_, 20\_\_\_\_ By: \_\_\_\_\_  
(Authorized Representative of Owner)

Title: \_\_\_\_\_ GENERAL MANAGER

Dated: \_\_\_\_\_, 20\_\_\_\_ \_\_\_\_\_  
(Contractor)

By: \_\_\_\_\_  
(Authorized Representative of Contractor)

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

(Seal if Corporation)

(Attach Acknowledgment for Authorized Representative of Contractor)

**APPROVED:**

\_\_\_\_\_  
(Attorney for OWNER)

\_\_\_\_\_  
Date

## CERTIFICATE OF CONTRACTOR

I, \_\_\_\_\_, certify that I am a/the

\_\_\_\_\_  
[designate sole proprietor, partner in partnership, or specify corporate office, e.g., secretary] in the entity named as CONTRACTOR in the foregoing contract.

I hereby expressly certify that the name of the entity to which I am associated is \_\_\_\_\_

\_\_\_\_\_  
that this entity is in good standing and has complied with all applicable laws and regulations, and that I have been expressly authorized by the proper parties in this entity to execute this contract on behalf of the above-named entity.

\_\_\_\_\_  
(Signature)

ATTEST:

\_\_\_\_\_  
Name: \_\_\_\_\_  
(Please Type)

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

## PERFORMANCE BOND

We, \_\_\_\_\_ as Principal,  
and \_\_\_\_\_ as Surety, jointly and  
severally, bind ourselves, our heirs, representatives, successors and assigns, as set forth herein,  
to the

### OLIVENHAIN MUNICIPAL WATER DISTRICT

(herein called Owner) for payment of the penal sum of \_\_\_\_\_  
\_\_\_\_\_, Dollars (\$ \_\_\_\_\_),

lawful money of the United States. Owner has awarded Principal a contract for the construction of

### DAVID C. McCOLLOM WATER TREATMENT PLANT pH CONTROL SYSTEM PROJECT

**THE CONDITION OF THIS OBLIGATION IS SUCH** that if the Principal shall in all things abide by and well and truly keep and perform the covenants, and agreements in the said contract, and any alteration thereof made as therein provided, on his part to be kept and performed at the time and in the manner therein specified, including all guarantees of workmanship and/or materials for a three (3) year period, and shall indemnify and save harmless the Owner, District, Olivenhain Municipal Water District, the Engineer/Architect, the Owner's Representative, and their consultants, and each of their directors, officers, employees, and agents, as therein stipulated, this obligation shall become null and void, otherwise, it shall be and remain in full force and effect.

Surety agrees that no change, extension of time, alteration, or addition to the terms of the contract, or the work to be performed thereunder, or the plans and specifications shall in any wise affect its obligation on this bond, and it does hereby waive notice thereof.

Principal and Surety agree that if the Owner is required to engage the services of an attorney in connection with the enforcement of this bond, each shall pay Owner's reasonable attorney's fees incurred, with or without suit, in addition to the above sum.

Executed in four original counterparts on \_\_\_\_\_, 20\_\_

\_\_\_\_\_  
PRINCIPAL

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

(Seal if Corporation) Title: \_\_\_\_\_

(Attach Acknowledgment of Authorized Representative of Principal)

Any claims under this bond may be addressed to:

\_\_\_\_\_ (name and address of Surety)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (name and address of Surety's agent for service of process in California, if different from above)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (telephone number of Surety's agent in California)

(Attach Acknowledgment) \_\_\_\_\_  
SURETY

By: \_\_\_\_\_  
(Attorney-in-Fact)

**APPROVED:**

\_\_\_\_\_  
(Attorney for OWNER) Date

**NOTICE:**

No substitution or revision to this bond form will be accepted. Sureties must meet all requirements of Code of Civil Procedure Section 995.660(a). A certified copy of the Power of Attorney must be attached.

## PAYMENT BOND

We, \_\_\_\_\_ as Principal,  
and \_\_\_\_\_ as Surety, jointly and  
severally, bind ourselves, our heirs, representatives, successors and assigns, as set forth herein,  
to the

### OLIVENHAIN MUNICIPAL WATER DISTRICT

(herein called Owner) for payment of the penal sum of \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ Dollars (\$ \_\_\_\_\_),

lawful money of the United States. Owner has awarded Principal a contract for the construction of

### DAVID C. McCOLLOM WATER TREATMENT PLANT pH CONTROL SYSTEM PROJECT

If Principal or any of his subcontractors fails to pay any of the persons named in Section 3181 of the California Civil Code, or amounts due under the Unemployment Insurance Code with respect to work or labor performed under the contract or during the three-year guarantee period, or for any amounts required to be deducted, withheld, and paid over to the Franchise Tax Board from the wages of employees of the contractor and his subcontractors pursuant to Section 13020 of the Unemployment Insurance Code, with respect to such work and labor, then Surety will pay the same in an amount not exceeding the sum specified above, and also will pay, in case suit is brought upon this bond, such reasonable attorney's fees as shall be fixed by the court.

This bond shall inure to the benefit of any of the persons named in Section 3181 of the California Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Surety agrees that no change, extension of time, alteration, or addition to the terms of the contract, or the work to be performed thereunder, or the plans and specifications shall in any wise affect its obligation on this bond, and it does hereby waive notice thereof.

Principal and Surety agree that should Owner become a party to any action on this bond that, each will also pay Owner's reasonable attorney's fees incurred therein in addition to the sum above set forth.





**CONTRACTOR'S CERTIFICATE  
REGARDING WORKERS' COMPENSATION**

Name of Contract: **DAVID C. McCOLLOM WATER TREATMENT PLANT pH  
CONTROL SYSTEM PROJECT**

Name of Owner: **OLIVENHAIN MUNICIPAL WATER DISTRICT**

Labor Code Section 3700:

"Every employer except the State shall secure the payment of compensation in one or more of the following ways:

- (a) By being insured against liability to pay compensation in one or more insurers duly authorized to write compensation insurance in this State.
- (b) By securing from the Director of Industrial Relations a certificate of consent to self-insure, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his employees.
- (c) For all political subdivisions of the state, including each member of a pooling arrangement under a joint exercise of powers agreement (but not the state itself), by securing from the Director of Industrial Relations a certificate of consent to self-insure against workers' compensation claims, which certificate may be given upon furnishing proof satisfactory to the director of ability to administer workers' compensation claims that may become due to its employees. On or before March 31, 1979, a political subdivision of the state which, on December 31, 1978, was uninsured for its liability to pay compensation, shall file a properly completed and executed application for a certificate of consent to self-insure against workers' compensation claims. The certificate shall be issued and be subject to the provisions of Section 3702."

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.

Dated: \_\_\_\_\_, 20\_\_\_\_  
\_\_\_\_\_  
(Contractor)

By: \_\_\_\_\_  
(Authorized Representative of Contractor)

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

(Seal if Corporation)

(Labor Code Section 1861 provides that the above certificate must be signed and filed by the Contractor with the Owner prior to performing any work under this Contract.)

## CERTIFICATE OF INSURANCE

Name of Contract: **DAVID C. McCOLLOM WATER TREATMENT PLANT pH CONTROL SYSTEM PROJECT**

Name of Owner: **OLIVENHAIN MUNICIPAL WATER DISTRICT**

Type of Insurance: **WORKERS' COMPENSATION INSURANCE AND EMPLOYER'S LIABILITY INSURANCE**

**THIS IS TO CERTIFY** that the following policy has been issued by the below-stated company in conformance with the requirements of Articles 8-1 and 8-2 of the General Provisions and is in force at this time.

The Company will give at least 30 days' written notice by certified mail to the Owner and Engineer/Architect prior to any material change or cancellation of said policy.

<u>POLICY NUMBER</u>	<u>EXPIRATION DATE</u>	<u>TYPE OF INSURANCE</u>	<u>LIMITS OF LIABILITY</u>	
_____		<b>A. WORKERS' COMPENSATION</b>	Statutory Limits Under the Laws of the State of California	
_____		<b>B. EMPLOYER'S LIABILITY</b>	Each Employee	Each Accident
		Bodily Injury By Accident	\$	\$
		Bodily Injury By Disease	\$	\$

_____ Named Insured (Contractor)	_____ Insurance Company
_____ Street Number	_____ Street Number
_____ City and State	_____ City and State

By: \_\_\_\_\_  
(Company Representative)  
**(SEE NOTICE ON PAGE 2 OF 2)**

State of \_\_\_\_\_ )  
County of \_\_\_\_\_ ) ss.

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document

On \_\_\_\_\_ before me, \_\_\_\_\_  
Date Here Insert Name and Title of the Officer

Personally appeared \_\_\_\_\_  
Name(s) of Signer(s)

Who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal

\_\_\_\_\_  
NOTARY PUBLIC

Insurance Company Agent for Service  
of Process in California:

\_\_\_\_\_  
Name

\_\_\_\_\_  
Agency

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
City and State

\_\_\_\_\_  
City and State

\_\_\_\_\_  
Telephone Number

\_\_\_\_\_  
Telephone Number

This certificate or verification of insurance is not an insurance policy and does not amend, extend, or alter the coverage afforded by the policies listed herein. Notwithstanding any requirement, term, or condition of any contract or other document with respect to which this certificate or verification of insurance may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the terms, exclusions, and conditions of such policies.

**NOTICE:**

No substitution or revision to the above certificate form will be accepted. If the insurance called for is provided by more than one insurance company, a separate certificate in the exact above form shall be provided for each insurance company.

Insurers must be authorized to do business and have an agent for service of process in California, have an "A" policyholder's rating and a financial rating of at least Class VI in accordance with the most current rating by A.M. Best Company.

## INSURANCE ENDORSEMENT

Name of Contract: **DAVID C. McCOLLOM WATER TREATMENT PLANT pH CONTROL SYSTEM PROJECT**

Name of Owner: **OLIVENHAIN MUNICIPAL WATER DISTRICT**

Type of Insurance: **WORKERS' COMPENSATION INSURANCE AND EMPLOYER'S LIABILITY INSURANCE**

This endorsement forms a part of Policy No. \_\_\_\_\_.

### ENDORSEMENT:

It is agreed that with respect to such insurance as is afforded by the policy, the Company waives any right of subrogation it may acquire against the Owner, the Engineer/Architect, Olivenhain Municipal Water District, the Owner's Representative, and their consultants, and each of their directors, officers, employees, and agents by reason of any payment made on account of injury, including death resulting therefrom, sustained by any employee of the insured, arising out of the performance of the above-referenced contract.

This endorsement does not increase the Company's total limits of liability.

\_\_\_\_\_  
Named Insured (Contractor)

\_\_\_\_\_  
Insurance Company

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
City and State

\_\_\_\_\_  
City and State

By: \_\_\_\_\_  
(Company Representative)

**(SEE NOTICE ON PAGE 2 OF 2)**

State of \_\_\_\_\_ )  
County of \_\_\_\_\_ ) ss.

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document

On \_\_\_\_\_ before me, \_\_\_\_\_  
Date Here Insert Name and Title of the Officer

Personally appeared \_\_\_\_\_  
Name(s) of Signer(s)

Who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal

\_\_\_\_\_  
NOTARY PUBLIC

**NOTICE:**

No substitution or revision to the above endorsement form will be accepted. If the insurance called for is provided by more than one policy, a separate endorsement in the exact above form shall be provided for each policy.

Insurers must be authorized to do business and have an agent for service of process in California, have an "A" policyholder's rating and a financial rating of at least Class VI in accordance with the most current rating by A.M. Best Company.

## CERTIFICATE OF INSURANCE

Name of Contract: **DAVID C. McCOLLOM WATER TREATMENT PLANT pH CONTROL SYSTEM PROJECT**

Name of Owner: **OLIVENHAIN MUNICIPAL WATER DISTRICT**

Type of Insurance: **LIABILITY INSURANCE**

**THIS IS TO CERTIFY** that the following policies have been issued by the below-stated company in conformance with the requirements of Articles 8-1 and 8-3 of the General Provisions and are in force at this time. The policy shall be an occurrence policy with a deductible not to exceed \$5,000.

<u>POLICY NUMBER</u> <u>EXPIRATION DATE</u>	<u>TYPE OF INSURANCE</u>	<b>LIMITS OF LIABILITY</b> In Thousands (000)	
		Occurrence	Aggregate
_____	<b>A. GENERAL LIABILITY</b>		
	Bodily Injury, Personal Injury, and Property Damage Combined	\$	\$
_____	<b>B. EXCESS GENERAL LIABILITY</b>	\$	\$
_____	<b>C. AUTOMOBILE LIABILITY</b>		
	Bodily Injury and Property Damage Combined	\$	\$
_____	<b>D. EXCESS AUTOMOBILE LIABILITY</b>	\$	\$



The following types of coverage are included in said policies (indicate by "X" in space):

**A. GENERAL LIABILITY**

Comprehensive Form-----YES\_\_\_ NO\_\_\_

Premises-Operations -----YES\_\_\_ NO\_\_\_

Explosion and Collapse Hazard-----YES\_\_\_ NO\_\_\_

Underground Hazard -----YES\_\_\_ NO\_\_\_

Products/Completed Operations Hazard-----YES\_\_\_ NO\_\_\_

Contractual Insurance -----YES\_\_\_ NO\_\_\_

Broad Form Property Damage Including Completed Operations -----YES\_\_\_ NO\_\_\_

Independent Contractors -----YES\_\_\_ NO\_\_\_

Personal Injury -----YES\_\_\_ NO\_\_\_

**B. EXCESS GENERAL LIABILITY**

Umbrella Form-----YES\_\_\_ NO\_\_\_

Other Than Umbrella Form-----YES\_\_\_ NO\_\_\_

If other than Umbrella Form, please explain below:

**C. AUTOMOBILE LIABILITY**

Comprehensive Form Including Loading and Unloading-----YES\_\_\_ NO\_\_\_

Owned-----YES\_\_\_ NO\_\_\_

Hired -----YES\_\_\_ NO\_\_\_

Non-Owned -----YES\_\_\_ NO\_\_\_

**D. EXCESS AUTOMOBILE LIABILITY**

Umbrella Form-----YES\_\_\_ NO\_\_\_

Other Than Umbrella Form-----YES\_\_\_ NO\_\_\_

If other than Umbrella Form, please explain below:

This certificate or verification of insurance is not an insurance policy and does not amend, extend, or alter the coverage afforded by the policies listed herein. However, the insurance provided shall meet the requirements of the Contract Documents and include coverage as specified in this certificate.

The Company will give at least 30 days' written notice by certified mail to the Owner and the Engineer/Architect prior to any material change or cancellation of said policies.

\_\_\_\_\_  
Named Insured (Contractor)

\_\_\_\_\_  
Insurance Company

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
City and State

\_\_\_\_\_  
City and State

By: \_\_\_\_\_  
(Company Representative)

**(SEE NOTICE ON PAGE 5 OF 5)**

State of \_\_\_\_\_ )  
County of \_\_\_\_\_ ) ss.

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document

On \_\_\_\_\_ before me, \_\_\_\_\_  
Date Here Insert Name and Title of the Officer

Personally appeared \_\_\_\_\_  
Name(s) of Signer(s)

Who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the withing instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal

\_\_\_\_\_  
NOTARY PUBLIC

Insurance Company Agent for Service  
of Process in California:

\_\_\_\_\_  
Name

\_\_\_\_\_  
Agency

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
City and State

\_\_\_\_\_  
City and State

\_\_\_\_\_  
Telephone Number

\_\_\_\_\_  
Telephone Number

**NOTICE:**

No substitution or revision to the above certificate form will be accepted. if the insurance called for is provided by more than one insurance company, a separate certificate in the exact above form shall be provided for each insurance company.

Insurers must be authorized to do business and have an agent for service of process in California, have an "A" policyholder's rating and a financial rating of at least Class VI in accordance with the most current rating by A.M. Best Company.

## INSURANCE ENDORSEMENT

Name of Contract: **DAVID C. McCOLLOM WATER TREATMENT PLANT pH CONTROL SYSTEM PROJECT**

Name of Owner: **OLIVENHAIN MUNICIPAL WATER DISTRICT**

Type of Insurance: **LIABILITY INSURANCE**

This endorsement forms a part of Policy No. \_\_\_\_\_.

### ENDORSEMENT:

The Owner, the Engineer/Architect, Olivenhain Municipal Water District, the Owner's Representative, and their consultants, and each of their directors, officers, employees, and agents are included as additional insureds under said policies but only while acting in their capacity as such and only as respects operations of the named insured, his contractors, any subcontractor, any supplier, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable in the performance of the above-referenced contract. This insurance shall not apply if the loss or damage is ultimately determined to be the result of the sole and exclusive negligence (including any connected with the preparation or approval of maps, drawings, opinions, reports, surveys, designs, or specifications) of one or more of the aforesaid additional insureds. The insurance afforded to these additional insureds is primary insurance. If the additional insureds have other insurance which might be applicable to any loss, the amount of this insurance shall not be reduced or prorated by the existence of such other insurance.

The Contractual Liability Insurance afforded is sufficiently broad to insure all of the matters set forth in the article entitled "Indemnity" in the General Provisions of the above-referenced contract except those matters set forth in the third paragraph thereof.

This endorsement does not increase the Company's total limits of liability.

\_\_\_\_\_  
Named Insured (Contractor)

\_\_\_\_\_  
Insurance Company

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
City and State

\_\_\_\_\_  
City and State

By: \_\_\_\_\_  
(Company Representative)

**(SEE NOTICE ON PAGE 2 OF 2)**

State of \_\_\_\_\_ )  
County of \_\_\_\_\_ ) ss.

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document

On \_\_\_\_\_ before me, \_\_\_\_\_  
Date Here Insert Name and Title of the Officer

Personally appeared \_\_\_\_\_  
Name(s) of Signer(s)

Who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal

\_\_\_\_\_  
NOTARY PUBLIC

**NOTICE:**

No substitution or revision to the above endorsement form will be accepted. If the insurance called for is provided by more than one policy, a separate endorsement in the exact form shall be provided for each policy.

Insurers must be authorized to do business and have an agent for service of process in California, have an "A" policyholder's rating and a financial rating of at least Class VI in accordance with the most current rating by A.M. Best Company.

## CERTIFICATE OF INSURANCE

Name of Contract:           **DAVID C. McCOLLOM WATER TREATMENT PLANT pH  
CONTROL SYSTEM PROJECT**

Name of Owner:             **OLIVENHAIN MUNICIPAL WATER DISTRICT**

Type of Insurance:         **BUILDERS' RISK "ALL RISK" INSURANCE**

**THIS IS TO CERTIFY** that the following policy has been issued by the below-stated company in conformance with the requirements of Articles 8-1 and 8-4 of the General Provisions and is in force at this time:

<b>POLICY NUMBER</b>	<b>EXPIRATION DATE</b>	<b>LIMITS OF LIABILITY</b>
		\$
		(Not Less Than Contract Amount)
		Deductible:
		\$
	(Not Sooner Than Contract Completion Date)	(Not More Than \$100,000)

This certificate or verification of insurance is not an insurance policy and does not amend, extend, or alter the coverage afforded by the policies listed herein. Notwithstanding any requirement, term, or condition of any contract or other document with respect to which this certificate or verification of insurance may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the terms, exclusions, and conditions of such policies.

The Company will give at least 30 days' written notice by certified mail to the Owner and the Engineer/Architect prior to any material change or cancellation of said policy.

\_\_\_\_\_  
Named Insured (Contractor)

\_\_\_\_\_  
Insurance Company

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
City and State

\_\_\_\_\_  
City and State

By: \_\_\_\_\_  
(Company Representative)

**(SEE NOTICE ON PAGE 4 OF 4)**



State of \_\_\_\_\_ )  
County of \_\_\_\_\_ ) ss.

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document

On \_\_\_\_\_ before me, \_\_\_\_\_  
Date Here Insert Name and Title of the Officer

Personally appeared \_\_\_\_\_  
Name(s) of Signer(s)

Who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the withing instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal

\_\_\_\_\_

Insurance Company Agent for Service  
of Process in California:

\_\_\_\_\_  
Name

\_\_\_\_\_  
Agency

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
City and State

\_\_\_\_\_  
City and State

\_\_\_\_\_  
Telephone Number

\_\_\_\_\_  
Telephone Number

**NOTICE:**

No substitution or revision to the above certificate form will be accepted. If the insurance called for is provided by more than one insurance company, a separate certificate in the exact above form shall be provided for each insurance company.

Insurers must be authorized to do business and have an agent for service of process in California, have an "A" policyholder's rating and a financial rating of at least Class VI in accordance with the most current rating by A.M. Best Company.

## INSURANCE ENDORSEMENT

Name of Contract: **DAVID C. McCOLLOM WATER TREATMENT PLANT pH CONTROL SYSTEM PROJECT**

Name of Owner: **OLIVENHAIN MUNICIPAL WATER DISTRICT**

Type of Insurance: **BUILDERS' RISK "ALL RISK" INSURANCE**

This endorsement forms a part of Policy No. \_\_\_\_\_.

### ENDORSEMENT:

The Owner, the Engineer/Architect, Olivenhain Municipal Water District, the Owner's Representative, and their consultants, and each of their directors, officers, employees, and agents are included as additional insureds under said policy but only while acting in their capacity as such with respect to the above-referenced contract.

The insurance afforded to these additional insureds is primary insurance. If the additional insureds have other insurance which might be applicable to any loss, the amount of this insurance shall not be reduced or prorated by the existence of such other insurance.

This endorsement does not increase the Company's total limits of liability.

\_\_\_\_\_  
Named Insured (Contractor)

\_\_\_\_\_  
Insurance Company

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
Street Number

\_\_\_\_\_  
City and State

\_\_\_\_\_  
City and State

By: \_\_\_\_\_  
(Company Representative)

**(SEE NOTICE ON PAGE 2 OF 2)**

State of \_\_\_\_\_ )  
County of \_\_\_\_\_ ) ss.

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document

On \_\_\_\_\_ before me, \_\_\_\_\_  
Date Here Insert Name and Title of the Officer

Personally appeared \_\_\_\_\_  
Name(s) of Signer(s)

Who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal

\_\_\_\_\_  
NOTARY PUBLIC

**NOTICE:**

No substitution or revision to the above endorsement form will be accepted. If the insurance called for is provided by more than one policy, a separate endorsement in the exact above form shall be provided for each policy.

Insurers must be authorized to do business and have an agent for service of process in California, have an "A" policyholder's rating and a financial rating of at least Class VI in accordance with the most current rating by A.M. Best Company.

**TABLE OF CONTENTS  
GENERAL PROVISIONS**

<b>SECTION</b>	<b>ARTICLE</b>	<b>PAGE</b>
<b>1</b>	<b>DEFINITIONS, TERMS, AND ABBREVIATIONS-----</b>	<b>1</b>
	1-1 DEFINITIONS-----	1
	1-2 TERMS -----	2
	1-3 ABBREVIATIONS-----	2
<b>2</b>	<b>PROPOSAL REQUIREMENTS AND CONDITIONS-----</b>	<b>2</b>
	2-1 CONTRACT DOCUMENTS -----	2
	2-2 LICENSE AND BIDDER'S EXPERIENCE -----	3
	2-3 PROPOSALS -----	3
	2-4 WITHDRAWAL OF BID-----	4
	2-5 BIDDERS INTERESTED IN MORE THAN ONE BID -----	4
	2-6 INTERPRETATION OF PLANS AND OTHER CONTRACT DOCUMENTS -----	4
	2-7 ADDENDA -----	4
	2-8 EXISTING CONDITIONS AND EXAMINATION OF CONTRACT DOCUMENTS -----	4
<b>3</b>	<b>AWARD AND EXECUTION OF CONTRACT-----</b>	<b>5</b>
	3-1 AWARD OF CONTRACT OR REJECTION OF BIDS-----	5
	3-2 EXECUTION OF CONTRACT -----	6
	3-3 BONDS-----	6
	3-4 INSURANCE REQUIREMENTS -----	7
	3-5 FAILURE TO EXECUTE CONTRACT -----	7
<b>4</b>	<b>SCOPE OF WORK -----</b>	<b>7</b>
	4-1 WORK TO BE DONE -----	7
	4-2 CHANGES IN THE WORK -----	7
	4-3 OBSTRUCTIONS-----	8
	4-4 UTILITIES-----	8
	4-5 PLANS AND SPECIFICATIONS FURNISHED BY THE OWNER-----	9
	4-6 FINAL CLEANUP -----	9
<b>5</b>	<b>QUALITY OF THE WORK -----</b>	<b>9</b>
	5-1 AUTHORITY OF THE OWNER'S REPRESENTATIVE-----	9
	5-2 SUPPLEMENTAL DRAWINGS-----	10
	5-3 CONFORMITY WITH CONTRACT DOCUMENTS AND ALLOWABLE DEVIATIONS -----	10
	5-4 MANUFACTURER'S INSTRUCTIONS -----	10
	5-5 COORDINATION OF PLANS AND SPECIFICATIONS -----	10
	5-6 INTERPRETATION OF PLANS AND SPECIFICATIONS-----	10

SECTION	ARTICLE	PAGE
	5-7 ERRORS OR DISCREPANCIES NOTED BY CONTRACTOR-----	11
	5-8 SUPERVISION AND SUPERINTENDENCE -----	11
	5-9 SHOP DRAWINGS -----	12
	5-10 QUALITY AND SAFETY OF MATERIALS AND EQUIPMENT -----	13
	5-11 STANDARDS, CODES, SAMPLES, AND TESTS -----	14
	5-12 OBSERVATION OF WORK BY OWNER'S REPRESENTATIVE -----	14
	5-13 REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK -----	15
	5-14 TWO-YEAR GUARANTEE -----	15
<b>6</b>	<b>PROSECUTION AND PROGRESS -----</b>	<b>16</b>
	6-1 CONTRACTOR'S LIABILITY-----	16
	6-2 ASSIGNMENT -----	17
	6-3 CONTRACTOR'S CONSTRUCTION SCHEDULE AND COST BREAKDOWN -----	17
	6-4 TIME FOR COMPLETION AND FORFEITURE DUE TO DELAY-----	17
	6-5 EXTENSION OF TIME-----	18
	6-6 USE OF COMPLETED PORTIONS -----	19
<b>7</b>	<b>LEGAL RELATIONS AND RESPONSIBILITIES -----</b>	<b>19</b>
	7-1 OBSERVING LAWS AND ORDINANCES -----	19
	7-2 PERMITS AND LICENSES-----	19
	7-3 INVENTIONS, PATENTS AND COPYRIGHTS-----	20
	7-4 PUBLIC CONVENIENCE AND SAFETY-----	20
	7-5 RESPONSIBILITY FOR LOSS, DAMAGE, OR INJURIES-----	21
	7-6 CONTRACTOR'S RESPONSIBILITY FOR THE WORK -----	22
	7-7 PRESERVATION OF PROPERTY -----	23
	7-8 REGIONAL NOTIFICATION CENTER CONTACT -----	23
	7-9 EXCAVATION PLANS FOR WORKER PROTECTION REQUIRED BY LABOR CODE SECTION 6705-----	24
	7-10 SAFETY -----	25
	7-11 PERSONAL LIABILITY -----	25
	7-12 DEFENSE AND INDEMNITY -----	25
	7-13 HOURS OF LABOR-----	26
	7-14 PREVAILING WAGE -----	26
	7-15 TRAVEL AND SUBSISTENCE PAYMENTS -----	27
	7-16 APPRENTICES-----	27
	7-17 WARRANTY OF TITLE-----	27
	7-18 PROPERTY RIGHTS IN MATERIALS-----	28
	7-19 MUTUAL RESPONSIBILITY OF CONTRACTORS-----	28
	7-20 TERMINATION FOR BREACH -----	29
	7-21 NOTICE AND SERVICE THEREOF -----	30
	7-22 PARTIAL INVALIDITY -----	30

SECTION	ARTICLE	PAGE
	7-23 ATTORNEYS' FEES -----	30
	7-24 LANDS AND RIGHTS-OF-WAY-----	31
	7-25 NO WAIVER OF RIGHTS OR REMEDIES-----	31
	7-26 TAXES-----	31
	7-27 ASSIGNMENT OF ANTI-TRUST ACTIONS-----	32
	7-28 PAYROLL RECORDS -----	32
	7-29 MODIFICATION-----	33
	7-30 JURISDICTION AND VENUE-----	33
	7-31 HAZARDOUS WASTE-----	33
	7-32 EXCAVATIONS BELOW FOUR (4) FEET -----	34
	7-33 ARBITRATION-----	34
<b>8</b>	<b>CONTRACTOR'S INSURANCE-----</b>	<b>35</b>
	8-1 GENERAL -----	35
	8-2 WORKERS' COMPENSATION INSURANCE AND EMPLOYER'S LIABILITY INSURANCE -----	35
	8-3 LIABILITY INSURANCE-----	35
	8-4 BUILDERS' RISK "ALL RISK" INSURANCE -----	36
	8-5 CONTRACTOR'S LIABILITY NOT LIMITED BY INSURANCE -----	36
<b>9</b>	<b>ESTIMATES AND PAYMENTS -----</b>	<b>37</b>
	9-1 PAYMENT FOR CHANGES IN THE WORK -----	37
	9-2 PROGRESS PAYMENTS-----	38
	9-3 FINAL ESTIMATE AND PAYMENT -----	39
	9-4 OWNER'S RIGHT TO WITHHOLD CERTAIN AMOUNTS AND MAKE APPLICATION THEREOF-----	39
	9-5 WITHHELD CONTRACT FUNDS-----	40
	9-6 REQUIRED RELEASES -----	41
<b>10</b>	<b>AUTHORITY AND STATUS OF OWNERS REPRESENTATIVES-----</b>	<b>41</b>
	10-1 STATUS OF OWNERS REPRESENTATIVES-----	41
	10-2 AUTHORITY OF OWNERS REPRESENTATIVES-----	41
<b>11</b>	<b>FORMS -----</b>	<b>42</b>
	11-1 APPROVED MATERIALS LIST SUBMITAL-----	42
	11-2 SHOP DRAWING SUBMITTAL FORM -----	42
	11-3 PROGRESS ESTIMATE AND PAYMENT FORM -----	42
	11-4 RELEASE FORM -----	42

## **GENERAL PROVISIONS**

### **SECTION 1 DEFINITIONS, TERMS, AND ABBREVIATIONS**

#### **1-1 DEFINITIONS**

Whenever the following terms occur in the Contract Documents, the meaning shall be interpreted as follows:

**ACCEPTANCE, FINAL ACCEPTANCE** - The formal action by the Owner accepting the work as being complete.

**ACCEPTED BID** - The bid (proposal) accepted by the Owner.

**ATTORNEY FOR OWNER** – Alfred E. Smith, Nossaman, LLP, 777 S. Figueroa Street, 34<sup>th</sup> Floor, Los Angeles, CA. 90017, (213) 612-7831

**BIDDER** - Any individual, partnership, corporation, joint venture, or other combination thereof submitting a proposal for the work contemplated, acting directly or through an authorized representative.

**CALENDAR DAY** - Means all days of the week including Saturdays, Sundays and Holidays with the first day counted being the first day following the date specified.

**CONTRACT** - The written agreement executed between the Owner and the Contractor covering the performance of the work.

**CONTRACTOR** - The individual, partnership, corporation, joint venture, or other combination thereof who has entered into the contract with the Owner for the performance of the work. The term "Contractor" means the Contractor or his authorized representative.

**CONTRACT DOCUMENTS** - The Contract Documents set forth in the Agreement; also any and all supplemental agreements amending or extending the work contemplated. Supplemental agreements are written agreements covering alterations, amendments, or extensions to the contract and include contract change orders.

**DAYS** - Unless otherwise specified, days shall mean calendar days.

**ENGINEER/ARCHITECT** – The term "Engineer/Architect" means the Engineer/Architect or his authorized representative.

**OWNER** - The public entity identified as such in the Agreement. The term "Owner" means the Owner or his authorized representative.

**OWNER'S REPRESENTATIVE** - The person or firm authorized by the Owner to represent it during the performance of the work by the Contractor. The term "Owner's Representative" means the Owner's Representative or his assistants.

**PLANS, DRAWINGS** - The Plans (drawings), or reproductions thereof, which show the location, character, dimensions, and details of the work to be done.



**SPECIAL PROVISIONS** - Additions, deletions, and changes to the General Provisions and Standard Specifications.

**SPECIFICATIONS** - The directions, provisions, and requirements contained in the General Provisions and Standard Specifications as supplemented by the Special Provisions.

**STANDARD SPECIFICATIONS** - The Contract Documents identified or referenced as such.

**SUBCONTRACTOR** - An individual, partnership, corporation, joint venture, or other combination thereof who has a contract with the Contractor to perform any of the work at the site. Subcontractor also means an individual, partnership, corporation, joint venture, or other combination thereof who has a contract with another subcontractor to perform any of the work at the site.

**STANDARD DRAWINGS, STANDARD PLANS** - That portion of the Plans identified or referenced as such.

**UTILITY** - Public or private fixed works for the transportation of fluids, gases, power, signals, or communications.

**WORK** - Any and all obligations, duties, and responsibilities necessary to complete the construction assigned to, or undertaken by, the Contractor pursuant to the Contract Documents including all materials, equipment, and supplies incorporated or to be incorporated in the construction. Also, the completed construction or parts thereof required to be provided under the Contract Documents.

## 1-2 TERMS

Wherever the terms "required," "permitted," "ordered," "designated," "directed," "prescribed," or terms of like import are used, it shall be understood that the requirements, permission, order, designation, direction, or prescription of the Owner's Representative is intended. Similarly, the terms "acceptable," "satisfactory," "or equal," or terms of like import shall mean acceptable to or satisfactory to the Owner's Representative, unless otherwise expressly stated. The word "provide" shall be understood to mean furnish and install.

## 1-3 ABBREVIATIONS

Wherever abbreviations are used, they shall have the meanings as set forth in the Special Provisions.

# SECTION 2 PROPOSAL REQUIREMENTS AND CONDITIONS

## 2-1 CONTRACT DOCUMENTS

The Contract Documents are set forth in the Agreement form and the definition of "Contract Documents" is in Article 1-1 DEFINITIONS.

## 2-2 LICENSE AND BIDDER'S EXPERIENCE

No bid will be accepted from a bidder who is not licensed to conduct business in the state of California and licensed to perform the class of work defined by the Contract Documents. All bidders shall complete the Bidder's Experience form as part of their bid. Bidders failing to complete and submit the Bidder's Experience form with their bid may be treated as nonresponsive at the option of the Owner. Bidders unable to demonstrate five (5) years of successful prior experience performing the type and magnitude of work required by this contract may also be rejected as nonresponsive.

## 2-3 PROPOSALS

Bids shall be made upon the Bid Form furnished by the Owner and a part of the Contract Documents. The Bid Form Checklist, Bid Form and Bid Bond must be submitted with the bid. All bids shall be properly executed and with all items filled in; the signatures of all persons signing shall be in longhand. Erasures, interlineations, or other corrections shall be authenticated by affixing in the margin immediately opposite the correction the initials of a person signing the bid. Written amounts shall govern in case of discrepancy between the amounts stated in writing and the amounts stated in figures. If the unit price and the total amount named by a bidder for any item are not in agreement, the unit price alone shall be considered as representing the bidder's intention, and the totals shall be corrected to conform thereto.

Bids shall not contain any recapitulation of the work to be done. Alternative proposals will not be considered, except as called for. No oral, telegraphic, or telephonic proposals or modifications will be considered.

Bids shall be accompanied by a "Proposal Guarantee" in the form of a cashier's check, a certified check, or bidder's bond executed by an admitted surety insurer, in an amount not less than 10% of the amount of bid, and made payable to or for the benefit of the Owner. Said check, or bond shall be given as a guarantee that the bidder will enter into a contract and furnish the required bonds or substitutes and insurance certificates and endorsements if awarded the contract, and in case of refusal or failure to enter into said contract and furnish the required bonds or substitutes and insurance certificates and endorsements within 15 calendar days after notice of award by the Owner in writing, the cash or the check and the money represented by said check shall be forfeited to the Owner, or in the event that a bond is deposited, said security shall be forfeited. Forfeiture does not preclude the Owner from seeking all other remedies provided by law to recover losses sustained as a result of the Contractor's failure to enter into the contract or to furnish the required bonds or insurance certificates and endorsements.

Bids shall be sealed in an envelope marked and addressed as set forth in the Special Provisions. Bids shall be delivered to personnel of the Owner at the location designated in the Notice Inviting Sealed Proposals (Bids) on or before the day and hour set for the opening of bids. Bids not marked as being received by personnel of the Owner on or before the day and hour of bid opening will be rejected. It is the responsibility of the bidder to ensure that the bid is received by personnel of the Owner on or before the day and hour of bid opening.

## 2-4 WITHDRAWAL OF BID

A bidder may withdraw his bid by a signed written request any time prior to the day and hour for receiving bids designated in the Notice Inviting Sealed Proposals. Thereafter the Bid may be

withdrawn only as permitted in accordance with Public Contract Code Section 5100, et seq., regarding relief of Bidders.

The withdrawal of a bid does not prejudice the right of a bidder to file a new bid so long as the new bid is delivered as set forth in Article 2-3 PROPOSALS prior to the closing time specified for all bids.

## 2-5 BIDDERS INTERESTED IN MORE THAN ONE BID

No person, partnership, or corporation shall be allowed to make or file, or be interested in more than one bid for the work, unless alternative bids are called for. A person, partnership, or corporation submitting a subproposal to a bidder, or who has quoted prices on material to a bidder, is not thereby disqualified from submitting a subproposal or quoting prices to other bidders.

## 2-6 INTERPRETATION OF PLANS AND OTHER CONTRACT DOCUMENTS

If any person or entity contemplating submitting a bid for the proposed contract is in doubt as to the true meaning of any part of the Plans, Specifications, or other Contract Documents, or finds discrepancies in, or omissions from the Plans and Specifications or other Contract Documents, he may submit to the Owner a written request for an interpretation or correction thereof. The person submitting the request will be responsible for its prompt delivery prior to the last date/time noticed for prebid questions as stipulated in the Notice Inviting Sealed Proposals (Bids). An interpretation or correction of the Contract Documents will be made only by Addendum duly issued by the Owner. Notice of the availability of such Addendum will be electronically delivered (email) to each person or entity that has received a set of such documents. The Owner and the Engineer/Architect will not be responsible for any other explanation or interpretation of the documents.

## 2-7 ADDENDA

Addenda issued before the time in which to submit bids expires shall be included in the bid and shall be made a part of the contract.

## 2-8 EXISTING CONDITIONS AND EXAMINATION OF CONTRACT DOCUMENTS

The bidder represents that he has carefully examined the Contract Documents and the site where the work is to be performed and that they have familiarized themselves with all local conditions and federal, state and local laws, ordinances, rules, and regulations that may affect in any manner the performance of the work. The bidder further represents that they have studied all surveys and investigation reports about subsurface and latent physical conditions pertaining to the jobsite, that they have performed such additional surveys and investigations as they deem necessary to complete the work at their bid price, and that they have correlated the results of all such data with the requirements of the Contract Documents. The submittal of a bid shall be conclusive evidence that the bidder has investigated and is satisfied as to the conditions to be encountered, including locality, uncertainty of weather and all other contingencies, and as to the character, quality, quantities, and scope of the work.

The Plans and Specifications for the work show subsurface conditions or otherwise hidden conditions as they are supposed or believed by the Engineer/Architect to exist; but it is not intended or to be inferred that the conditions as shown thereon constitute a representation that such conditions are actually existent. Except as otherwise specifically provided in the Contract Documents, the Owner, the Engineer/Architect, and their consultants shall not be liable for any

loss sustained by the Contractor as a result of any variance of such conditions as shown on the Plans and the actual conditions revealed during the progress of the work or otherwise.

Where the Owner or the Engineer/Architect or their consultants have made investigations of subsurface conditions in areas where the work is to be performed, such investigations were made only for the purpose of study and design. The conditions indicated by such investigations apply only at the specific location of each boring or excavation at the time the borings or excavations were made. Where such investigations have been made, bidders or Contractors may inspect the records as to such investigations subject to and upon the conditions hereinafter set forth. The inspection of the records shall be made at the office of the Engineer/Architect.

The records of such investigations are not a part of the contract and are shown solely for the convenience of the bidder or Contractor. It is expressly understood and agreed that the Owner, the Engineer/Architect, and their consultants assume no responsibility whatsoever in respect to the sufficiency or accuracy of the investigations; the records thereof; or of the interpretations set forth therein or made by the Owner's consultants, the Engineer/Architect or his consultants in the use thereof by the Engineer/Architect, and there is no warranty or guarantee, either express or implied, that the conditions indicated by such investigations or records thereof are representative of those existing throughout such areas, or any part thereof, or that unlooked-for developments may not occur, or that materials other than, or in proportions, densities, or other characteristics different from, those indicated may not be encountered.

When a log of test borings showing a record of the data obtained by the investigation of subsurface conditions by the Owner, the Engineer/Architect, or their consultants is included with the Plans or other documents, it is expressly understood and agreed that said log of test borings does not constitute a part of the contract, represents only the opinion of the Owner or the Engineer/Architect or their consultants as to the character of the materials encountered by them in the test borings, is included in the Plans or other documents only for the convenience of bidders, and its use is subject to all of the conditions and limitations set forth in this article.

The availability or use of information described in this article is not to be construed in any way as a waiver of the provisions of the first paragraph in this article and a bidder or Contractor is cautioned to make such independent investigations and examination as he deems necessary to satisfy himself as to conditions to be encountered in the performance of the work.

No information derived from such inspection of records of investigations or compilation thereof made by the Owner, the Engineer/Architect, or their consultants will in any way relieve the bidder or Contractor from any risk or from properly fulfilling the terms of the contract nor entitle the Contractor to any additional compensation.

### **SECTION 3    AWARD AND EXECUTION OF CONTRACT**

#### **3-1     AWARD OF CONTRACT OR REJECTION OF BIDS**

The award of the contract, if it be awarded, will be to the lowest responsible responsive bidder complying with the instructions contained in the Contract Documents. The Owner, however, reserves the right to select the schedules under which the bids are to be compared; to delete certain bid items from the Bid Schedule, to reject any and all bids, and to waive any irregularity in bids received. If, in the judgment of the Owner, a bid is unbalanced or if the bidder is not responsible, it shall be considered sufficient grounds for rejection of the entire bid.

The Owner shall have the period of time set forth in the Special Provisions after the opening of bids within which to accept or reject the bids. No bidder may withdraw his bid during said period. The Owner will return the proposal guarantees, except any guarantees which have been forfeited, and except bidders' bonds, to the respective bidders whose proposals they accompanied after the execution of the contract by the successful bidder or rejection of all bids or upon receipt of a written request therefor received after said period of time set forth in the Special Provisions. The proposal guarantee of the unsuccessful bidders will be returned by the Owner no later than 60 calendar days following the date of award of contract.

Before award of the contract, any bidder shall furnish upon request, proof of required insurance, a recent statement of his financial condition, and previous construction experience or such other evidence of his qualifications as may be requested by the Owner. If a bidder fails to furnish in a timely manner the information requested, it shall be considered sufficient grounds for rejection of such bidder's entire bid.

### 3-2 EXECUTION OF CONTRACT

The form of agreement, bonds, and other documents which the successful bidder, as Contractor, will be required to execute are included as a part of the Contract Documents.

The contract shall be signed by the successful bidder and returned to the Owner, together with the bonds or substitutes and insurance certificates and endorsements, within 15 calendar days or such additional time as may be allowed by the Owner from the date of the mailing of notice from the Owner to the bidder or from the date of personal delivery of notice from the Owner to the bidder that the agreement is ready for signature. The agreement, bonds or substitutes, insurance certificates and endorsements, and other documents to be executed by the Contractor shall be executed in original-triplicate, one each of which shall be filed with the Owner and one each with the Attorney for the Owner and the Contractor.

### 3-3 BONDS

The successful bidder, simultaneously with execution of the Contract Documents, shall either furnish a Payment Bond and Performance Bond each in an amount equal to 100% of the contract amount, or equivalent cash or securities in lieu of these bonds in accordance with Code of Civil Procedure Section 995.710. The failure of Contractor to make a written request to Owner to use alternative securities meeting the requirements of Code of Civil Procedure Section 995.710 at the time the Contract Documents are signed shall be deemed a waiver of the right of Contractor to subsequently substitute these alternative securities. Alternative securities proposed by the Contractor shall be subject to review and approval by Owner. Contractor agrees to provide Owner with a deposit in a sum determined adequate by the Owner to cover all attorney's fees and all other fees, costs, and expenses incurred by the Owner in reviewing Contractor's request to use alternative securities in lieu of the required bonds and to prepare all agreements determined necessary by Owner to adequately protect Owner's interest. Performance and Payment Bonds shall be furnished by surety companies meeting the requirements of Code of Civil Procedure Section 995.660(a) and shall be completed on the forms furnished as part of the Contract Documents. Surety companies, to be acceptable to Owner, must meet all requirements of Code of Civil Procedure Section 995.660(a).

If at any time a surety on any such bond fails to comply with Code of Civil Procedure Section 995.660(a), the Contractor shall, within 10 calendar days after notice from the Owner, substitute new bonds with surety companies meeting all requirements of Code of Civil Procedure Section

995.660(a). All premiums on these new bonds shall be paid solely by the Contractor. No further progress payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished new bonds to Owner meeting all requirements of Code of Civil Procedure Section 995.660(a).

The Performance Bond and the Payment Bond, or alternative securities meeting the requirements of Code of Civil Procedure Section 995.710 approved by the Owner, must remain in full effect throughout the period of the Work and for a period of two-year thereafter as required by Article 5-14 TWO-YEAR GUARANTEE.

### 3-4 INSURANCE REQUIREMENTS

The successful bidder will be required to furnish the Owner proof of full compliance with all insurance requirements as specified in SECTION 8 CONTRACTOR'S INSURANCE. The forms of Certificate of Insurance and Endorsement which the successful bidder, as Contractor, will be required to furnish are included as a part of the Contract Documents.

### 3-5 FAILURE TO EXECUTE CONTRACT

Failure by a bidder to whom the contract is awarded to execute the contract or to furnish the required bonds or insurance certificates and endorsements within the period of time required by Section 3-2 Execution of Contract shall be just cause for the annulment of the award and the forfeiture of the proposal guarantee.

A bidder who is awarded the contract and fails to execute the contract or furnish the required bonds or substitutes, or insurance certificates and endorsements shall be liable to the Owner for all damages resulting therefrom including reasonable attorneys' fees. The proposal guarantee forfeited shall not be a limitation thereon.

## SECTION 4 SCOPE OF WORK

### 4-1 WORK TO BE DONE

The work to be done consists of furnishing all transportation, labor, materials, tools, equipment, services, permits, utilities and all other items which are necessary or appurtenant to construct and complete the entire project and construct the project designated in the Contract Documents, and to leave the grounds in a neat and presentable condition.

### 4-2 CHANGES IN THE WORK

The Owner may require changes in, additions to, or deductions from the work, including complete termination thereof. Adjustment, if any, in the amounts to be paid to the Contractor by reason of any such change, addition, or deduction shall be determined as set forth in SECTION 9 ESTIMATES AND PAYMENTS.

The Owner's Representative may order minor changes in the work not involving an increase or decrease in the contract amount, not involving a change in the time for completion, and not inconsistent with the purposes for which the work is being constructed. **If the Contractor believes that any order for minor changes in the work for which the contract amount or time for completion should be changed, he shall not proceed with the changes in the work so ordered and shall within seven calendar days of the receipt of such order notify the**

**Owner's Representative in writing of his estimate of the changes in the contract amount and time for completion he believes to be appropriate.**

No payment for changes in the work will be made and no changes in the time for completion by reason of changes in the work will be made, unless the changes are covered by a written change order approved by the Owner in advance of the Contractor's proceeding with the changed work.

#### **4-3 OBSTRUCTIONS**

The Contractor shall remove and dispose of all structures, debris, or other obstructions of any character necessary to accommodate the work. Where such obstructions consist of improvements not required by law to be removed by the owner thereof, all such improvements shall be removed, maintained, and permanently replaced by the Contractor at his expense except as otherwise specifically provided in the Contract Documents.

#### **4-4 UTILITIES**

The Engineer/Architect has endeavored to determine the existence of utilities at the site of the work from the records of the owners of known utilities in the vicinity of the work. The positions of these utilities as derived from such records are shown on the Plans. The service connections to these utilities are not shown on the Plans.

The Contractor shall make his own investigations, including exploratory excavations, to determine the locations and type of existing service laterals or appurtenances when their presence can be inferred from the presence of other visible facilities, such as buildings, meter and junction boxes, on or adjacent to the site of the work. If the Contractor discovers utility facilities not identified in the Plans or Specifications or in a position different from that shown in the Plans and Specifications, he shall immediately notify in writing the Owner's Representative and the owner of the utility facility.

The Owner shall have the responsibility for the timely removal, relocation, protection, and temporary maintenance of existing main or trunkline utility facilities which are not indicated in the Plans and Specifications with reasonable accuracy.

In case it should be necessary to remove, relocate, protect, or temporarily maintain a utility because of interference with the work, the work on such utility shall be performed and paid for as follows:

When it is necessary to remove, relocate, protect, or temporarily maintain an existing main or trunkline utility facility not indicated in the Plans and Specifications with reasonable accuracy, the Owner will compensate the Contractor for the costs of locating, for the costs of repairing damage not due to the failure of the Contractor to exercise reasonable care, for the costs of removing, relocating, protecting, or temporarily maintaining such utility facilities, and for the costs for equipment on the site necessarily idled during such work. These costs, the work to be done by the Contractor in locating, removing, relocating, protecting, or temporarily maintaining such utility facilities shall be covered by a written change order conforming to the provisions of Article 4-2 CHANGES IN THE WORK and Article 9-1 PAYMENT FOR CHANGES IN THE WORK. The Owner may make changes in the alignment and grade of the work to obviate the necessity to remove, relocate, protect, or temporarily maintain such utility facilities or to reduce the costs of the work involved in removing, relocating, protecting, or temporarily maintaining such utility facilities. Changes

in alignment and grade will be ordered in accordance with Article 4-2 CHANGES IN THE WORK.

When it is necessary to remove, relocate, protect, or temporarily maintain a utility (other than [1] existing main or trunkline utility facilities not indicated in the Plans and Specifications with reasonable accuracy, or [2] existing service laterals or appurtenances when their presence cannot be inferred from the presence of other visible facilities, such as buildings, meter and junction boxes, on or adjacent to the site of the work) the cost of which is not required to be borne by the owner thereof, the Contractor shall bear all expenses incidental to the work on the utility or damage thereto. The work on the utility shall be done in a manner satisfactory to the owner thereof; it being understood that the owner of the utility has the option of doing such work with his own forces, or permitting the work to be done by the Contractor. No representations are made that the obligations to remove, relocate, protect, or temporarily maintain any utility and to pay the cost thereof is or is not required to be borne by the owner of such utility, and it shall be the responsibility of the Contractor to investigate to find out whether or not said cost is required to be borne by the owner of the utility.

The right is reserved to governmental agencies and to owners of utilities to enter at any time upon any street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the work and for the purpose of maintaining and making repairs to their property.

#### **4-5 PLANS AND SPECIFICATIONS FURNISHED BY THE OWNER**

The Owner will furnish to the Contractor free of charge up to five (5) full size copies of Plans and Specifications reasonably necessary for the execution of the work. The Contractor shall keep one set of Plans and Specifications in good order with red line changes available to the Owner's Representative at the site of the work.

#### **4-6 FINAL CLEANUP**

Upon completion and before making application for acceptance of the work, the Contractor shall clean all rights-of-way, streets, borrow pits, and all other grounds occupied by him in connection with the work of all rubbish, excess materials, temporary structures, and equipment, and all parts of the work and grounds occupied by him shall be left in a neat and presentable condition.

### **SECTION 5 QUALITY OF THE WORK**

#### **5-1 AUTHORITY OF THE OWNER'S REPRESENTATIVE**

The Owner's Representative shall decide any and all questions which may arise as to the interpretation of the Plans and Specifications and shall have authority to disapprove or reject materials and equipment furnished and work performed which, in his opinion, is not in accordance with the Contract Documents. The Owner's Representative shall also have the authority to require the Contractor or any subcontractor to replace any workman or supervisor who, in his opinion, is not performing the work in a safe manner, fails to follow the instructions of the Owner's Representative, fails to perform work in accordance with the Contract Documents, fails to properly supervise the work, or demonstrates lack of competence to perform the particular work assigned to the workman or supervisor. The failure of the Contractor or any subcontractor to replace a worker or supervisor as directed by the Owner's Representative shall constitute a material breach



of this agreement. Neither the Owner's Representative nor the Owner shall be liable to Contractor, any subcontractor, or any other person or entity for removing a workman or supervisor in accordance with the terms of this article.

## 5-2 SUPPLEMENTAL DRAWINGS

The Plans shall be supplemented by such drawings as are necessary to better define the work. All such drawings delivered to the Contractor by the Owner's Representative shall be deemed written instructions to the Contractor. If the Contractor believes that any supplemental drawings call for changes in the work for which the contract amount or time for completion should be changed, he shall not proceed with the changes in the work so called for and shall within seven calendar days of the receipt of the supplemental drawings notify the Owner's Representative in writing of his estimate of the changes in the contract amount and time for completion he believes to be appropriate.

No payment for changes in the work will be made and no change in the time for completion by reason of changes in the work will be made, unless the changes are covered by a written change order approved by the Owner in advance of the Contractor's proceeding with the changed work.

## 5-3 CONFORMITY WITH CONTRACT DOCUMENTS AND ALLOWABLE DEVIATIONS

The work shall conform to the lines, grades, dimensions, tolerances, and material and equipment requirements shown on the Plans or set forth in the Specifications. Although measurement, sampling, and testing may be considered evidence as to such conformity, the Owner's Representative shall be the sole judge as to whether the work or materials deviate from the Plans and Specifications, and his decision as to any allowable deviations therefrom shall be final.

If specific lines, grades, and dimensions are not shown on the Plans, those furnished by the Owner's Representative shall govern.

## 5-4 MANUFACTURER'S INSTRUCTIONS

All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, supplier, or distributor, except as otherwise specifically provided in the Contract Documents.

## 5-5 COORDINATION OF PLANS AND SPECIFICATIONS

The Plans, Specifications, and other Contract Documents are essential parts of the contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for the complete work. In the event of an apparent difference between Plans and Specifications, reference shall be made to the Owner's Representative whose decision thereon shall be final.

Special Provisions shall govern over General Provisions and Standard Specifications.

## 5-6 INTERPRETATION OF PLANS AND SPECIFICATIONS

Figured dimensions on drawings shall govern, but work not dimensioned shall be as directed. Work not particularly shown or specified shall be the same as similar parts that are shown or specified. Large-scale details shall take precedence over smaller scale drawings as to shape and

details of construction. Specifications shall govern as to materials and workmanship. Plans and Specifications are intended to be fully complementary and to agree. The Specifications calling for the higher quality material or workmanship shall prevail. Materials or work described in words which so applied have a well known technical or trade meaning shall be deemed to refer to such recognized standards. In the event of any discrepancy between any drawings and the figures thereon, the figures shall be taken as correct. In the event of any doubt or question arising respecting the true meaning of the Plans or Specifications, reference shall be made to the Owner's Representative whose decision thereon shall be final.

#### **5-7 ERRORS OR DISCREPANCIES NOTED BY CONTRACTOR**

It is the duty of the Contractor to promptly notify the Owner's Representative in writing of any design, materials, or specified method that the Contractor believes may prove defective or insufficient. If the Contractor believes that a defect or insufficiency exists in design, materials, or specified method and fails to promptly notify the Owner's Representative in writing of this belief, the Contractor waives any right to assert that defect or insufficiency in design, materials, or specified method at any later date in any legal or equitable proceeding against Owner, or in any subsequent mediation, arbitration, or settlement conference between the Owner and the Contractor. The Owner's Representative, on receipt of any such notice, will promptly investigate the circumstances and give appropriate instructions to the Contractor. Until such instructions are given, any work done by the Contractor after he comes to the belief that a defect or insufficiency exists in design, materials, or specified method which is directly or indirectly affected by such alleged defect or insufficiency in design, materials, or specified method will be at his own risk and he shall bear all cost arising therefrom.

If the Contractor, either before commencing work or in the course of the work, finds any discrepancy between the Plans and the Specifications or between either of them and the physical conditions at the site of the work or finds any error or omission in any of the Plans or in any survey, he shall promptly notify the Owner's Representative of such discrepancy, error, or omission. If the Contractor observes that any Plans or Specifications are at variance with any applicable law, ordinance, regulation, order, or decree, he shall promptly notify the Owner's Representative in writing of such conflict. The Owner's Representative, on receipt of any such notice, will promptly investigate the circumstances and give appropriate instructions to the Contractor. Until such instructions are given, any work done by the Contractor after his discovery of such error, discrepancy, or conflict which is directly or indirectly affected by such error, discrepancy, or conflict will be at his own risk and he shall bear all cost arising therefrom.

#### **5-8 SUPERVISION AND SUPERINTENDENCE**

The Contractor shall supervise and direct the work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the work in accordance with the Contract Documents.

The Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction, but the Contractor shall not be solely responsible for the negligence of others in the design or selection of a specific means, method, technique, sequence, or procedure of construction which is indicated in and required by the Contract Documents except as otherwise provided in Article 5-7 ERRORS OR DISCREPANCIES NOTED BY CONTRACTOR.

The Contractor shall be responsible to see that the completed work complies with the Contract Documents.

The Contractor shall designate and keep on the work at all times during its progress a competent superintendent who shall not be replaced without written notice to the Owner's Representative. The superintendent will be the Contractor's representative at the site and shall have authority to act on behalf of the Contractor. All communications given to the superintendent shall be as binding as if given to the Contractor. During periods when the work is suspended, the Contractor shall make appropriate arrangements for any emergency work which may be required.

Whenever the superintendent is not present on any particular part of the work where the Owner's Representative may desire to inform the Contractor relative to interpretation of the Plans and Specifications or to the disapproval or rejection of materials or work performed, the Owner's Representative may so inform the foreman or other worker in charge of the particular part of the work in reference to which the information is given. Information so given shall be as binding as if given to the superintendent.

## 5-9 SHOP DRAWINGS

Shop drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data which are prepared by the Contractor or any subcontractor, manufacturer, supplier, or distributor and which illustrates some portion of the work.

The Contractor shall review, mark with his approval, and submit for review by the Owner's Representative shop drawings as called for in the Special Provisions and Standard Specifications or requested by the Owner's Representative. Shop drawings shall be submitted by email as a PDF to the Owner's Representative and be accompanied by the Shop Drawing Submittal Form included at the end of the General Provisions. Shop drawings shall show the name of the project, the name of the Contractor, and, if any, the names of suppliers, manufacturers, and subcontractors. Shop drawings shall be submitted with promptness and in orderly sequence so as to cause no delay in prosecution of the work.

Shop drawings shall be complete in all respects. If the shop drawings show any deviations from the requirements of the Plans and Specifications because of standard shop practices or other reasons, the deviations and the reasons therefor shall be set forth in the Shop Drawing Submittal Form.

By submitting shop drawings, the Contractor represents that material, equipment, and other work shown thereon conforms to the Plans and Specifications, except for any deviations set forth in the Shop Drawing Submittal Form. A log shall be maintained by the Contractor showing the following information: sequential shop drawings number, brief description, date submitted, date approved, any other data relevant to the shop drawings.

Within 30 calendar days after receipt of said shop drawings, the Owner's Representative will return via electronic mail (email) the shop drawings to the Contractor with any comments noted thereon.

If so noted by the Owner's Representative, the Contractor shall correct the drawings and resubmit them in the same manner as specified for the original submittal. The Contractor, in the Shop Drawing Submittal Form accompanying resubmitted shop drawings, shall direct specific attention to revisions other than the corrections requested by the Owner's Representative on previous submittals.

The review by the Owner's Representative is only of general conformance with the design concept of the project and general compliance with the Plans and Specifications and shall not be construed as relieving the Contractor of the full responsibility for: providing materials, equipment, and work required by the contract; the proper fitting and construction of the work; the accuracy and completeness of the shop drawings; selecting fabrication processes and techniques of construction; and performing the work in a safe manner.

No portion of the work requiring a shop drawing submittal shall be commenced until the submittal has been reviewed by the Owner's Representative and returned to the Contractor with a notation indicating that resubmittal is not required.

**If the Contractor believes that any shop drawing or communication relative thereto calls for changes in the work for which the contract amount or time for completion should be changed, he shall not proceed with the changes in the work so called for and shall within seven calendar days of the receipt of the shop drawings notify the Owner's Representative in writing of his estimates of the changes in the contract amount and time for completion he believes to be appropriate.**

No payment for changes in the work will be made and no change in the time for completion by reason of changes in the work will be made, unless the changes are covered by a written change order approved by the Owner in advance of the Contractor's proceeding with the changed work.

#### 5-10 QUALITY AND SAFETY OF MATERIALS AND EQUIPMENT

All equipment, materials, and supplies to be incorporated in the work shall be new, unless otherwise specified. All equipment, materials, and supplies shall be produced in a good and workmanlike manner. When the quality of a material, process, or article is not specifically set forth in the Plans and Specifications, the best available quality of the material, process, or article shall be provided.

Whenever any material, process, or article is indicated or specified by grade, patent or proprietary name, or by name of manufacturer, such Specification shall be deemed to be used for the purpose of facilitating description of the materials, process, or articles desired and shall be deemed to be followed by the words "or equal", and the Contractor may offer any material, process, or article which shall be substantially equal or better in every respect to that so indicated or specified; provided, however, that if the material, process, or article offered by the Contractor is not, in the opinion of the Owner's Representative, equal or better in every respect to that specified, then the Contractor must furnish the material, process, or article specified or one that in the opinion of the

Owner's Representative is the substantial equal or better in every respect. In the event that the Contractor furnishes material, process, or article more expensive than that specified, the difference in cost of such material, process, or article so furnished shall be borne by the Contractor.

In accordance with Public Contract Code Section 3400, the Contractor shall submit data substantiating requests for substitution of "equal" items within 35 calendar days after award of the contract. This 35-day period of time is included in the number of days allowed for the completion of the work.

All materials, equipment, and supplies provided shall, without additional charge to Owner, fully conform with all applicable state and federal safety laws, rules, regulations, and orders, and it shall be Contractor's responsibility to provide only such materials, equipment, and supplies notwithstanding any omission in the Contract Documents therefor or that a particular material, equipment, or supply was specified.

All machinery and equipment provided by the Contractor for the work shall include locking mechanisms capable of locking any shut-down devices on the machinery and equipment before commencement of any repairs or other work. Any machinery or equipment provided by the Contractor, which does not have this locking ability, shall be altered at the expense of the Contractor to provide these locking mechanisms without compromising any safety features on the equipment or machinery prior to the commencement of any repairs or work on the equipment or machinery. The Contractor shall not commence any work or repairs on any machinery or equipment which has been shut down until the locking mechanism has been activated and the Contractor has tagged the applicable machinery or equipment with a tag stating "Danger Do Not Operate." This tag shall include the name of the employee who locked the equipment prior to the commencement of any work or repairs. The Contractor shall insure that all equipment and machinery fully complies with Title 8 of California Administrative Code Sections 3202, 3314, 6003, 2320.4-2320.6, 2530.43, and 2530-86 at all times during performance of the work.

#### 5-11 STANDARDS, CODES, SAMPLES, AND TESTS

Whenever reference is made to a standard, code, Specification, or test and the designation representing the date of adoption or latest revision thereof is omitted, it shall mean the latest revision of such standard, code, Specification, or test in effect on the day the Notice Inviting Sealed Proposals (Bids) is dated.

Tests shall be made in accordance with commonly recognized procedures of technical organizations and such special procedures as may be prescribed elsewhere in the Plans and Specifications. The Contractor shall furnish without charge such samples for testing as may be required by the Owner's Representative.

#### 5-12 OBSERVATION OF WORK BY OWNER'S REPRESENTATIVE

The Owner's Representative shall at all times have access to the work during construction and shall be furnished with every reasonable facility for ascertaining full knowledge respecting the progress, workmanship, and character of materials and equipment used and employed in the work.

Whenever the Contractor varies the normal period during which work or any portion of it is carried on each day, he shall give timely notice to the Owner's Representative so that the Owner's Representative may, if he wishes, be present to observe the work in progress. If the Contractor fails to give such timely notice, any work done in the absence of the Owner's Representative will be subject to rejection. Any time spent by the Owner's Representative in the observation of work in progress that exceeds eight (8) hours in any single day shall be compensated back to the Owner by the Contractor at the Owner's fully loaded rate.

The Contractor shall give timely notice to the Owner's Representative in advance of backfilling or otherwise covering any part of the work so that the Owner's Representative may, if he wishes, observe such part of the work before it is concealed.

The observation, if any, by the Owner's Representative of the work shall not relieve the Contractor of any of his obligations to fulfill the contract as prescribed. Defective work shall be made good, and materials and equipment furnished and work performed which is not in accordance with the Contract Documents may be rejected notwithstanding the fact that such materials, equipment, and work have been previously observed by the Owner's Representative or that payment therefor has been included in an estimate for payment.

#### 5-13 REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK

Any work which does not conform the requirements of the Contract Documents or which is found unacceptable or deficient by the Owner or the Owner's Representative shall be remedied or removed and replaced by the Contractor at the Contractor's sole cost and expense, together with any other work which may be displaced in so doing, and no compensation will be allowed the Contractor for such removal, replacement, or remedial work. All materials found inadequate or deficient by the Owner or the Owner's Representative shall be immediately removed from the site.

Any work done beyond the lines and grades shown on the Plans or established by the Owner or any changes in, additions to, or deductions from the work done without written authority from the Owner will be considered as unauthorized and will not be paid for. Work so done will be ordered remedied, removed, or replaced by the Owner or the Owner's Representative at the Contractor's sole cost and expense.

Upon failure on the part of Contractor to comply promptly with any order of the Owner or Owner's Representative made under the provisions of this article the Owner or Owner's Representative shall have authority to cause all non-conforming materials, rejected work, or unauthorized work to be remedied, removed, or replaced at the Contractor's sole cost and expense and to deduct all fees and costs incurred by the Owner including staff time from any monies due or to become due the Contractor under this contract.

#### 5-14 TWO-YEAR GUARANTEE

Besides guarantees required elsewhere, the Contractor shall and hereby does guarantee all work, materials, parts, equipment and supplies to be free from all defects due to faulty materials or workmanship for a period of two-years after the date of formal acceptance of the work by the Board of Directors of Owner except for any portion of the work that is utilized or placed into service by the Owner in accordance with the provisions of Article 6-6 USE OF COMPLETED PORTIONS. The guarantee period for portions of the work so utilized or placed into service shall be two-years commencing on the date of the written notification to the Contractor described in Article 6-6 USE OF COMPLETED PORTIONS. The Contractor shall repair or remove and replace any and all such work, together with any other work which may be displaced in so doing, that is found to be defective by Owner in workmanship and/or materials, equipment, parts or supplies within the two-year period, at the Contractor's sole cost and expense, ordinary wear and tear and unusual abuse or neglect excepted. In the event the Contractor fails to correct all defects identified by the Owner within seven (7) consecutive days after written notice of the defects from Owner, the Owner is hereby authorized to proceed to have the defects remedied and made good at the sole expense of the Contractor who hereby agrees to pay the cost and charges therefore immediately on demand. Such action by the Owner will not relieve the Contractor of the guarantees required by this article or elsewhere in the Contract Documents.

The Performance Bond and the Payment Bond shall continue in full force and effect for the guarantee period.

If, in the opinion of the Owner, defective work creates a dangerous condition or requires immediate correction or attention to prevent further loss to the Owner or to prevent interruption of operations of the Owner, the Owner may require the Contractor to correct the defects in a shorter period of time determined solely by Owner. If the Contractor does not correct the defects within the time specified by Owner, Owner may proceed to make such corrections or provide such attention; and all fees and costs of such correction or attention shall be charged against the Contractor. Such action by the Owner will not relieve the Contractor of the guarantees required by this article or elsewhere in the Contract Documents.

This article does not in any way limit the guarantee on any items for which a longer guaranty is specified or on any items for which a manufacturer or supplier gives a guarantee for a longer period. The Contractor agrees to act as a co-guarantor with such manufacturer or supplier and shall furnish the Owner all appropriate guarantee or warranty certificates upon completion of the project. No guarantee period whether provided for in this article or elsewhere in this contract shall in any way limit the liability of the Contractor or his subcontractors, materialmen, suppliers, sureties or insurers for the full statutory periods provided by California law.

## **SECTION 6 PROSECUTION AND PROGRESS**

### **6-1 CONTRACTOR'S LIABILITY**

The Contractor shall be solely liable and responsible to the Owner for all acts and omissions of the Contractor's directors, officers, agents, owners, and employees and for all acts and omissions of all subcontractors, materialmen and suppliers and their respective directors, officers, managers, members, agents, owners and employees performing any of the work or providing any materials or supplies included as part of the work. The Owner, the Engineer/Architect and the Owner's Representative shall not be liable in any way for any acts or omissions of the Contractor, any subcontractors, any materialmen, any suppliers, or any of their respective directors, officers, managers, members, agents, employees or owners. Nothing contained in the Contract Documents shall create any contractual relationship between any subcontractor materialman, or supplier and the Owner. The Contractor shall bind all subcontractors to all terms of the Contract Documents for all work being performed by those subcontractors.

The divisions and sections of the Specifications and the identifications of any Drawings shall not control the Contractor in dividing the work among subcontractors.

### **6-2 ASSIGNMENT**

The performance of the contract may not be assigned, except upon the written consent of the Owner. Consent will not be given to any proposed assignment which would relieve the original Contractor or his sureties or insurers of their responsibilities under the contract, nor will the Owner consent to any assignment of a part of the work under the contract.

Upon obtaining a prior written consent of the Owner, the Contractor may assign moneys due or to become due him under the contract, to the extent permitted by law, but any assignment of moneys shall be subject to all proper setoffs in favor of the Owner and to all deductions provided for in the contract, and particularly all money withheld, whether assigned or not, shall be subject to being used by the Owner for the completion of the work in the event that the Contractor should be in default therein.

No assignment of this contract will be approved unless it shall contain a provision that the funds to be paid to the assignee under the assignment are subject to a prior lien for services rendered or materials supplied for performance of the work called for under the contract in favor of all persons, firms, or corporations rendering such services or supplying such materials and that the Owner may withhold funds due until all work required by the Contract Documents is completed to the Owner's satisfaction.

In the event of bankruptcy of the Contractor, whether voluntary or involuntary, this Agreement may be automatically terminated at the election of the Owner. The election to terminate in accordance with this provision shall be deemed effective as of the date the Owner mails notice of termination in accordance with this section to the Contractor at the Contractor's last known address without any further action of any party. Upon termination in accordance with this provision, the Contractor shall be entitled to no further payments over and above the reasonable value of the actual Work completed as of the date the termination notice is mailed.

### 6-3 CONTRACTOR'S CONSTRUCTION SCHEDULE AND COST BREAKDOWN

Within fourteen (14) days after Notice to Proceed, the Contractor shall deliver to the Owner's Representative a construction progress schedule and cost breakdown in bar chart form showing the proposed dates of commencement and completion and cost of each of the various parts of the work and the anticipated amount of each monthly payment that will become due the Contractor in accordance therewith. The Owner shall be entitled to terminate this Contract if, in the Owner's opinion, the Contractor is failing to carry on the work diligently or in accordance with the approved construction schedule and breakdown. The Contractor has been advised and understands that time is of the essence with respect to completion of all phases of the work in accordance with the approved construction schedule.

### 6-4 TIME FOR COMPLETION AND FORFEITURE DUE TO DELAY

The Contractor shall complete all or any designated portion of the work called for under the contract within the time set forth in Special Provisions. Time is of the essence in this contract.

Failure of the Contractor to perform any covenant or condition contained in the Contract Documents within the time period specified shall constitute a material breach of this contract entitling the Owner to terminate the contract unless the Contractor applies for, and receives, an extension of time in accordance with the procedures set forth in this article and Article 6-5 EXTENSION OF TIME.

Failure of the Owner to insist upon the performance of any covenant or condition within the time period specified in the Contract Documents shall not constitute a waiver of the Contractor's duty to complete performance within the designated periods unless the waiver is in writing.

The Owner's agreement to waive a specific time provision or to extend the time for performance shall not constitute a waiver of any other time provisions contained in the Contract Documents. Failure of the Contractor to complete performance promptly within the additional time authorized in the waiver or extension of time agreement shall constitute a material breach of this contract entitling the Owner to terminate.

In accordance with Government Code 53069.85, Contractor agrees to forfeit and pay Owner the amount per day set forth in the Special Provisions for each and every day of delay which shall be deducted from any payments due or to become due the Contractor.



The Contractor shall not be deemed in breach of this contract and no forfeiture due to delay shall be made because of any delays in the completion of the work due to unforeseeable causes beyond the control and without the fault or negligence of the Contractor provided the Contractor requests an extension of time in accordance with the procedures set forth in this article and Article 6-5 EXTENSION OF TIME. Unforeseeable causes of delay beyond the control of Contractor shall include acts of God, acts of a public enemy, acts of the government, acts of the Owner, or acts of another contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and weather, or delays of subcontractors due to such causes, or delays caused by failure of the Owner or the owner of a utility to provide for removal or relocation of existing utility facilities. Delays caused by actions or neglect of Contractor or his agents, servants, employees, officers, subcontractors, directors, or of any party contracting to perform part or all of the work or to supply any equipment or materials shall not be excusable delays. Excusable delays (those beyond Contractor's control) shall not entitle the Contractor to any additional compensation. The sole remedy of the Contractor shall be to seek an extension of time.

#### 6-5 EXTENSION OF TIME

The Contractor shall not be entitled to any increase in the contract price as a result of the Owner's approval of any extension of time except to the extent that the Owner approves an increase in the contract price on a properly executed Change Order.

The time specified for completion of all of the work or any part of the work may be extended only by a written change order executed by the Owner or other written form executed by the Owner.

Requests for an extension of time must be delivered to the Owner's Representative within ten consecutive calendar days following the date of the occurrence which caused the delay. The request must be submitted in writing and must state the cause of the delay, the date of the occurrence causing the delay, and the amount of additional time requested. Requests for extensions of time shall be supported by all evidence reasonably available or known to the Contractor which would support the extension of time requested. Requests for extensions of time failing to include the information specified in this article and requests for extensions of time which are not received within the time specified above shall result in the forfeiture of the Contractor's right to receive any extension of time requested.

If the Contractor is requesting an extension of time because of weather, he shall supply daily written reports to the Owner's Representative describing such weather and the work which could not be performed that day because of such weather or conditions resulting therefrom and which he otherwise would have performed.

The Owner's acceptance of the daily reports shall not be deemed an admission of the Contractor's right to receive an extension of time or a waiver of the Owner's right to strictly enforce the time provisions contained in the Contract Documents.

When the Contractor has submitted a request for an extension of time in accordance with the procedures of this article and Article 6-4 TIME FOR COMPLETION AND FORFEITURE DUE TO DELAY, the Owner will ascertain the facts and extent the delay and extend the time for completing the work if, in its judgment, the findings of fact justify such an extension, and its findings of facts thereon shall be final and conclusive. An extension of time may be granted by the Owner after the expiration of the time originally fixed in the contract or as previously extended, and the extension so granted shall be deemed to commence and be effective from the date of such expiration.

Any extension of time shall not release the sureties upon any bond required under the contract.

#### **6-6 USE OF COMPLETED PORTIONS**

When the work or any portion of it is sufficiently complete to be utilized or placed into service, the Owner shall have the right upon written notification to the Contractor to utilize such portions of the work and to place the operable portions into service and to operate same.

Upon said notice and commencement of utilization or operation by the Owner, the Contractor shall be relieved of the duty of maintaining the portions so utilized or placed into operation; provided, however, that nothing in this article shall be construed as relieving the Contractor of the full responsibility for completing the work in its entirety, for making good defective work and materials, for protecting the work from damage, and for being responsible for damage and for the work as set forth in the General Provisions and other Contract Documents nor shall such action by the Owner be deemed completion and acceptance, and such action shall not relieve the Contractor, his sureties, or insurers of the provisions of SECTION 8 CONTRACTOR'S INSURANCE, of Article 7-12 INDEMNITY, and of Article 5-14 TWO-YEAR GUARANTEE.

### **SECTION 7 LEGAL RELATIONS AND RESPONSIBILITIES**

#### **7-1 OBSERVING LAWS AND ORDINANCES**

The Contractor shall keep himself fully informed of all existing and future laws, ordinances, and regulations which in any manner affect those engaged or employed to perform any of the work or providing any materials or supplies or which in any way affect the conduct of the work and of all statutes, laws, rules, regulations, orders, decisions, and decrees of any court or governmental agency having any jurisdiction or authority over all or any of the work or the conduct of the work, including all federal, state and local safety rules, regulations, and orders. This shall expressly include all ordinances, rules, regulations, and requirements applying to the work or the conduct of the work enacted by the Owner. If any discrepancy or inconsistency is discovered in the Plans, Specifications, or contract for the work the relation to any such law, rule, regulation, ordinance, order or decree, the Contractor shall forthwith report the same to the Owner's Representative in writing and cease operations on that part of the work until the Owner's Representative has given him appropriate instructions as provided for Article 5-7 ERRORS OR DISCREPANCIES NOTED BY CONTRACTOR.

The Contractor shall at all times observe and comply with and shall cause all of his directors, officers, agents, managers, members, owners, employees, subcontractors, materialmen and suppliers to observe and comply with all existing and future laws, ordinances, regulations, orders, and decrees, and shall hold harmless, indemnify, and defend the Owner, the Water Authority, the Engineer/Architect, the Owner's Representative, and their consultants, and each of their directors, officers, employees, and agents from and against any and all liability, claims, causes of action, damages, losses, claim fees and costs, staff time, expenses, fees, and costs, including all costs of defense and attorneys' fees, arising from or based on the violation any such law, ordinance, regulation, order, or decree by the Contractor, any subcontractor, any materialman or supplier or any of their respective directors, officers, agents, managers, members, owners, or employees.

#### **7-2 PERMITS AND LICENSES**

The Contractor shall be solely liable and responsible for securing all permits and licenses necessary to perform all of the work, for paying all fees and charges necessary to secure any such

permit, license, or approval, and for giving all notices which are appropriate or necessary to the proper and safe prosecution of the work. The Owner shall have no obligation to procure any permit, license, or approval necessary to perform all or any portion of the work. The Contractor shall also be solely liable and responsible for fully complying with all requirements of any permits, licenses or approvals pertaining to all or any of the work. The failure of Contractor to strictly comply with all requirements of any permits, licenses, or approvals applying to all or any of the work shall constitute a material breach of the contract.

### 7-3 INVENTIONS, PATENTS, AND COPYRIGHTS

The Contractor shall pay all royalties and assume all costs arising from the use of any invention, design, process, materials, equipment, product, or device which is the subject of patent rights or copyrights.

The Contractor shall hold harmless, indemnify, and defend the Owner, the Water Authority, the Engineer/Architect, the Owner's Representative, and their consultants, and each of their directors, officers, employees, and agents from and against all claims, damages, losses, expenses, and other costs, including costs of defense and attorneys' fees, arising out of 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, materials, equipment, product or device, and shall defend all such claims in connection with any alleged infringement of such rights.

### 7-4 PUBLIC CONVENIENCE AND SAFETY

The Contractor shall conduct his operations at all times in a manner that creates the least possible obstruction and inconvenience to the public, and he shall have under construction no greater length or amount of work than he can prosecute properly with due regard to the rights of the public and all property owners in the area of the work. The Contractor shall be solely liable and responsible for ensuring that all of the work is conducted at all times in a safe manner that does not injure or damage any workers, members of the public or private or public property.

Convenient access to driveways, houses, and buildings along the line of work shall be maintained and temporary crossings shall be provided and maintained in good condition at all times during performance of the work. Not more than one crossing or intersecting street or road shall be closed at any one time.

The Contractor shall provide and maintain such fences, barriers, directional signs, lights, and flagmen as are necessary to give adequate warning to the public at all times of any conditions to be encountered as a result of the work and to give directions to the public. The Contractor shall ensure that all unsafe conditions created by the work are promptly remedied and that any unsafe conditions created by the work are protected by barriers, safeguards and warnings preventing vehicular, bicycle or walking access in any unsafe areas.

It shall also be the sole responsibility of the Contractor to ensure that the work is performed at all times in a manner that does not injure or harm any person or injure or damage any real or personal property of any person or entity.

The Contractor shall perform the work only the areas expressly identified on the drawings. The Contractor must operate entirely within the limits of the project site. No equipment or materials may be parked, stockpiled, or stored outside the project site or designated Contractor staging areas. The Contractor shall not enter onto, occupy, or disturb any privately owned land or any

public or private habitat not scheduled for removal in the approved plans with any men, tools, materials, dirt, or equipment except with the prior express written consent of the Owner and all owners of any privately-owned land. The Contractor has been advised, and understands, that any request to enter onto, occupy, or disturb any privately-owned land or habitat must be submitted to the General Manager of the Owner for written approval prior to entering onto, occupying, or disturbing any privately-owned land or public or private habitat for any purpose. The violation of this section by Contractor shall constitute a material breach of this contract.

The Contractor and any subcontractors, materialmen, or suppliers shall not, at any time, conduct any of the work in any manner that creates any public or private nuisance or trespass on the land of any private party or public agency. It shall be the sole responsibility of Contractor to conduct the work at all times in a manner that avoids creating any nuisance or trespass on any real or personal property owned by any private party or public agency.

The Contractor hereby agrees to indemnify, defend, and hold harmless the Owner, Olivenhain Municipal Water District, Engineer/Architect, the Owner's Representative, and their consultants, and each of their directors, officers, employees, and agents from and against any and all liability, claims, causes of action, actions, damages, losses, fees, costs, or expenses, of whatever type or nature, including all costs of defense, attorneys' fees, and claim fees or costs, arising out of or resulting from performance of any of the work by the Contractor, its subcontractors, materialmen, or suppliers, or their respective directors, officers, agents, managers, members, owners, or employees which results in any injury or damage to persons or property including wrongful death regardless of whether or not such claim, cause of action, damage, loss or expense is caused in whole or in part by the negligence, active or passive, of Owner, the Engineer/Architect, or the Owner's Representative excepting only those claims and causes of action caused by the sole active negligence or intentional misconduct of the Owner, the Engineer/Architect, or the Owner's Representative. From and after the date of submission of any claim or demand to Owner, the indemnified parties shall recover from the Contractor all attorneys fees, expert fees and costs, claim costs, and staff time involved in handling the claim or any subsequent action on the claim at the standard hourly rates for staff handling the claim or action.

#### **7-5 RESPONSIBILITY FOR LOSS, DAMAGE, OR INJURIES**

The Contractor shall be solely responsible for all liability, claims, causes of action, demands, losses, costs, fees, expenses, and damages, of whatever type or nature, from any cause arising out of or resulting from or in connection with the performance of any of the work, excepting only those claims and causes of action caused solely and exclusively by the active negligence or intentional misconduct of the Owner, the Engineer/Architect, the Owner's Representative, or their consultants, directors, officers, employees, and agents. This exclusive responsibility shall extend to all liability, claims, causes of action, demands, losses, costs, fees, and expenses, of whatever type or nature, after completion of the work as well as during the progress of the work.

In the event any hazardous or toxic materials, including but not limited to asbestos, are utilized in construction or hazardous or toxic materials are otherwise encountered during construction, the Contractor shall take all appropriate precautions to protect persons and property and shall comply with all applicable regulations for the installation and handling of such hazardous or toxic materials. The Contractor is solely responsible for protection of all persons and property that could be affected by any construction or work and for the proper handling and disposal of all such hazardous or toxic materials.

Contractor has been advised that the Owner has Safety Data Sheets (hereinafter "SDS") available for review on any hazardous chemical they may be exposed to while working in or around Owner facilities. It shall be the sole responsibility of Contractor to request and inspect these SDS forms prior to commencement of any work and to alert all employees and agents of Contractor of potential hazardous waste exposure from Owner facilities. It shall be the sole responsibility of Contractor to provide the Owner's Representative with completed SDS forms for all hazardous or toxic substances that the Contractor utilizes as part of the work prior to the use of any hazardous or toxic substances and to provide these SDS forms to the Contractor's agents and employees prior to their exposure to any hazardous or toxic substance utilized by the Contractor. Further, Contractor shall comply with all provisions contained in General Industry Safety Orders Section 5194 of Title 8 of the California Administrative Code (the California Hazardous Communication Regulation) at all times during performance of the work.

## 7-6 CONTRACTOR'S RESPONSIBILITY FOR THE WORK

Until formal acceptance of the work by action of the Board of Directors of Owner, the Contractor shall be solely liable and responsible for all aspects of the work and all equipment materials and supplies to be provided as part of the work (including materials for which he has received partial payment or materials which have been furnished by the Owner) and shall bear the sole risk of injury, loss, or damage to any of the work, or any materials, supplies, or equipment being used or provided in conjunction with the work from any act of nature or the elements and from all other causes, whether arising from the execution or from the non-execution of the work.

The Contractor, at the Contractor's sole cost and expense, shall rebuild, repair, restore, and make good all injuries, losses, or damages whatsoever to any portion of the work or to any materials, equipment, or supplies from any cause before completion and formal acceptance of the work by formal action of the Board of Directors of Owner and shall solely bear the expense thereof. Where the Owner or the Owner's Representative determines it is necessary to protect the work or materials from any damage or injury, the Contractor shall at his sole expense provide suitable drainage and erect any additional structures and take all additional protective actions determined necessary or appropriate by either the Owner or the Owner's Representative to protect the work or materials from further damage or injury. The suspension of the work or the granting of an extension of time from any cause whatsoever shall not relieve the Contractor of his sole responsibility for the work, materials, or equipment as specified herein.

In an emergency affecting the safety of life or property, including any adjoining property, the Contractor, without special instructions or authorizations, shall promptly act to prevent such threatened loss or injury. The Contractor shall also promptly implement any and all directions given by the Owner or the Owner's Representative to protect the safety of life or property during any emergency as determined by Owner.

Notwithstanding the foregoing provisions of this section, the Contractor shall not be responsible for the cost of repairing or restoring damage to the work where the damage has been determined to have been caused solely by an Act of God in excess of 5% of the contract and amount provided that the work damaged is built in accordance with accepted and applicable building standards and in strict compliance with the Plans and Specifications. For the purpose of this paragraph, "Acts of God" shall include only earthquakes in excess of a magnitude of 3.5 on the Richter Scale and tidal waves. No other actions of the elements, nature, or man shall be treated as Acts of God under this paragraph.

## 7-7 PRESERVATION OF PROPERTY

The Contractor shall be solely liable and responsible for avoiding injury or damage or interfering with the construction or operation of any and all existing improvements or facilities, all utility facilities, all personal and real property whether owned by any public agency or private party, and any and all trees, shrubbery, landscaping and habitat that are not to be removed. The Contractor shall be solely liable and responsible for any and all damage and injury to any real or personal property of any person or entity both during and after performance of the work.

All trees, shrubbery, and landscaping that are not to be removed, and all lines, fences, signs, survey markers and monuments, buildings and structures, conduits, pipelines both under or above ground, all sewer and water pipelines or facilities, all highway or street facilities, and any and all other improvements, facilities, habitat, trees, or landscaping within or adjacent to the work not to be removed in the approved plans shall be protected by the Contractor from all injury or damage and the Contractor shall provide and install suitable safeguards to protect all such objects from any injury or damage. If any of the foregoing objects are injured or damaged either during or after performance of the work, they shall be promptly replaced or restored to a condition as good as when the Contractor commenced work or as good as required by the Plans and Specifications if any such objects or are part of the work being performed, at the Contractor's sole cost and expense. The Owner, the Engineer/Architect and the Owner's Representative and their respective Directors, officers, agents and employees shall have no liability whatsoever for any injury or damage caused in whole or in part by the actions or omissions of the Contractor, any subcontractor, any materialmen or supplier, or any of their respective directors, officers, agents, employees, managers, or members except where the injury or damage is caused by the sole and exclusive active negligence or intentional misconduct of the Owner, the Engineer/Architect, the Owner's Representative, or their consultants, directors, officers, employees, and agents. The Contractor shall also be solely liable and responsible for any and all damage or injury to any landscaping or habitat caused in whole or in part by the actions or omissions of the Contractor, any subcontractor, any materialmen or supplier, or their respective directors, officers, agents, employees, managers, owners, or members.

The fact that any pipeline or other underground facility is not shown on the Plans, shall not relieve the Contractor of his responsibility under this section.

In addition to any requirements imposed by law, the Contractor shall shore up, brace, underpin, and protect all foundations, structures, or improvements adjacent to or adjoining the site of the work which are in any way affected by the excavations or by any of the work. Whenever any notice is required to be given by the Owner or the Contractor at any adjacent or adjoining landowner or other party before commencement of any work, this notice shall be given by the Contractor.

## 7-8 REGIONAL NOTIFICATION CENTER CONTACT

The Contractor, except in an emergency, shall contact the appropriate regional notification center prior to commencing any excavation work. Notify the center at least two working days in advance or up to a maximum of 14 calendar days in advance of any excavation work. The Contractor shall delineate the proposed excavation site with white paint on paved surfaces or with markings such as flags or stakes in unpaved areas. The Contractor shall provide the regional notification center with all job site location information. The regional notification center will assign to the Contractor a Dig Alert Number which validates the Contractor's excavation permit and will notify all of its members having subsurface installations in the area. No excavation shall be commenced and

carried out by the Contractor until all existing subsurface installations have been field marked and the Owner has been given the Dig Alert Number by the Contractor.

Emergency shall be defined as a sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services. Emergency includes such occurrences as fire, flood, earthquake, or other soil or geologic movements, as well as such occurrences as riot, accident, or sabotage (Government Code Section 4216).

Subsurface installation means any underground pipeline, conduit, duct, wire, or other structure operated or maintained in or across a public street or public right-of-way (Government Code Section 4216).

#### **7-9 EXCAVATION PLANS FOR WORKER PROTECTION REQUIRED BY LABOR CODE SECTION 6705**

If the total amount of the contract is in excess of \$25,000, the Contractor shall submit to the Owner for acceptance, in advance of excavation, a detailed Plans 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 any trench or trenches 5 feet or more in depth. The Plans shall be prepared by a registered civil or structural engineer. As a part of the Plans, a note shall be included stating that the registered civil or structural engineer certifies that the Plans complies with all CAL-OSHA Construction Safety Orders and regulations, or that the registered civil or structural engineer certifies that the Plans is not less effective than the shoring, bracing, sloping, or other provisions of the Safety Orders and regulations.

The Owner or the Engineer/Architect or their consultants may have made investigations of subsurface conditions in areas where the work is to be performed. If so, these investigations are identified in the Special Provisions and the records of such investigations are available for inspection at the office of the Engineer/Architect. The detailed Plans showing the design of shoring, etc., which the Contractor is required to submit to the Owner for acceptance in advance of excavation will not be accepted by the Owner if the Plans are based on subsurface conditions which are more favorable than those revealed by the investigations made by the Owner or the Engineer/Architect or their consultants; nor will the Plans be accepted if it is based on soils-related design criteria which is less restrictive than the criteria set forth in the report on the aforesaid investigations of subsurface conditions.

The detailed Plans showing the design of shoring, etc., shall include surcharge loads for nearby embankments and structures, for spoil banks, and for construction equipment and other construction loadings.

The Plans shall indicate for all trench conditions the minimum horizontal distances from the side of the trench at its top to the near side of the surcharge loads.

Nothing contained in this article shall be construed as relieving the Contractor of the full responsibility for providing shoring, bracing, sloping, or other provisions which are adequate for worker protection.

## 7-10 SAFETY

In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for conditions of the jobsite, including safety of all persons and property during performance of the work, and the Contractor shall fully comply with all state, federal and other laws, rules, regulations, and orders relating to safety of the public and workers.

The right of the Engineer/Architect or the Owner's Representative to conduct construction review or observation of the Contractor's performance will not include review or observation of the adequacy of the Contractor's safety measures in, on, or near the construction site.

## 7-11 PERSONAL LIABILITY

No director, officer, employee, or agent of the Owner, the Engineer/Architect, the Owner's Representative, or their consultants shall be personally responsible for any liability arising under or by virtue of the contract.

## 7-12 DEFENSE AND INDEMNITY

The Contractor hereby agrees to indemnify, defend, and hold harmless the Owner, the Engineer/Architect, and the Owner's Representative and their respective directors, officers, agents, employees and consultants from and against any and all liability, claims, demands, causes of action, actions, damages, losses, fees, costs, or expenses, of whatever type or nature, including all costs of defense and attorneys' fees, caused in whole or in part, or claimed to be caused in whole or in part, by any act or omission of the Contractor, any subcontractor, any supplier or materialman or any of their respective directors, officers, agents, employees, managers, members, or owners except only those claims and causes of action caused by the sole active negligence or intentional misconduct of the Owner, the Engineer/Architect or the Owner's Representative or their respective agents or employees. This indemnification shall extend to all claims, demands, causes of action, actions, or liability occurring after completion of the project as well as during the progress of the Work.

The Contractor further agrees to indemnify, defend, and hold harmless the Owner, the Engineer/Architect, and Owner's Representative and their respective directors, officers, agents, employees, and consultants from and against any and all liability, claims, causes of action, actions, losses, fees, costs, expenses, or damages, of whatever type or nature, including all costs of defense and attorneys' fees, as a result of the failure of or claimed failure of the Contractor to strictly comply with any of the Contractor's obligations under this contract. This indemnity shall expressly include claims by the Owner for any injury, damages, losses, costs, fees or expenses arising from or related to the failure of the Contractor or any of his subcontractors, materialmen, or suppliers to strictly comply with all terms of this contract or as a result of any improper workmanship or defective supplies or materials.

The Contractor's indemnity obligations as contained in this section shall remain in full force and effect and shall apply whether or not the claim, cause of action, damage, cost, fee, or expense is covered by any applicable insurance policy and regardless of any position that may be taken by any insurance company regarding a defense or coverage for any claim or cause of action asserted. From and after the date any claim or demand is submitted to Owner covered by these indemnity provisions, the indemnified parties shall be entitled to recover from Contractor all fees and costs incurred in investigating the claim, all staff time involved in handling the claim or any subsequent action on the claim at staff's ordinary hourly rates, all expert fees and costs, all



attorneys' fees, and all court costs. The Contractor shall also be solely liable and responsible for paying any and all damages, fees or costs awarded to the claimant as a result of any settlement or final judgment of any cause of action or action covered by these indemnity provisions. This indemnity shall expressly include all wrongful death actions as well as any actions asserting any damage or injury to any persons or real or personal property.

From and after submission of any claim or demand to any of the indemnified parties, the indemnified party shall be entitled to appoint their own independent counsel to represent them and the Contractor shall pay all fees, costs, and expenses of whatever type or nature (including all staff time) incurred by each of the indemnified parties within thirty (30) consecutive days of receipt of a demand for reimbursement of these costs, fees, or expenses by each of the indemnified parties. A breach of this indemnity provision by Contractor shall constitute a material breach of the contract.

#### 7-13 HOURS OF LABOR

The Contractor shall forfeit as a penalty to the Owner \$25 for each worker employed in the execution of the contract by the Contractor or any subcontractor under him for each calendar day during which such worker is required or permitted to work more than 8 hours in any one calendar day and 40 hours in any one calendar week in violation of 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 8 hours per day and 40 hours during any one week shall be permitted upon compensation for all hours worked in excess of 8 hours per day at not less than one and one-half times the basic rate of pay as provided in said Section 1815.

#### 7-14 PREVAILING WAGE

The Contractor shall comply with Labor Code Section 1775. In accordance with said Section 1775, the Contractor shall forfeit as a penalty to the Owner \$50 for each calendar day or portion thereof for each worker paid less than the stipulated prevailing rates for such work or craft in which such worker is employed for any work done under the contract by him or her or by any subcontractor under him or her in violation of the provisions of the Labor Code and in particular, Labor Code Sections 1770 to 1780, inclusive. In addition to said penalty and pursuant to said Section 1775, the difference between such stipulated prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the stipulated prevailing wage rate shall be paid to each worker by the Contractor. Pursuant to Labor Code Section 1775, to the extent there is insufficient money due a contractor to cover all penalties forfeited and amounts due, the Division of Labor Standards Enforcement shall be notified of the violation and the Division of Labor Standards Enforcement shall be entitled to maintain an action in any court of competent jurisdiction to recover the penalties and the amounts due pursuant to Labor Code Section 1775.

Section 1776 of the Labor Code requires each contractor and its subcontractors to keep accurate payroll records 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 him or her in connection with the work required by these Contract Documents. These payroll records shall be made available for inspection or furnished to all employees, any representative of the Owner, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations. Contractor shall provide a certified copy of these payroll records to any of the aforementioned parties within 10 calendar days after receipt of a written request for these records.

Contractor understands that it is the responsibility of the Contractor to ensure that these payroll records are maintained by Contractor and all subcontractors performing the work in accordance with Labor Code Section 1776(h). The payroll records shall be on forms provided by the Division of Labor Standard Enforcement or provide the same information as the information required by this form.

Pursuant to Labor Code Section 1777.1, whenever any contractor or subcontractor performing a public works project is found by the Labor Commissioner or the Owner to be in violation of Labor Code Section 1770 et seq., except Section 1775, the contractor or subcontractor or any firm, corporation, partnership, or association of which the contractor or any subcontractor has a substantial interest, shall be ineligible to bid on or to receive any public works contract for a period of not less than one-year or more than three years. The period of debarment shall run from the date the determination of the violation is made by the Labor Commissioner.

The Owner shall be entitled to withhold wages and penalties due as a result of any violation of the Labor Code from Payments due the Contractor in accordance with Labor Code Section 1726. These withheld amounts shall be paid to the Labor Commissioner for disbursement in accordance with Labor Code Section 1730. The Contractor's right to recover these wages and penalties shall be limited as provided in the Labor Code.

#### 7-15 TRAVEL AND SUBSISTENCE PAYMENTS

Each worker needed to execute the work must be paid travel and subsistence payments as defined in the applicable collective bargaining agreements filed in accordance with Labor Code Section 1773.8.

#### 7-16 APPRENTICES

Attention is directed to the provisions in Sections 1777.5, 1777.6, and 1777.7 of the Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under him.

The Contractor and any subcontractor under him shall comply with the requirements of Sections 1777.5 and 1777.6 of the Labor Code in the employment of apprentices.

Information relative to apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of Industrial Relations, ex officio the Administrator of Apprenticeship, San Francisco, California, or from the Division of Apprenticeship Standards and its branch offices.

Willful violations of Section 1777.5 will result in the Contractor, and the business entity under which the Contractor is doing business, being denied the right to bid on, or to receive, any public works contract for a period of up to one year for the first violation and for a period of up to three years for the second and subsequent violations commencing from the date the determination of noncompliance by the Administrator of Apprenticeship Council. In addition, if the Contractor violates Section 1777.5, he will forfeit as a civil penalty the sum of \$50 for each calendar day of non-compliance which shall be withheld from progress payments by Owner upon notice from the Department of Industrial Relations. (Labor Code Section 1777.7.)

#### 7-17 WARRANTY OF TITLE

No materials, supplies, or equipment for the work under this contract shall be purchased subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest

therein or any part thereof is retained by the seller or supplier. The Contractor warrants clear and good title to all materials, supplies, and equipment installed and incorporated in the work and agrees upon completion of all work to deliver the premises together with all improvements and appurtenances constructed or placed thereon by him to the Owner free from any claims, liens, encumbrances, or charges and further agrees that neither he nor any person, firm, or corporation furnishing any material or labor for any work covered by the contract shall have any right to a lien upon the premises or any improvement or appurtenance thereon, provided that this shall not preclude the Contractor from installing metering devices or other equipment of utility companies or of municipalities, the title of which is commonly retained by the utility company or the municipality. Nothing contained in this article, however, shall defeat or impair the right of such persons furnishing materials or labor under any bond given by the Contractor for their protection or any right under any law permitting such persons to look to funds due the Contractor in the hands of the Owner. The provisions of this article shall be inserted in all subcontracts and material contracts, and notices of its provision shall be given to all persons furnishing materials for the work when no formal contract is entered into for such materials.

#### 7-18 PROPERTY RIGHTS IN MATERIALS

Nothing in the contract shall be construed as vesting in the Contractor any right of property in the materials used after they have been attached or affixed to the work or the soil. All such materials shall become the property of the Owner upon being so attached or affixed. Soil, stone, gravel, and other materials found at the site of the work and which conform to the Plans and Specifications for incorporation into the work may be used in the work. No other use shall be made of such materials except as may be otherwise described in the Plans and Specifications.

#### 7-19 MUTUAL RESPONSIBILITY OF CONTRACTORS

Nothing in the contract shall be interpreted as granting to the Contractor exclusive occupancy of the site of the project. The Contractor must ascertain to his own satisfaction the scope of the project and the nature of any other contracts that have been or may be awarded by the Owner in the construction of the project, to the end that the Contractor may perform this contract in the light of such other contracts, if any.

The Contractor shall not cause any unnecessary hindrance or delay to any other contractor working on the project. If the performance of any contract for the project is likely to be interfered with by the simultaneous performance of some other contract or contracts, the Owner's Representative shall decide which contractor shall cease work temporarily and which contractor shall continue or whether the work under the contracts can be coordinated so that the contractors may proceed simultaneously. On all questions concerning conflicting interest of contractors performing related work, the decision of the Owner's Representative shall be binding upon all contractors concerned and the Owner, the Engineer/Architect, the Owner's Representative, and their consultants shall not be responsible for any damages suffered or extra costs incurred by the Contractor resulting directly or indirectly from the award or performance or attempted performance of any other contract or contracts on the project or caused by a decision or omission of the Owner's Representative respecting the order of precedence in the performance of the contracts.

If through acts of neglect on the part of the Contractor, any other contractor or any subcontractor shall suffer loss or damage on the work, the Contractor agrees to settle with such other contractor or subcontractor by agreement or arbitration, if such other contractor or subcontractor will so settle. If such other contractor or subcontractor shall assert any claim against the Owner, the Engineer/Architect, the Owner's Representative, or their consultants or any of their directors,

officers, employees, or agents on account of any damage alleged to have been so sustained, the Owner shall notify the Contractor who shall hold harmless, indemnify, and defend the Owner, Olivenhain Municipal Water District, the Engineer/Architect, the Owner's Representative, and their consultants, and each of their directors, officers, employees, and agents against any such claim, including all attorneys' fees and any other costs incurred by the indemnified parties relative to any such claim.

## 7-20 TERMINATION FOR BREACH

If the Contractor refuses or fails to prosecute the work or any separable part thereof with such diligence as will ensure its completion within the time specified herein, or any extension thereof, or fails to complete such work within such time, or if the Contractor should be adjudged a bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he files a petition to take advantage of any debtor's act, or if he or any of his subcontractors should violate any of the provisions of the contract, or if he should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials to complete the work in the time specified, or if he should fail to make prompt payment to subcontractors or for material or labor, or if he should persistently disregard laws, ordinances, or instructions given by the Owner or Owner's Representative, the Owner may, without prejudice to any other right or remedy, serve written notice upon the Contractor and his surety of his intention to terminate the contract, said notice to contain the reasons for such intention to terminate the contract, and unless within ten days after the service of such notice such violations shall cease and satisfactory arrangements for the corrections thereof be made, the contract shall upon the expiration of said ten days cease and terminate. In such case, the Contractor shall not be entitled to receive any further payment until the work is finished.

In the event of any such termination, the Owner shall immediately serve written notice thereof upon the surety and the Contractor, and the surety shall have the right to take over and perform the contract; provided, however, that if the surety within 15 calendar days after the serving upon it of a notice of termination does not give the Owner written notice of its intention to take over and perform the contract or does not commence performance thereof within 30 calendar days from the date of serving said notice, the Owner may take over the work and prosecute the same to completion by contract or by any other method it may deem advisable for the account and at the expense of the Contractor, and his surety shall be liable to the Owner for any excess cost or other damage occasioned the Owner thereby, and in such event the Owner may, without liability for so doing, take possession of and utilize in completing the work such materials, appliances, plants, and other property belonging to the Contractor that may be on the site of the work and be necessary therefor. For any portion of such work that the Owner elects to complete by furnishing its own employees, materials, tools, and equipment, the Owner shall be compensated for such in accordance with the schedule of compensation for force account work in Article 9-1 PAYMENT FOR CHANGES IN THE WORK.

If the unpaid balance of the contract price exceeds the direct and indirect costs of completing the work, including, but not limited to, all costs to Owner arising from professional services and attorneys' fees and all costs generated to insure or bond the work of substituted contractors or subcontractors utilized to complete the work, such excess shall be paid to Contractor. If such costs exceed the unpaid balance, Contractor shall pay the difference to Owner promptly upon demand; on failure of Contractor to pay, the surety shall pay on demand by Owner. Any portion of such difference not paid by Contractor or surety within 30 calendar days following the mailing of a

demand for such costs by Owner shall earn interest at the rate of 10% per annum or the maximum rate authorized by California law, whichever is lower.

The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to the Owner.

#### 7-21 NOTICE AND SERVICE THEREOF

Any notice required or given under the contract shall be in writing, be dated, and signed by the party giving such notice or his duly authorized representative, and be served as follows:

If to the Owner, by personal delivery or by deposit in the United States mail.

If to the Contractor, by personal delivery to the Contractor or to his authorized representative at the site of the project or by deposit in the United States mail.

If to the surety or any other person, by personal delivery to said surety or other person or by deposit in the United States mail.

All mailed notices shall be in sealed envelopes, shall be sent by certified mail with postage prepaid, and shall be addressed to the addresses in the Contract Documents or such substitute addresses which a party designates in writing and serves as set forth herein.

#### 7-22 PARTIAL INVALIDITY

If any provision of this contract is held by a court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions shall nevertheless continue in full force without being impaired or invalidated in any way.

#### 7-23 ATTORNEYS' FEES

In the event any arbitration proceeding, administrative proceeding or litigation in law or in equity, including an action for declaratory relief, is brought to invalidate, enforce, or interpret any term or provision of this contract, the prevailing party shall recover all attorneys' fees, all expert fees and costs, and all costs of the proceeding which shall be determined by the Court or the presiding officer at the proceeding authorized to make a determination of the issues or in a separate action brought for that purpose, in addition to any other relief provided by California law.

If any party to this agreement becomes a party to any litigation, administrative proceeding or arbitration concerning the invalidation, enforcement or interpretation of the provisions of this agreement or the performance of this agreement by reason of any act or omission of another party or authorized representative of another party to this agreement and not by any act or omission of a party that becomes a party to that proceeding or any act or omission of its authorized representatives, the party that causes another party to become involved in the proceeding shall be liable to that party for all expert fees and costs, all attorneys' fees, and all costs of the proceeding. The award of these expert fees and costs, attorneys' fees, and costs shall be determined as provided above.

From and after any date of submission of any demand or claim to Owner or any of the other indemnified parties covered by any indemnity provisions of this contract, the indemnified party shall be entitled to appoint their own independent counsel to represent them and the Contractor

shall pay all fees and costs incurred by the indemnified parties to investigate and evaluate the claim or cause of action, for all staff time at the hourly rates of each staff member handling the claim or cause of action, all attorneys' fees, all expert fees and costs, and all court costs when and as these fees and costs are incurred by each of the indemnified parties. The Contractor agrees to pay all of these fees, costs, and expenses to each of the indemnified parties not later than thirty (30) days following a demand for reimbursement of these fees, costs, and expenses by each of the indemnified parties. Amounts not paid by the Contractor within this thirty (30) day period shall earn interest at the rate of one percent (1%) per month until paid by Contractor in full.

In the event opposing parties have each prevailed on one or more cause of action actually contested or admitted by pleadings or pre-hearing documents on file, the presiding officer may offset such fees and costs between prevailing parties after considering the necessity of the proceeding and the importance of the issue or issues upon which a party has prevailed. However, the court or presiding officer shall have no authority to relieve the Contractor of the Contractor's obligation to pay all damages, fees, costs, and expenses of each of the indemnified parties as provided in the indemnity provisions of this contract.

The term "prevail" as used in this section shall include any action at law, in equity, or pursuant to arbitration in which either party has been successful including, but not limited to, demurrers, motions to strike, judgments on the pleadings, summary judgments or summary adjudications of issues, any other motion of whatever type or nature, or any trial proceeding or motion.

#### 7-24 LANDS AND RIGHTS-OF-WAY

The lands and rights-of-way for the facility to be constructed will be provided by the Owner. The Contractor shall make his own arrangements and pay all expenses for additional area required by him outside the limits of the Owner's lands and rights-of-way.

Work in public right-of-way shall be done in accordance with the requirements of the permit issued by the public agency in whose right-of-way the work is located in addition to conforming to the Plans and Specifications. If a permit is not required, the work shall conform to the standards of the public agency involved in addition to conforming to the Plans and Specifications.

#### 7-25 NO WAIVER OF RIGHTS OR REMEDIES

No action or failure to act by the Owner, Engineer/Architect, or Owner's Representative shall constitute a waiver of any right or duty afforded any of them under the Contract Documents, nor shall any such action or failure to act constitute an approval of or acquiescence in a breach of this contract by Contractor. No oral waiver of any rights or remedies granted to the Owner, Engineer/Architect, or Owner's Representative shall be effective for any purpose. To be effective, the waiver must be in writing and executed by an authorized representative of Owner, the Engineer/Architect, or the Owner's Representative. Contractor has been informed, and understands, that the Engineer/Architect and Owner's Representative have no authority whatsoever to waive any rights or remedies granted to the Owner by this contract or to alter any term or provision of the Contracts Documents or the approved Plans and Specifications. Any such purported waiver shall be void and unenforceable.

#### 7-26 TAXES

The Contractor shall pay all sales, consumer, use, and other taxes.

NOTICE OF TAXABLE POSSESSORY INTEREST - The terms of this document may result in the creation of a possessory interest. If such a possessory interest is vested in a private party to this document, the private party may be subjected to the payment of personal property taxes levied on such interest.

#### 7-27 ASSIGNMENT OF ANTI-TRUST ACTIONS

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

In submitting a bid to a public purchasing body, the bidder offers and agrees that if the bid is accepted, it will assign to the purchasing body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Chapter 2 [commencing with Section 16700] of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, materials, or services by the bidder for sale to the purchasing body pursuant to the bid. Such assignment shall be made and become effective at the time the purchasing body tenders final payment to the bidder.

Contractor shall insure that a comparable provision is included in all subcontracts at all tier levels which are executed pursuant to this Agreement.

#### 7-28 PAYROLL RECORDS

It shall be the responsibility of the Contractor to maintain 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 employee in accordance with Labor Code Section 1776, and to ensure that each subcontractor also complies with all provisions of Labor Code Section 1776 and this contract provision.

All payroll records shall be certified as accurate by the applicable contractor or subcontractor or its agent having authority over such matters.

The Contractor shall ensure that all payroll records are available for inspection at the Contractor's principal office during normal business hours and shall notify the Owner, in writing, of the place where all payroll records are located from time to time.

The Contractor shall furnish a copy of all payroll records, upon request, to employees or their authorized agents, to the Owner, to the Division of Labor Standards Enforcement, and to the Division of Apprenticeship Standards of the Department of Industrial Relations. The Contractor shall also furnish a copy of payroll records to the general public upon request provided the public request is made through the Owner, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement of the Department of Industrial Relations. In no event shall members of the general public be given access to payroll records at the Contractor's principal office.

Records made available to the general public in accordance with the prior paragraph shall be marked or obliterated in such a manner that the name and address of the Contractor and/or subcontractor and the name, address, and telephone number of all employees does not appear on the modified record.

The Contractor shall file a certified copy of any requested payroll records with the entity that requested such records within ten days of the date a written request for payroll records has been received.

Failure of the Contractor to comply with any provisions of this article or Labor Code Section 1776 within ten days of the date of a written request for compliance is received shall result in a forfeiture of up to \$50 per calendar day or portion thereof, for each worker, until strict compliance is obtained. Upon notification by the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement of the Department of Industrial Relations, the Owner shall withhold penalties under this article or Labor Code Section 1776 from the Contractor's payments then due.

#### 7-29 MODIFICATION

This contract may not be altered in whole or in part except by modification in writing and properly executed by all parties hereto or by change as provided herein.

#### 7-30 JURISDICTION AND VENUE

In the event any legal or equitable proceeding is commenced to invalidate, enforce, or interpret any of the terms or provisions of this contract, the parties expressly agree that jurisdiction and venue shall lie only in the Superior Court located in the North County Judicial District, County of San Diego, State of California. The Contractor acknowledges and agrees that this contract has been executed and requires performance solely within the jurisdiction and venue of the North County Judicial District and that the contract requires work solely within the jurisdiction and venue of the North County Judicial District.

#### 7-31 HAZARDOUS WASTE

It shall be the responsibility of the Contractor to pay all fees and costs associated with removal and cleanup of any hazardous waste used at or brought to the job site by the Contractor, any subcontractor, or any agent, representative, or employee of the Contractor or any subcontractor.

The Contractor shall identify and remove all such hazardous waste in accordance with all federal, state, and local rules and regulations and shall promptly notify the Owner's Representative of any such hazardous waste. If hazardous waste is discovered during performance of the work which has not been brought to, or used at, the job site by the Contractor, any subcontractor, or any agent, representative, or employee of the Contractor or any subcontractor, the Contractor shall identify and remove this hazardous waste in accordance with all federal, state, and local rules and regulations and in accordance with directions of the Owner and the Contractor shall be entitled to request an increase in compensation due for these removal and cleanup costs in accordance with Article 9-1 PAYMENT FOR CHANGES IN THE WORK.



## 7-32 EXCAVATIONS BELOW FOUR (4) FEET

If any work required by this contract includes digging trenches or other excavations that extend deeper than four feet below the surface, the Contractor shall promptly, and before the following conditions are disturbed, notify the Owner in writing of any:

Material that the Contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with the provisions of existing law.

Subsurface or latent physical conditions at the site differing from those indicated.

Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract.

Nothing in this article is intended to relieve the Contractor of his responsibility to carefully examine the Contract Documents and the site where the work is to be performed in accordance with Article 2-8 EXISTING CONDITIONS AND EXAMINATION OF CONTRACT DOCUMENTS; to familiarize himself with all local conditions and federal, state, and local laws, ordinances, rules, and regulations that may affect the performance of any work; to study all surveys and investigation reports about subsurface and latent physical conditions pertaining to the job site; to perform such additional surveys and investigations as the Contractor deems necessary to complete the work at his bid price; and to correlate the results of all such data with the requirements of the Contract Documents.

If the Owner determines that hazardous waste exists and that conditions exist which Contractor could not discover through the investigations required by the preceding paragraph, the Owner shall notify the Contractor and the Contractor may request a change order in accordance with Article 9-1 PAYMENT FOR CHANGES IN THE WORK. Nothing in this article shall relieve the Contractor of the obligation to pay all fees and costs associated with removal and cleanup of any hazardous waste used at, or brought to, the job site by the Contractor as specified in Article 7-31 HAZARDOUS WASTE. Nor shall this article relieve the Contractor of responsibility for site conditions discoverable by any investigation required by the preceding paragraph.

In the event that a dispute arises between the Owner and the Contractor involving hazardous waste and whether site conditions differ materially from those the Contractor could or should have discovered by the investigations required by this contract, the Contractor shall not be excused from the scheduled completion date provided in the Contract Documents and shall proceed with all work in the manner and in the time required by the Contract Documents.

7-33 ARBITRATION All public works claims between the Contractor and Owner relating to this contract where the total claims of both parties are equal to or less than \$375,000 shall be submitted to mediation first and then to arbitration in accordance with Public Contract Code Section 20104, et seq. A copy of Public Contract Code Section 20104, et seq stating these arbitration requirements is attached following the General Provisions. When a total payment of the Contractor and the Owner exceed a total of \$375,000, this section shall not apply and neither the Owner nor the Contractor shall have any obligation to arbitrate the claim.

## **SECTION 8 CONTRACTOR'S INSURANCE**

### **8-1 GENERAL**

The Contractor shall not commence or continue to perform any work unless he, at his own expense, has in full force and effect all required insurance. The Contractor shall not permit any subcontractor to perform work on this project unless the Workers' Compensation Insurance requirements have been complied with by such subcontractor.

The types of insurance the Contractor shall obtain and maintain are Workers' Compensation Insurance and Employer's Liability Insurance, Liability Insurance, Builders' Risk "All Risk" Insurance, all as set forth herein.

Workers' Compensation Insurance and Employer's Liability Insurance and Liability Insurance shall be maintained in effect for the full guarantee period.

Insurers must be authorized to do business and have an agent for service of process in California, have an "A" policyholder's rating and a financial rating of at least Class VI in accordance with the most current rating by A.M. Best Company.

As evidence of specified insurance coverage, the Contractor shall provide certificates of insurance and endorsements on the forms provided as a part of the Contract Documents. No alteration or substitution of said forms will be allowed.

### **8-2 WORKERS' COMPENSATION INSURANCE AND EMPLOYER'S LIABILITY INSURANCE**

Upon execution of the Agreement, the Contractor shall provide a Certificate(s) of Insurance certifying that he has obtained for the period of the contract full Workers' Compensation Insurance coverage for no less than the statutory limits and Employer's Liability Insurance coverage in limits not less than the amounts set forth in the Special Provisions, for all persons whom he employs or may employ in carrying out the work under the contract. At the same time, the Contractor shall provide the Insurance Endorsement(s) on the forms provided as part of the Contract Documents. This insurance shall be in strict accordance with the requirements of the most current and applicable state Workers' Compensation Insurance laws.

### **8-3 LIABILITY INSURANCE**

Upon execution of the Agreement, the Contractor shall provide a Certificate(s) of Insurance showing that he has Liability Insurance coverage in limits not less than the amounts set forth in the Special Provisions. At the same time, the Contractor shall provide the Insurance Endorsement(s) on the forms provided as part of the Contract Documents.

All liability insurance shall include occurrence coverage with a deductible amount not exceeding the amount specified on the liability certificate form.

Included in such insurance shall be a "Cross Liability" or "Severability of Interest" clause.

The Liability Insurance coverage shall include each of the following types of insurance:

- A. General Liability
  - (1) Comprehensive Form.

- (2) Premises-Operations.
- (3) Explosion and Collapse Hazard.
- (4) Underground Hazard.
- (5) Products/Completed Operations Hazard.
- (6) Contractual Insurance.
- (7) Broad Form Property Damage Including Completed Operations.
- (8) Independent Contractors.
- (9) Personal Injury.

**B. Automobile Liability**

- (1) Comprehensive Form Including Loading and Unloading.
- (2) Owned.
- (3) Hired.
- (4) Non-Owned.

The Liability Insurance shall include as additional insureds: the Owner, the Engineer/Architect, the Owner's Representative, and their consultants, and each of their directors, officers, employees, and agents. The insurance afforded to these additional insureds shall be primary insurance. If the additional insureds have other insurance which might be applicable to any loss, the amount of the insurance provided under this article on LIABILITY INSURANCE shall not be reduced or prorated by the existence of such other insurance.

**8-4 BUILDERS' RISK "ALL RISK" INSURANCE**

Upon execution of the Agreement, the Contractor shall provide a Certificate(s) of Insurance showing that he has obtained for the period of the contract Builders' Risk "All Risk" completed value insurance coverage (including any damage attributable directly or indirectly to surface water, runoff, rainfall or flood but excluding earthquake and tidal wave) upon the entire project which is the subject of the contract and including completed work and work in progress. At the same time, the Contractor shall provide the Insurance Endorsement(s) on the forms provided as a part of the Contract Documents. Such insurance shall include as additional insureds: the Owner, the Engineer/Architect, the Owner's Representative, and their consultants, and each of their directors, officers, employees, and agents.

Such insurance may have a deductible clause but not to exceed \$25,000.

**8-5 CONTRACTOR'S LIABILITY NOT LIMITED BY INSURANCE**

Nothing contained in these insurance requirements is to be construed as limiting the liability of the Contractor or the right of the Owner to secure damages in excess of any insurance which may be provided.

## **SECTION 9 ESTIMATES AND PAYMENTS**

### **9-1 PAYMENT FOR CHANGES IN THE WORK**

The Contractor shall not be entitled to any increase in the contract price due to any change in the work unless the Contractor submits a written request within seven calendar days from the date of the event which causes the Contractor to request a change in the price.

Changes in, additions to, or deductions from the work, including increases or decreases in the quantity of any item or portion of the work, shall be set forth in a written change order executed by the Owner and by the Contractor which shall specify:

The changes, additions, and deductions to be made.

The increase or decrease in compensation due the Contractor, if any.

Adjustment in the time of completion, if any.

Adjustment in the compensation due the Contractor shall be determined by one or more of the following methods in the order of precedence listed below:

Unit price contained in the contract.

Mutually agreeable lump sum or unit prices. If requested by the Owner's Representative, the Contractor shall furnish an itemized breakdown of the quantities and prices used in computing proposed lump sum and unit prices.

Force account whereby the Contractor is compensated for furnishing labor, materials, tools, and equipment as follows:

Cost of labor plus 15% for workers directly engaged in the performance of the work. Cost of labor shall include actual wages paid including employer payments to or on behalf of the workers for health and welfare, pension, vacation, and similar purposes plus payments imposed on payroll amounts by state and federal laws plus subsistence and travel allowance payments to workers.

Cost of material plus 15%. Cost of material shall include sales tax, freight, and delivery charges. The Owner reserves the right to furnish such materials as he deems advisable and the Contractor shall not be paid the 15% markup on such materials.

For tools and equipment actually engaged in the performance of the work, rental rates plus 15%. The rental rates shall be those prevailing in the area where the work is performed. No rental charge shall be made for the use of tools or equipment having a replacement value of \$500 or less.

Subcontractor invoices to the Contractor plus 5%. Subcontractor invoices shall be based on the above-described cost of labor plus 15%, cost of material plus 15%, and tool and equipment rental rates plus 15%.

No payment shall be made for any item not set forth above, including without limitation, Contractor's overhead, general administrative expense, supervision, or damages claimed for delay in prosecuting the remainder of the work.

For force account work, the Contractor shall submit to the Owner's Representative for his verification, daily work sheets showing an itemized breakdown of labor, materials, tools, and equipment used in performing the work. No payment will be made for work not verified by the Owner's Representative.

## 9-2 PROGRESS PAYMENTS

The Contractor shall, on or before the third day of each calendar month after actual construction work is started, prepare the Progress Estimate and Payment Form included at the end of the General Provisions. The Contractor and the Owner's Representative shall review each work item and agree on the total value of work performed during the previous month. In the event the Contractor and the Owner's Representative cannot agree on the estimated total value of work during the previous month, the estimated total value of work performed as determined by the Owner's Representative during the previous month shall be used. No progress payment will be processed by the Owner until all information required by the Progress Estimate and Payment Form has been completed and the Contractor has signed the form. By signing the Progress Estimate and Payment Form, the Contractor expressly waives and releases any claims the Contractor may have, of whatever type or nature, for the period specified which is not shown as a retention amount or a disputed claim on the Release Form included at the end of the General Provisions. The Contractor shall submit to the Owner within seven days from signing the Progress Estimate and Payment Form a completed and signed Release Form that corresponds to the same pay estimate work period. The Owner shall have no obligation to pay the Contractor for any work done until the Release Form has been executed by the Contractor and submitted to the Owner for the corresponding pay period in accordance with Article 9-6 REQUIRED RELEASES.

Properly submitted Progress Estimate and Payment Form with corresponding Release Form shall be paid by the Owner within thirty days after receipt. Properly submitted forms not paid within this thirty-day period shall earn interest at the legal rate set forth in subdivision (a) of Section 685.010 of the Code of Civil Procedure. The Contractor and Owner agree that the thirty-day period for payment shall not commence until the Contractor has executed and submitted the Release Form to the Owner for the corresponding pay period.

In preparing any progress payment with the Contractor, the Owner's Representative will may use the cost breakdown in by Article 6-3 CONTRACTOR'S CONSTRUCTION SCHEDULE AND COST BREAKDOWN. No allowance shall be made for materials delivered but not installed. In evaluating any progress payment, the Owner's Representative may take into consideration any facts and conditions deemed proper by him or her in his or her sole discretion including, but not limited to, the ratio of the difficulty or cost of the work done to the probable difficulty or cost of the work remaining to be done under the contract, the value of the work actually completed, and the estimated cost to complete all of the work in accordance with the contract price. In the event of any dispute between the Owner and the Contractor on the amount that should be paid for any progress payment, the determination of the Owner or the Owner's Representative shall control and be binding on the Contractor. No dispute between the Contractor and the Owner concerning the amount to be paid for any progress payment shall relieve the Contractor of its continuing obligation to complete all contract work within the time required by the Contract Documents, and to complete the work for the contract price and shall not relieve the Contractor of any other obligations contained in the Contract Documents. Owner shall retain five percent (5%) of each

progress payment approved by the Owner's Representative as part security for the fulfillment of the contract by Contractor, unless Contractor has substituted adequate equivalent securities as required by Article 9-5 WITHHELD CONTRACT FUNDS. The total amount retained will equal 5% of the contract price. In the event of a dispute between the Owner and Contractor, the Owner shall have the right to withhold an amount up to 150% of the disputed amount in accordance with Public Contract Code Section 7107(c). As part of any progress payment the Owner shall have the express right to deduct and withhold from any payments due the Contractor any amounts the Owner or the Owner's Representative determines are necessary or appropriate to cover all fees, costs, expenses, and damages incurred or estimated by the Owner as a result of any breach of this contract by the Contractor and to cover any and all damages suffered or estimated by the Owner as a result of the breach of any term or provision of the contract by the Contractor. Amounts the Owner may withhold also expressly include any and all liquidated damages authorized by the terms of this contract.

### 9-3 FINAL ESTIMATE AND PAYMENT

Contractor shall not make any request for the final payment until all work required by the Plans and Specifications of the Contract Documents has been completed to the satisfaction of the Owner's Representative. Upon receipt of a request from Contractor for final payment, the Owner's Representative will make a final inspection of the work done and advise the Contractor of additional work required before final payment will be processed. All prior progress estimates and payments shall be subject to correction in the final estimate and payment.

The final payment shall not be due and payable until 60 calendar days after the date of filing a Notice of Completion of the accepted work. The date of completion shall be determined in accordance with Public Contract Code Section 7107. In the event of a dispute between the Owner and the Contractor, Owner shall be entitled to withhold an amount up to 150% of the disputed amount.

It is mutually agreed between the parties to the contract that no certificate given or payment made under this contract shall constitute evidence of performance of the contract and no payment by Owner shall be construed as an acceptance of any defective work or improper materials.

Contractor shall not be entitled to payment of the final amount due until Contractor has executed a Release Form in accordance with Article 9-6 REQUIRED RELEASES. Contractor hereby expressly agrees that payment of the final amount due under the contract shall release the Owner, the Engineer/Architect, the Owner's Representative, and their consultants, and each of their directors, officers, employees, and agents, from any and all claims relating to the work for which Contractor is being paid. It is the declared intention of the parties that this provision comply with Public Contract Code Section 7100 and that this section shall be construed as in compliance with Public Contract Code Section 7100 to the maximum feasible extent.

### 9-4 OWNER'S RIGHT TO WITHHOLD CERTAIN AMOUNTS AND MAKE APPLICATION THEREOF

In addition to the amounts which the Owner may retain under Sections 9-2 and 9-3 of this contract, the Owner may withhold a sufficient amount or amounts from any payment otherwise due to the Contractor (including any final payment) as may be necessary or appropriate in Owner's sole and exclusive judgment to cover each of the following:

Payments which are or may be past due and payable for properly filed claims against the Contractor or any subcontractors for any labor, materials, or equipment furnished in or about the performance of the work on the project under this contract including any amounts asserted as attorneys' fees, costs, or interest by the claimant.

All fees, costs, and expenses estimated by the Owner for correcting any work determined to be defective by the Owner.

Any amounts determined appropriate or necessary by the Owner to cover the Owner's estimate of any damages paid or payable as a result of any claim or cause of action on the contract caused, or claimed to be caused by any action or omission of Contractor, any subcontractor, supplier or materialmen or their respective directors, officers, agents, employees, members, managers or consultants and all fees, costs, and expenses, including all attorneys' fees, expert fees and costs, staff time at each staff members' normal hourly rates and all court costs estimated by the Owner in responding to the claim or cause of action.

Any amounts determined necessary or appropriate by Owner to cover all of the indemnity obligations of Contractor under this contract.

Any amounts claimed by the Owner as forfeiture due to delay and any and all other amounts, fees, costs, or expenses estimated by the Owner as offsets.

The Owner has the express authority to withhold any amount or amounts determined appropriate by Owner from time to time from any payments otherwise due Contractor to cover all or any of the preceding items in the Owner's sole and exclusive judgment. The Owner may also apply all or any portion of any such withheld amount or amounts to the payment of any claims in such amounts and at such times as are determined appropriate by Owner, in Owner's discretion. In withholding any sums permitted by this section or in paying any claims, the Owner shall be deemed the agent of the Contractor and any payments made by the Owner on any claim shall be considered as a payment made under the contract by the Owner to the Contractor. The Owner shall not be liable to the Contractor for Owner's withholding of any and all amounts permitted by this section or Owner's payment of any claims as permitted by this section. Such withholdings and payments may be made by Owner at any time without prior judicial determination of the merits of any claims or causes of action. The Owner will render to the Contractor a proper account of any funds withheld or disbursed as permitted by this section.

#### 9-5 WITHHELD CONTRACT FUNDS

Pursuant to Public Contract Code Section 22300, the Contractor may substitute equivalent securities for retention amounts which this Contract requires. However, the Owner reserves the right to solely determine the adequacy of the securities being proposed by the Contractor and the value of those securities. The Owner shall also be entitled to charge an administrative fee, as determined by Owner in its sole discretion, for substituting equivalent securities for retention amounts.

The Contractor agrees that the Owner's decision with respect to the administration of the provisions of Section 22300 shall be final and binding and not subject to subsequent litigation or arbitration of any kind as to acceptance of any securities being proposed, the value of these securities, the costs of administration and the determination of whether or not the administration should be accomplished by an independent agency or by the Owner. The Owner shall be entitled,

at any time, to request the deposit of additional securities of a value designated by the Owner, in Owner's sole discretion, to satisfy this requirement. If the Owner does not receive satisfactory securities within 12 calendar days of the date of the written request, Owner shall be entitled to withhold amounts due Contractor until securities of satisfactory value to Owner have been received.

#### **9-6 REQUIRED RELEASES**

In accordance with Public Contract Code Section 7100, the Contractor shall not be entitled to any payment specified in this Contract which is undisputed until such time as the Contractor has executed the Release Form(s) included at the end of the General Provisions releasing the Owner from all claims relating to work for which the Contractor is being paid. The Release Form contains space for the Contractor to claim any disputed amount and to designate the retention amount for each pay period associated with the release. Contractor hereby expressly agrees that failure on his part to designate any disputed amount or to designate the correct retention amount for each release period on the Release Form shall constitute an express waiver of the right of the Contractor to claim any disputed amount or any retention amount at any later date. The Owner shall have no obligation to pay the Contractor for any work done until the Release Form at the end of the General Provisions has been executed by the Contractor and submitted to the Owner.

### **SECTION 10 AUTHORITY AND STATUS OF OWNERS REPRESENTATIVES**

#### **10-1 STATUS OF OWNERS REPRESENTATIVES**

The Contractor has been informed, and understands, that the Engineer/Architect and the Owner's Representative are not agents or employees of Owner. They are independent contractors retained by Owner to assist in preparation of the design plans for the work and in supervising the work to be performed by the Contractor. Owner does not direct the Engineer/Architect or the Owner's Representative in the performance of their respective duties and obligations. Owner shall not be liable for any errors or omissions of the Engineer/Architect, the Owners Representative or their respective directors, officers, agents or employees.

#### **10-2 AUTHORITY OF OWNER'S REPRESENTATIVES**

Contractor has been informed, and understands, that the Engineer/Architect and the Owner's Representative have no authority to alter any of the terms or provisions of the Contract Documents

or to alter any of the requirements contained in the plans and specifications approved by Owner. In the event that Contractor desires to modify any term or provision of the Contract Documents or to modify any of the requirements of the approved plans and specifications, a written request must be submitted with the requested changes to the Owner through the Owner's Representative. Only the general manager of Owner has the authority to alter or modify any of the terms or provisions of the Contract Documents. No modification or change to the Contract Documents shall be effective for any purpose unless the change or modification has been expressly approved, in writing, by the general manager of Owner. Any requested changes by the Contractor to the approved plans and specifications must be submitted to the Owner's Engineer for review and approval through the Owner's Representative. No changes to the approved plans or specifications shall be effective for any purpose unless the Owner's Engineer has expressly approved of the change, in writing. The Contractor is expressly prohibited from entering onto private property, disturbing any habitat, or using private property to stockpile, store, or spread any men, tools, equipment, materials, or dirt without the express prior written consent of the general manager of Owner. The violation of this



section by Contractor or any of its subcontractors, materialmen, or suppliers or their respective directors, officers, managers, members, agents, consultants or employees shall constitute a material breach of this Agreement.

## **SECTION 11 FORMS**

### **11-1 APPROVED MATERIALS LIST SUBMITTAL**

The Contractor shall complete the Approved Materials List (AML) which can be found on the Bids and Planning page of the District's website at [www.olivenhain.com](http://www.olivenhain.com) as called for in the Special Provisions and Standard Specifications and submit as directed by the Owner's Representative. No substitution or revision to this form will be accepted or approved by the Owner.

### **11-2 SHOP DRAWING SUBMITTAL FORM**

The Contractor shall complete the Shop Drawing Submittal Form included at the end of the General Provisions when submitting Shop Drawings as called for in the Special Provisions and Standard Specifications or requested by the Owner's Representative. Duplication of this form is permissible to comply with the requirements of the Contract Documents. No substitution or revision to this form will be accepted and approved by the Owner.

### **11-3 PROGRESS ESTIMATE AND PAYMENT FORM**

The Contractor will use the Progress Estimate and Payment Form included at the end of the General Provisions when preparing the monthly progress payment for review. No progress payment will be processed to pay the Contractor until the progress estimate and payment form and the release form included at the end of these general provisions have been fully completed and submitted by the Contractor to the Owner's Representative and approved by the Owner.

### **11-4 RELEASE FORM(S)**

The Contractor shall complete the Conditional and/or Final Release Forms (as appropriate) included at the end of the General Provisions and submit to the Owner for the corresponding pay period in accordance with Article 9-6, REQUIRED RELEASES. Duplication of this form is permissible to comply with the requirements of the Contract Documents. No substitution or revision to this form will be accepted. No payment request to the Contractor will be processed until the Release Form has been fully completed and submitted by the Contractor.

**END OF SECTION**

## SHOP DRAWING SUBMITTAL FORM

TO: OWNER'S REPRESENTATIVE  
c/o Olivenhain Municipal Water District  
19090 Via Ambiente Road  
Escondido, CA 92029

From: (Contractor)  
(Address)

Contractor Job Number \_\_\_\_\_

Owner: **OLIVENHAIN MUNICIPAL WATER DISTRICT**

OMWD PN: **D120068**

Project: **David C. McCollom WTP pH Control System Project**

OWNER'S REP ACCT NO. \_\_\_\_\_

SUBMITTAL NO.: \_\_\_\_\_

RESUBMITTAL: ☐ Yes ☐ No

SPECIFICATION SECTION: \_\_\_\_\_

DESCRIPTION: \_\_\_\_\_

This Shop Drawing Submittal has been prepared by the Contractor or any subcontractor, manufacturer, supplier, or distributor and illustrates some portion of the work. The Contractor warrants one of the following conditions:

- ☐ The Contractor has approved this submittal and represents that the material, equipment, and other work shown conforms to the Plans and Specifications.
- ☐ The Contractor has approved this submittal but represents that this is a deviation from the requirements of the Plans and Specifications and has set forth the reasons for the deviation below.

DEVIATION/REVISIONS:

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

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

## PROGRESS ESTIMATE AND PAYMENT FORM

Owner: **OLIVENHAIN MUNICIPAL WATER DISTRICT**

OMWD PN: **D120068**

Project: **David C. McCollom WTP pH Control System Project**

Contract End Date \_\_\_\_\_

Contractor: \_\_\_\_\_

Revised Contract End Date \_\_\_\_\_

**PAY ESTIMATE NO.** \_\_\_\_\_

**PERIOD WORK PERFORMED:** \_\_\_\_\_

Contract Job No. \_\_\_\_\_

Date Created \_\_\_\_\_

Work Item	Description of Work Item	Total Cost of Work Item	Percent Complete	Value of Work
Total Project Cost of Work Items				-----
Estimated Total Value of Work Performed				
Less Five Percent (5%) of Such Estimated Total Value				
Total Amount Due for Work Performed				
Less All Previous Payments				
<b>AMOUNT DUE AND PAYABLE TO THE CONTRACTOR</b>				
Prepared by Owner's Representative _____  <div style="display: flex; justify-content: space-between;"> <div>             Accepted by CONTRACTOR               By: _____               Date: _____           </div> <div>             Approved by OWNER               By: _____               Date: _____           </div> </div>				
Distribution: <input type="checkbox"/> Owner <input type="checkbox"/> Contractor <input type="checkbox"/> Engineer <input type="checkbox"/> Finance				

**CONDITIONAL WAIVER AND RELEASE ON  
PROGRESS PAYMENT**

(CA CIVIL CODE §8132) (1)

**NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.**

**Identifying Information:**

Name of Claimant: \_\_\_\_\_

Name of Customer: **Olivenhain Municipal Water District**

Job Location: 19090 Via Ambiente Rd. Escondido, CA 92029

Owner: Olivenhain Municipal Water District

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

**Conditional Waiver and Release**

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: Olivenhain Municipal Water District

Amount of Check: \_\_\_\_\_

Check Payable to: \_\_\_\_\_

This document does not affect any of the following:

- (1) Retentions.
- (2) Extras for which the claimant has not received payment.
- (3) The following progress payments for which the claimant has previously given a conditional waiver and release but has not received payment:  
Date(s) of waiver and release: \_\_\_\_\_  
Amount(s) of unpaid progress payment(s): \$ \_\_\_\_\_
- (4) Contract rights, including:  
(A) a right based on rescission, abandonment, or breach of contract, and  
(B) the right to recover compensation for work not compensated by the payment.

**SIGNATURE**

Claimant's Signature: \_\_\_\_\_

Claimant's Title: \_\_\_\_\_

Date of Signature: \_\_\_\_\_

**CONDITIONAL WAIVER AND RELEASE ON  
FINAL PAYMENT**

(CA CIVIL CODE §8136) (3)

**NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.**

**Identifying Information:**

Name of Claimant: \_\_\_\_\_

Name of Customer: **Olivenhain Municipal Water District**

Job Location: 19090 Via Ambiente Rd. Escondido, CA 92029

Owner: \_\_\_\_\_

**Conditional Waiver and Release**

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: Olivenhain Municipal Water District

Amount of Check: \_\_\_\_\_

Check Payable To: \_\_\_\_\_

**Exceptions**

This document does not affect any of the following:

Disputed claims for extras in the amount of: \$ \_\_\_\_\_

**SIGNATURE**

Claimant's Signature: \_\_\_\_\_

Claimant's Title: \_\_\_\_\_

Date of Signature: \_\_\_\_\_

## PROPOSED CHANGE ORDER

Owner: **OLIVENHAIN MUNICIPAL WATER DISTRICT**

OMWD PN: **D120068**

Project: **David C. McCollom WTP pH Control System Project**

Contractor: \_\_\_\_\_

**PROPOSED CHANGE ORDER NO.** \_\_\_\_\_

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

\*A change to the contract documents for the above referenced project is being considered. Please provide cost and schedule impact(s) for the following described work:

**DESCRIPTION OF CHANGE / PCO's**

**Cost Impact**

**Schedule Impact**

\$ \_\_\_\_\_

\_\_\_\_\_ Day(s)

**TOTAL**

**Calendar Day(s)**

\$ \_\_\_\_\_

\_\_\_\_\_

**NOTE: Attention is called to the sections in the General Provisions on Scope of Work and Estimates and Payments.**

**THIS PROPOSED CHANGE ORDER IS NOT EFFECTIVE UNTIL A CONTRACT CHANGE ORDER HAS BEEN APPROVED BY OWNER.**

This PCO was initiated by \_\_\_\_\_

On \_\_\_\_\_

Submitted \_\_\_\_\_

On \_\_\_\_\_

Contractor

## Article 1.5

### RESOLUTION OF CONSTRUCTION CLAIMS

Section	Section
20104. Application of article; provisions included in plans and specifications.	20104.6. Payment on undisputed portion of claim; interest on arbitration awards or judgments
20104.2. Claims; requirements; tort claims excluded.	20104.8. Repealed.
20104.4. Civil action procedures; mediation and arbitration; trial de novo; witnesses.	

*Article 1.5 was added by Stats. 1994, c. 726 (A.B. 3069), § 22, eff. Sept. 22, 1994.*

*Former Article 1.5, Resolution of Construction Claims, consisting of §§20104 to 20104.8, added by Stats. 1990, c. 1414 (A.B. 4165), § 2, was repealed by Stats. 1990, c. 1414 (A.B. 4165), § 2, operative Jan. 1, 1994.*

#### **§ 20104. Application of article; provisions included in plans and specifications**

(a) (1) This article applies to all public works claims of three hundred seventy-five thousand dollars (\$375,000) or less which arise between a contractor and local agency.

(2) This article shall not apply to any claims resulting from a contract between a contractor and a public agency when the public agency has elected to resolve any disputes pursuant to Article 7.1 (commencing with Section 10240) of Chapter 1 of Part 2.

(b) (1) “Public work” has the same meaning as in Sections 3100 and 3106 of the Civil Code, except that “public work” does not include any work or improvement contracted for by the state or the Regents of the University of California.

(2) “Claim” means a separate demand by the contractor for (A) a time extension, (B) payment of money or damages arising from work done by, or on behalf of, the contractor pursuant to the contract for a public work and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or (C) an amount the payment of which is disputed by the local agency.

(c) The provisions of this article or a summary thereof shall be set forth in the plans or specifications for any work which may give rise to a claim under this article.

(d) This article applies only to contracts entered into on or after January 1, 1991.

(Added by Stats. 1994, c. 726 (A.B. 3069), § 22, eff. Sept. 22, 1994.)

#### **Historical and Statutory Notes**

**1990 Legislation**  
Former § 20104 was renumbered Public Contract Code § 20103.5 and amended by Stats. 1990, c. 1414 (A.B. 4165), § 1.  
Former § 20104, added by Stats. 1990, c. 1414 (A.B. 4165), § 2, relating to application of article regarding resolution

of construction claims, was repealed by Stats. 1990, c. 1414 (A.B. 4165), § 2, operative Jan. 1, 1994. See, now, this section.

**Derivation:** Former § 20104, added by Stats. 1990, c. 1414, § 2.

#### **§ 20104.2 Claims; requirements; tort claims excluded**

For any claim subject to this article, the following requirements apply:

(a) The claim shall be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the date of final payment. Nothing in this subdivision is intended to extend the time limit or supersede notice requirements otherwise provided by contract for the filing of claims.

(b) (1) For claims of less than fifty thousand dollars (\$50,000), the local agency shall respond in writing to any written claim within 45 days of receipt of the claim, or may request, in writing, within 80 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 15 days after receipt of the further documentation or within a period of time no greater than that taken by the claimant in producing the additional information, whichever is greater.

(c) (1) For claims of over fifty thousand dollars (\$50,000) and less than or equal to three hundred seventy-five thousand dollars (\$375,000), the local agency shall respond in writing to all written claims within 60 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 30 days after receipt of the further documentation, or within a period of time no greater than that taken by the claimant in producing the additional information or requested documentation, whichever is greater.

(d) If the claimant disputes the local agency's written response, or the local agency fails to respond within the time prescribed, the claimant may so notify the local agency, in writing, either within 15 days of receipt of the local agency's response or within 15 days of the local agency's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the local agency shall schedule a meet and confer conference within 30 days for settlement of the dispute.

(e) Following the meet and confer conference, if the claim or any portion remains in dispute, the claimant may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the claimant submits his or her written claim pursuant to subdivision (a) until the time that claim is denied as a result of the meet and confer process, including any period of time utilized by the meet and confer process.

(f) This article does not apply to tort claims and nothing in this article is intended nor shall be construed to change the time periods for filing tort claims or actions specified by Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of Government Code.

(Added by Stats. 1994, c. 726 (A.B. 3069), § 22, eff. Sept. 22, 1994.)



#### Historical and Statutory Notes

##### 1990 Legislation

Former § 20104.2, added by Stats. 1990, c. 1414 (A.B. 4165), § 2, amended by Stats. 1991, c. 1029 (A.B. 1086), § 1, relating to requirements for claims filed under the article,

was repealed by Stats. 1990, c. 1414 (A.B. 4165), § 2, operative Jan. 1, 1994. See, now, this section.

**Derivation:** Former § 20104.2, added by Stats. 1990, c. 1414, § 2, amended by Stats. 1991, c. 1029, § 1.

#### Library Reference

California Practice Guide: Alternative Dispute Resolution, Knight, Fannin & Disco, see Guide's Table of Statutes for chapter paragraph number references to paragraphs discussing this section.

Civil Procedure Before Trial, Well & Brown, Guide's Table of Statutes for chapter paragraph number references to paragraphs discussing this section.

### § 20104.4 Civil action procedures, mediation and arbitration; trial de novo; witnesses

The following procedures are established for all civil actions filed to resolve claims subject to the article:

(a) Within 60 days, but no earlier than 30 days, following the filing or responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within 15 days by both parties of a disinterested third person as mediator, shall be commenced within 30 days of the submittal, and shall be concluded within 15 days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties fail to select a mediator within the 15-day period, any party may petition the court to appoint the mediator.

(b) (1) If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act of 1986 (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

(2) Notwithstanding any other provision of law, upon stipulation of the parties, arbitrators appointed for purposes of this article shall be experienced in construction law, and , upon stipulation of the parties, mediators and arbitrators shall be paid necessary and reasonable hourly rates of pay not to exceed their customary rate, and such fees and expenses shall be paid equally by the parties, except in the case of arbitration where the arbitrator, for good cause, determines a different division. In no event shall these fees or expenses be paid by state or county funds.

(3) In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, any party who after receiving an arbitration award requests a trial de novo but does not obtain more favorable judgment shall, in addition to payment of costs and fees under that chapter, pay the attorney's fees of the other party arising out of the trial de novo.

(c) The court may, upon request by any party, order any witnesses to participate in the mediation or arbitration process.

(Added by Stats. 1994, c. 726 (A.B. 3069), § 22, eff. Sept. 22, 1994.)

#### Historical and Statutory Notes

##### 1990 Legislation

Former § 20104.4, added by Stats. 1990, c. 1414 (A.B. 4165), § 2, amended by Stats. 1991, c. 1029 (A.B. 1086), § 2, relating to procedures for civil actions filed to resolve construction claims, was repealed by Stats. 1990, c. 1414

(A.B. 4165), § 2, operative Jan. 1, 1994. See, now, this section.

**Derivation:** §20104.4, added by Stats. 1990, c. 1414, § 2, amended by Stats. 1991, c. 1029, § 2.

#### Library Reference

California Practice Guide: Alternative Dispute Resolution,  
Knight, Fannin & Disco, see Guide's Table of Statutes

for chapter paragraph number references to paragraphs  
discussing this section.

### **§ 20104.6 Payment on undisputed portion of claim; interest on arbitration awards or judgments**

(a) No local agency shall fail to pay money as to any portion of a claim which is undisputed except as otherwise provided in the contract.

(b) In any suit filed under Section 20104.4, the local agency shall pay interest at the legal rate on any arbitration award or judgment. The interest shall begin to accrue on the date the suit is filed in a court of law.

(Added by Stats. 1994, c. 726 (A.B. 3069), § 22, eff. Sept. 22, 1994.)

#### Historical and Statutory Notes

##### 1990 Legislation

Former § 20104.6, added by Stats. 1990, c. 1414 (A.B. 4165), § 2, relating to payment of undisputed portion of claims, was repealed by Stats. 1990, c. 1414 (A.B. 4165), § 2, operative Jan. 1, 1994. See, now, this section.

**Derivation:** Former § 20104.6, added by Stats. 1990, c. 1414, § 2.

### **§ 20104.8 Repealed by Stats. 1990, c. 1414 (A.B. 4165), § 2, operative Jan. 1, 1994**

#### Historical and Statutory Notes

The repealed section, added by Stats. 1990, c. 1414 (A.B. 4165), § 2, related to application of the article to specified

contracts and provided for repeal of the article on Jan 1, 1994.

## SECTION 00810 – SPECIAL PROVISIONS

### 1.01 DEFINITIONS

Whenever the following terms occur in the Contract Documents, the meaning shall be interpreted as follows:

ATTORNEY FOR Owner – Alfred E. Smith, Nossaman LLP, 777 South Figueroa Street, 34th Floor, Los Angeles, CA 90017, (213) 612-7831

BOARD OF DIRECTORS - Board of Directors of the Olivenhain Municipal Water District.

CONTRACT TIME – The number of consecutive days stated in the contract documents commencing from the date of the notice of award, for completion of the Work.

DATE OF AWARD OF CONTRACT - The date of the District Resolution (formal action of the Board of Directors of the District) awarding the Contract.

DISTRICT - Olivenhain Municipal Water District (OMWD), David C. McCollom Water Treatment Plant, 19090 Via Ambiente Road, Escondido, California 92029, (760) 740-1385.

DISTRICT'S REPRESENTATIVE - The Owner's Representative.

DRAWINGS or PLANS – Construction drawings entitled, “**DAVID C. MCCOLLOM WTP PH CONTROL SYSTEM PROJECT**” and referenced Standard Drawings or Regional Standard Drawings.

ENGINEER / DESIGN ENGINEER – Dudek, 605 Third Street, Encinitas, CA 92024, Tel: (760) 942.5147.

OWNER - Olivenhain Municipal Water District (OMWD), David C. McCollom Water Treatment Plant, 19090 Via Ambiente Road, Escondido, California 92029, (760) 740-1385; Fax: (760) 740-1702.

OWNER'S REPRESENTATIVE - The person or engineering/architectural firm authorized by the District to represent it during the performance of the work and until final acceptance. The Owner's Representative is referred to throughout the Contract Documents as if singular in number and masculine in gender. The Owner's Representative means the Owner's Representative and his assistants.

PUBLIC WORKS SPECIFICATIONS – Latest edition of the Standard Specifications for Public Works Construction by APWA/AGC, the latest edition of the "GREENBOOK" with Regional Supplement Amendments.

REGIONAL STANDARD DRAWINGS – Standard Drawings for Agencies in the San Diego Region as recommended by the Regional Standards Committee and published by the San Diego County Department of Public Works, (latest version).

SPECIAL PROVISIONS - Section 00810 of the specifications.

SPECIFICATIONS - Division 1 to 17 of the technical specifications contained in these Contract Documents, and those technical specifications contained in the Drawings.

STANDARD DRAWINGS - Drawings A-1.1 through G-13 of the Olivenhain Municipal Water District, Standard Specifications and Drawings for the Construction of Water, Recycled Water, and Sewer Facilities, dated June 2008, with revisions.

STANDARD SPECIFICATIONS - Divisions 1 through 15 of the Olivenhain Municipal Water District, Standard Specifications and Drawings for the Construction of Water, Recycled Water, and Sewer Facilities, dated June 2008, with revisions.

STATE STANDARD SPECIFICATIONS - State of California, Department of Transportation, Standard Specifications, May 2006, Caltrans.

STATE STANDARD PLANS - State of California, Department of Transportation, Standard Plans, May 2006, Caltrans.

Whenever the following terms appear in the State Standard Specifications or Public Works Specifications, the meaning shall be interpreted as follows:

AGENCY, BOARD or DEPARTMENT - The Owner.

ENGINEER - The Owner's Representative.

## 1.02 TERMS

Command type sentences used in the Contract Documents refer to and are directed to the Contractor.

## 1.03 ABBREVIATIONS

Interpret abbreviations used on the Drawings and in the Specifications as explained on the Drawings.

## 1.04 MARKING AND ADDRESSING BID ENVELOPE

Bids shall be made on the Bid Form and Bid Bond included within the Contract Documents. Complete and include the Bid Form Checklist together with the completed Bid Form and Bid Bond when submitting a bid. Seal the Contract Documents with the filled out bid in an envelope marked and addressed as follows:

BID FOR CONSTRUCTION OF:

DAVID C. MCCOLLOM WTP PH CONTROL SYSTEM PROJECT

OLIVENHAIN MUNICIPAL WATER DISTRICT

Attention: Geoff Fulks, Water Treatment Facilities Supervisor

David C. McCollom Water Treatment Plant, 19090 Via Ambiente Road,  
Escondido, California 92029

#### 1.05 AWARD OF CONTRACT OR REJECTION OF BIDS

Within a period of 60 calendar days after the opening of bids, the District will accept or reject the bids.

#### 1.06 CONTRACTOR'S LICENSING REQUIREMENTS

The District has determined the license classification necessary to bid and perform the subject contract. In no case shall this contract be awarded to a specialty contractor whose classification constitutes less than a majority of the portion of the work of this contract, all work to be performed outside of the contractor's license specialty, except work specifically authorized by District, shall be performed by a licensed subcontractor in compliance with the Subletting and Subcontractor Fair Practices Act commencing with Section 4100 et seq., of the Public Contract Code. See Business and Professions Code Section 7059.

The Contractor's license classification required for this project is a California State Contractor's License Class A.

It is the District's intent that "plans", as used in Public Contract Code Section 3300, is defined as the construction Contract Documents, which include both the Drawings and the Specifications

#### 1.07 TIME FOR COMPLETION AND FORFEITURE DUE TO DELAY

The work shall be completed within ONE HUNDRED EIGHTY CONSECUTIVE CALENDAR DAYS from and after the date of the Notice to Proceed.

The Contractor will not be permitted to begin work until the agreement, bonds or substitutes, insurance certificates and endorsements are acceptable to the District and Attorney for Owner. This period of time is set forth in Paragraph 3-2 Execution of Contract in the General Provisions. Time is of the essence in this contract.

The Contractor shall complete all work in its entirety as specified in the Contract Documents within these time periods. Time of completion shall also include time for all submittals and coordination required to satisfy the requirements of these Contract Documents.

The Contractor agrees that the work shall be prosecuted regularly, diligently, and uninterruptedly and at such rate of progress as will insure full completion thereof within the Time for completion stated above. It is expressly understood and agreed, by and between Contractor and Owner that the Time for completion is reasonable for the completion of the WORK, taking into consideration the average climatic range, usual industrial conditions prevailing in this locality, and lead time required to procure equipment.

Pursuant to Government Code 53069.85, forfeiture for each day completion is delayed beyond the time allowed will be at the rate of \$500.00 per day.

#### 1.08 PERMITS

The Contractor shall obtain all required permits and provide copies of all permits to the District's Representative prior to starting work, including the San Diego County Air Pollution

Control District's permits for construction and operation of diesel generators. The Contractor shall comply with the ordinances, directives, and regulations of the respective agencies with jurisdiction over the area of the work. All work not specifically covered in the required permits shall conform to the requirements of these Specifications. The cost of all permits and plan check review shall be borne by the Contractor and included in the Contractor's bid.

The Contractor shall be responsible for developing haul routes for the importing or exporting of materials or equipment for the project and obtaining all required permits from the affected agencies of jurisdiction, i.e., City of Escondido. The Contractor shall provide copies of all permits to the District's Representative prior to starting work. The Contractor shall comply with the ordinances, directives, and regulations of the respective agencies with jurisdiction over the area of the work. All costs for transport fees, dump fees, plan or haul route reviews, permits, and related incidentals shall be borne by the Contractor and included in the Contractor's bid.

#### 1.09 USE OF ASBESTOS PRODUCTS NOT PERMITTED

The intent of the Contract Documents is to provide asbestos-free components throughout the project in accordance with the recent Environment Protection Agency stated policy seeking a ban on the use of all products containing asbestos. Where the Contract Documents or the referenced specifications, standards, codes, or tests refer to products containing asbestos, the Contractor shall provide acceptable alternatives under those documents, or in the absence of such referenced alternatives, he shall submit a proposed substitute to the District's Representative for review and acceptance.

#### 1.10 ASBESTOS CEMENT PIPE REMOVAL AND DISPOSAL

If asbestos cement pipe must be cut and handled in the field to accomplish the work, the Contractor is solely responsible for and shall take all appropriate precautions for protecting against threats to health and safety of the work force and general public arising out of construction involving asbestos. The Contractor shall comply with all applicable regulations for the handling, cutting, shaping, installation and disposal of asbestos. Asbestos cement pipe to be disposed shall be properly manifested, prepared for transport following criteria of County of San Diego Department of Public Works, Solid Waste Division, and delivered to a landfill permitted for disposal of non-friable asbestos containing materials. The completed Generator copy (yellow) manifest shall be returned to the District's Representative. All cost for disposal of the AC pipe shall be included in the Contractor's bid.

#### 1.11 ABATEMENT OF AIR POLLUTION

- A. Comply with all applicable Federal, State, County, and City laws and regulations concerning the prevention and control of air pollution.
- B. Conduct construction activities and equipment in a manner so as to minimize atmospheric emissions or discharges of air contaminants. Equipment or vehicles that show excessive emissions of exhaust gases shall not be operated on the site.

## 1.12 NOISE CONTROL REQUIREMENTS

- A. The Contractor shall comply with all local sound control and noise level rules, regulations and ordinances which apply to any work performed pursuant to the Contract.
- B. Each internal combustion engine, used for any purpose on the job or related to the job, shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without said muffler.
- C. Noise level requirements shall apply to all equipment on the job or related to the job, including but not limited to trucks and transient equipment that may or may not be owned by the Contractor. The use of loud sound signals shall be avoided in favor of light warnings except those required by safety for the protection of personnel.

## 1.13 AMOUNT OF LIABILITY INSURANCE

### A. Employer's Liability Insurance:

- 1. Bodily injury coverage by accident shall be for not less than \$1,000,000 for each employee and \$1,000,000 for each accident.
- 2. Bodily injury coverage by disease shall be for not less than \$1,000,000 for each employee and \$1,000,000 for each disease.

### B. General Liability:

Bodily injury, personal injury, and property damage coverage shall be in a combined single limit of not less than \$1,000,000 for each occurrence and \$3,000,000 aggregate.

### C. Automobile Liability:

Bodily injury and property damage coverage shall be in a combined single limit of not less than \$1,000,000 for each occurrence.

### D. Builder's Risk Insurance:

Builder's risk insurance shall be provided for the full contract amount.

### E. Earthquake and Tidal Wave Insurance:

Earthquake and Tidal Wave Insurance is not required for this project.

### F. Additional Insured:

In addition to the additional insureds required for Liability insurance in the General Provisions, 8-3 LIABILITY INSURANCE, and 8-4 BUILDER'S RISK "ALL RISK" INSURANCE, the OWNER and each of its directors, officers, employees, and agents and its Design Engineer shall be named as additional insureds for all Liability insurance and Builders' Risk Insurance provided herein.

#### 1.14 USE OF THE STANDARD DRAWINGS

Where the Drawings or Specifications make reference to the Standard Drawings, construct the item in accordance with the details and materials as specified in the Contract Documents. For items not included in the Standard Drawings that are part of the Contract Documents, construct the item in accordance with the Olivenhain Municipal Water District, Standard Specifications and Drawings for the Construction of Water, Recycled Water, and Sewer Facilities dated June 2008 with revisions. These District Standard Drawings and Standard Specifications are available for purchase at the office of the District.

#### 1.15 CONSTRUCTION SCHEDULE AND BID BREAKDOWN

The Contractor shall conform with the requirements of Article 6-3 Contractor's CONSTRUCTION SCHEDULE AND COST BREAKDOWN of the General Provisions within 15 days after the date of award of contract. Submit to the District's Representative a construction progress schedule and bid breakdown in bar chart form. Divide each lump sum bid item into its major elements of work and show separately labor, materials and equipment costs. The District's Representative will use this cost breakdown as a basis for the monthly progress estimate and payment. The schedule shall specifically include and identify the construction sequence requirements defined on the plans.

#### 1.16 ACCESS OF DISTRICT'S REPRESENTATIVE TO CONFINED SPACES IN STRUCTURES UNDER CONSTRUCTION

- A. The Contractor shall be aware that some or all portions of the work may be designated as a PERMIT REQUIRED CONFINED SPACE. The Contractor is required to provide the Owner with a copy of the Contractor's Confined Space Program for Owner's review and acceptance prior to beginning work. Contractor's Confined Space Program shall be in compliance with Cal-OSHA's Confined Space regulatory requirements. The Contractor is required to perform all work in accordance with Cal-OSHA Confined Space requirements and Title 8, Subchapter 20 "*Tunnel Safety Orders*".
- B. The Contractor shall provide the following assistance to the personnel of the District's Representative when said personnel must enter confined spaces in structures under construction or structures which have not been accepted by the District.
  - 1. Training program for the personnel of the District's Representative relevant to the specific structures being entered.
  - 2. Testing equipment and personnel to operate said equipment for testing the atmosphere in the confined spaces for oxygen deficiency, explosive gases, and toxic gases.
  - 3. Authorized competent person to stand by each confined space while entrants are inside the space.
  - 4. Safety equipment (breathing apparatus, harnesses, and rescue equipment) in good working order.
  - 5. Communication equipment.
  - 6. Access equipment (hoists and ladders).



- 7. Signs.
- 8. Alarm system.
- 9. Ventilation system.

- C. The Contractor shall identify confined spaces on the project, mark them with warning signs per CAL/OSHA requirements, and notify the District's Representative that these structures now exist.

#### 1.17 PROTECTION OF EXISTING UTILITIES

The Contractor shall coordinate their efforts with the District and shall take every precaution to protect all existing utilities and structures at the project site. The Contractor shall be responsible for all Underground Service Alert notification and mark outs prior to the beginning of work.

#### 1.18 COORDINATION WITH DISTRICT OPERATIONS

- A. The Contractor shall coordinate all work with the District sufficiently ahead of time so as to not interfere with the District's operation of their system. The Contractor shall submit a detailed sequence of work to the District for all work. This proposed sequence of work shall be reviewed with the District prior to construction for consistency with the Sequence of Work as described in these Contract Documents and the District's required operation and shut-down plan.
- B. The District will operate all existing valves. Therefore, the Contractor must coordinate connection work with operations. Once the pipelines have been isolated, the Contractor shall dechlorinate and drain all lines.

#### 1.19 PRE-CONSTRUCTION CONFERENCE AND PROGRESS MEETINGS

A Pre-Construction Conference shall be scheduled prior to start of project as described in Section 01201 Preconstruction Conference. The District, the Contractor, and the District's Construction Manager shall be present. The Contractor's detailed sequence of work and a list of labor, material and equipment rates for additional work shall be established and maintained throughout the project. Contractor shall identify all personnel assigned to the project and a complete set of approved submittal data for use by inspection personnel. Contractor shall have a designated representative for this project.

The Contractor shall also attend a project planning meeting as described in Specification Section 01202, Progress Meetings.

#### 1.20 HOURS OF WORK

Hours of work shall be 7:00 A.M. to 4:00 P.M. Saturday and nighttime work will only be allowed with prior written approval by the Owner. If allowed, nighttime work hours shall be 9:00 P.M. to 6:00 A.M. Overtime and shift work may be established as short-term procedure by Contractor with written notice to and written permission from Owner.

**Absolutely no equipment shall be started or warmed up prior to 7:00 AM or after 4:00 PM.** No work other than overtime and shift work approved by Owner shall be done

between the hours of 4:00 P.M. and 7:00 A.M., nor on weekends, or District recognized holidays, except such work as is necessary for the proper care and protection of the work already performed, except in case of emergency, and as specified herein. The District recognized holidays are as follows:

Labor Day	Monday, September 6, 2021
Veterans Day	Thursday, November 11, 2021
Thanksgiving Day	Thursday, November 25, 2021
Day after Thanksgiving	Friday, November 26, 2021
Christmas Day (observed)	Friday, December 24, 2021
New Year's Day	Friday, December 31, 2021
Martin Luther King Jr. Day	Monday, January 17, 2022
Presidents' Day	Monday, February 21, 2022
Memorial Day	Monday, May 30, 2022
Fourth of July (observed)	Monday, July 4, 2021

## 1.21 CONSTRUCTION SURVEYS

### A. LAND MONUMENTS

The Contractor shall notify the District and the District's Representative of any existing Federal, State, City, County, and private land monuments encountered. All monuments shall be preserved, or if necessary to be destroyed during performance of the Work, shall be replaced by a licensed surveyor under contract to the Contractor. Appropriate record of survey drawings shall be filed with the City of Escondido and County of San Diego for all replaced monuments. When government monuments are encountered, the Contractor shall notify the District's Representative at least two (2) weeks in advance of the proposed construction and provide for surveying of the existing monument before it is disturbed or destroyed.

### B. CONSTRUCTION STAKING

1. The Contractor shall furnish construction staking to execute the work as described in the Contract Documents. Preserve all construction stakes, reference points, and other survey points. In case of their loss or destruction, the Contractor shall be liable for their replacement. If the field survey stakes are not available for review by the District's Representative, the work may not proceed.

## 1.22 CONSTRUCTION WATER

- A. The Contractor shall obtain and pay for a construction water meter from the District and shall be responsible for all highlines and other temporary equipment and facilities necessary to provide adequate construction water to the project site. The Contractor shall coordinate the locations of water supply with the District. The following conditions must also be met:

1. Excess water must be available in the pipeline at the connection point.
2. The contractor shall submit a construction water service connection plan a minimum of two weeks prior to the need for water. This plan shall indicate all piping, valves, and

other materials necessary to connect to District owned piping at designated blow-off, air vacuum, and air release structures located within the project site. Do not install piping, meter, or valves until the District's Representative has approved the water service plan.

3. Accurately measure all water use and submit meter readings to the District's Representative when the meter is installed, at the end of each month and when the meter is removed.
4. Securely lock the installed valve in the closed position at the end of each workday and during all times of inactivity. Avoid wasting water and prevent unauthorized use. Do not use water from the District on any other project.
5. Coordinate all use of water, flushing of pipelines and filling of pipelines with the District's representative. All requests for use of water and for increases or decreases in quantity shall be made in writing to the District's Representative two working days in advance.

#### 1.23 POWER AND LIGHTING

- A. The Contractor shall provide all power required for construction operations, and shall provide and maintain all temporary power facilities required to perform the work in a safe and satisfactory manner. All electrical facilities shall conform to the requirements of the of the requirements of Title 8, Industrial Relations, Subchapter 5, Electrical Safety Orders, of the California Code of Regulation; and Subpart K of the OSHA Safety and Health Standards for Construction.
- B. The Contractor shall provide adequate light for work conducted at night or under low light conditions to provide adequate facilities for inspection and safe working conditions and to insure proper work.
- C. Temporary connections for electricity shall be subject to approval of the District's Representative and the power company representative. Remove temporary electrical connections in like manner prior to final acceptance of the work.

#### 1.24 CONTRACTOR STAGING AND LAYDOWN AREA

As shown in the Drawings, the Engineer has identified one staging/laydown areas that may be utilized by the Contractor, all of which are within the property boundary of the WTP. For any area to be used by the Contractor other than these identified areas, the Contractor shall coordinate with the District for use of the area. At least 14 days prior to moving onto any site, the Contractor shall submit to the District Representative confirmation of the staging/laydown area(s) to be used for this project. Submittals shall be in accordance with Section 01300. The Contractor shall be responsible for returning all areas used to their original conditions.

#### 1.25 DUST CONTROL AND CLEANUP

- A. Throughout all phases of construction, including suspension of work, and until final acceptance of the project, the Contractor shall keep the work site clean and free from rubbish and debris. The Contractor shall also abate dust nuisance by cleaning or sweeping

and sprinkling with water or other means as necessary, in accordance with the San Diego Air Pollution Control District's regulations. The use of water resulting in mud on public streets and/or private property will not be permitted as a substitute for cleaning, sweeping, or other methods. Every day, and as required by the Owner's Representative, the Contractor shall furnish and operate a motorized, self-loaded sweeper with water spray nozzles to keep paved areas affected by the work acceptably clean and dust free.

- B. The Contractor shall keep the premises free at all times from accumulations of waste materials and rubbish. Contractor shall provide adequate trash receptacles about the site, and shall promptly empty the containers when filled. Wastes shall not be buried or burned on the site or disposed of into storm drains, sanitary sewers, streams, or waterways. All wastes shall be removed from the site and disposed of in a manner complying with local ordinances and antipollution laws. Volatile wastes shall be properly stored in covered metal containers and removed daily. Construction materials shall be neatly stacked by the Contractor when not in use. The Contractor shall promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solutions from surfaces to prevent marring or other damage.

#### 1.26 SANITATION AND DRINKING WATER

- A. The Contractor shall provide toilet and wash-up facilities for his work force at the site of work. They shall comply with applicable laws, ordinances, and regulations pertaining to the public health and sanitation of dwellings and camps. The facilities shall be stored within the staging areas overnight and on weekends. The Contractor shall maintain the sanitary facilities in an acceptable condition from the beginning of work to completion and shall remove the facilities and disinfect the premises.
- B. The Contractor shall provide safe drinking water at all times at the jobsite.

#### 1.27 SAFETY

- A. Owner and its inspectors, consultants, agents and other representatives are in no way responsible for safety and are there only to observe the work compliance with plans and specifications.
- B. The Contractor acknowledges responsibility for jobsite and acknowledges that the District, Engineer and their agents, employees, consultants and representatives will not have any such responsibility. To the fullest extent permitted by law the Contractor shall indemnify, defend and hold harmless the District, Engineer, their present companies, subsidiaries, agents, and employees from and against all claims, damages, losses and expenses, including but not limited to attorney fees and claim costs, arising out of or resulting from performance of work by the Contractor, its subcontractors, or their agents and employees, which results in damage, loss or expense is caused in whole or in part by the negligence, active or passive, of District, Engineer, their parent and subsidiary companies, as well as their agents and employees, excepting only the sole negligence of District, Engineer, their parent or subsidiary companies and their agents and employees.

## 1.28 INDEMNIFICATION

- A. Contractor hereby releases and agrees to indemnify, defend, hold harmless the District, Engineer, their parent and subsidiary companies, agents, employees, consultants and representatives for any and all damage to persons or property or wrongful death regardless of whether or not such claim, damage, loss or expense is caused in whole or in part by the negligence, active or passive, of District, Engineer, their parent and subsidiary companies, as well as their agents and employees, excepting only the sole negligence of District, Engineer, their parent or subsidiary companies and their agents and employees to the fullest extent permitted by law. Such indemnification shall extend to all claims, demands, actions, or liability for injuries, death or damages occurring after completion of the project, as well as during the work's progress. Contractor further agrees that it shall accomplish the above at its own cost, expense and risk exclusive of and regardless of any applicable insurance policy or position taken by any insurance company regarding coverage.
- B. Contractor shall defend, indemnify and hold the District, Engineer, its employees, officers, or agents, harmless against any and all claims by any parties arising from, or related to, any and all damages, including legal costs and attorney's fees, resulting from interference with, interruption of, damage to, or any and all injuries which result from damage caused to subsurface installation, which is unforeseen and despite Engineer's/Architect's effort during the design process was not located, excepting only the gross negligence or willful misconduct of Engineer in providing its services.

## 1.29 MEASUREMENT AND PAYMENT

- A. General:
  - 1. See Section 01025 for additional requirements.
  - 2. The measurement and payment provisions of these Contract Documents shall govern over those of referenced standards, if any.
  - 3. The price set forth in the Bid Form for the work shall include all costs and expenses incidental to completing the work, and payment of the price bid will be payment in full under this contract, except as provided by Article 9-1 PAYMENT FOR CHANGES IN THE WORK of the General Provisions.
  - 4. As a condition precedent to approval of the Contractor's monthly payment application by the District's Representative, the Contractor shall attend all progress or issue resolution meetings scheduled by the District's Representative. In addition, the Contractor shall submit a monthly construction schedule properly updated and accurately showing the work completed to date and the work yet to be performed in the remaining Contract time. The Contractor agrees failure to comply with the foregoing to the satisfaction of the District's Representative shall delay the monthly progress payment to the Contractor without penalty to the District.
- B. Lump Sum Work Items Listed in the Bid Schedules:
  - 1. The lump sum prices include full compensation for furnishing the labor, materials, tools, and equipment and doing all the work involved to complete the work included in

lump sum work items listed in the Bid Schedules and defined by the Contract Documents.

2. The application for payment for a lump sum payment item will be for that specific work item based on the percentage completed. The percentage complete will be based on the value of partially completed work relative to the value of the item when entirely completed and ready for service. The application for payment will be in accordance with Article 9-2 PROGRESS PAYMENTS of the General Provisions.

C. Unit Price Work Items Listed in the Bid Schedules:

1. The unit prices include full compensation for furnishing the labor, materials, tools, and equipment and doing all the work involved to complete the work included in the unit price work items listed in the Bid Schedules and defined by the Contract Documents.
2. The application for payment for a unit price payment item will be for that specific work item based on the units of work that are entirely completed and ready for service. The application for payment will be in accordance with Article 9-2 PROGRESS PAYMENTS of the General Provisions.

D. Work Items Not Listed in the Bid Schedules:

1. The General Provisions and items in the Special Provisions which are not listed in the Bid Schedules of the Bid Form are, in general, applicable to more than one listed work item, and no separate work item is provided therefor. Include the cost of work not listed but necessary to complete the project designated in the Contract Documents in the various listed work items of the Bid Form.
2. The bids for the work are intended to establish a total cost for the work in its entirety. Should the Contractor feel that the cost for the work has not been established by specific items in the Bid Form, he shall include the cost for that work in some related bid item so that his proposal for the project does reflect his total cost for completing the work in its entirety.

1.30 NOTICE OF COMPLETION

Upon completion of all work, Contractor shall apply for acceptance of the work. Upon acceptance of the work, the District, at the District's sole discretion, will issue a Notice of Completion for this work

1.31 GUARANTEE

For all work, a two-year guarantee shall be furnished by the Contractor as required in the General Provisions, Article 5-14, except that any guarantee included for materials or equipment beyond the period specified herein shall be solely the responsibility of the guarantor and not the Contractor. This guarantee period shall commence with the District's issuance of a Notice of Completion.

### 1.32 LABOR COMPLIANCE PROGRAM AND CONTRACTOR REGISTRATION WITH STATE OF CALIFORNIA

In accordance with requirements defined by the California State Legislature via Senate Bill 854, all contractors and subcontractors involved with public works project shall be registered with the State Department of Industrial Relations. Registration is completed through an on-line application process and the payment of a fee to the State. The registration process requires contractors and subcontractors to provide workers' compensation coverage to its employees, hold a valid Contractors State Board License, have no delinquent unpaid wage or penalty assessments, and not be subject federal or state debarment. The registration form is located on the State Department of Industrial Relations website:

<http://www.dir.ca.gov/DLSE/dlsepublicworks.html>

Prior to start of construction, the Contractor shall submit to the District evidence of completing this registration for the prime firm and all subcontracting firms. Failure to submit the requested documentation shall be cause for delay of the project and subject to forfeiture due to delay in accordance with paragraph 1.07 of the Supplement to General Provisions.

This project is subject to monitoring by the Compliance Monitoring Unit (CMU) of the California Department of Industrial Relations (DIR). The Owner will be implementing and enforcing a labor compliance program (LCP) to ensure compliance with provisions of the California Labor Code. The Contractor must post a jobsite notice stating that the project is subject to CMU monitoring.

END OF SECTION

## **PART II**

### ***TECHNICAL SPECIFICATIONS***



## SECTION 01000 - SUMMARY OF WORK

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. This section provides a summary of the work of this project, the location, activities by others, coordination, handover, and acceptance by the Owner.

#### 1.02 SCOPE

- A. The Work of the Project consists of providing all labor, supervision, and furnishing and installing all materials, equipment, and appurtenances required to construct and put into operation the facilities described in the Contract Documents entitled, DAVID C. McCOLLOM WATER TREATMENT PLANT Ph CONTROL SYSTEM PROJECT.

The Work of the Contractor shall include provision of all equipment, labor, and materials necessary to complete construction of the following, as specified and shown in the Construction Documents:

1. Demolish and dispose of existing citric acid chemical storage tank and existing concrete equipment pad. Install new 1,550 gallon double wall citric acid chemical storage tank (provided by OMWD) in adjacent ACH chemical storage and supply area. Design, furnish, and install new citric acid chemical storage tank equipment pad and storage tank seismic anchoring in accordance with provided seismic design calculations (provided by OMWD). Tank installation includes removal and reinstallation of existing chemical storage area metal roof, metal roof support cross-beams, area lighting, and other existing utilities. Roof removal requires submittal of roof removal and reinstallation work plan, and safety plan for review and approval by OMWD.
2. Relocate existing citric acid feed pump, associated valves and appurtenances, including seal flush system, to adjacent ACH chemical storage chemical storage and supply area. Demolish existing concrete equipment pad and concrete pipe supports for supply piping.
3. Salvage existing sodium hydroxide (caustic) chemical storage tank to OMWD Operations staff.
4. Demolish and dispose of existing caustic supply and feed piping and tubing. This includes both the feed tubing and containment piping to existing CIP chemical injection point, and feed tubing and containment tubing to existing treated water chemical injection point).
5. Remove and dispose of existing fluoride feed tubing from existing fluoride injection double containment piping. Demolish existing fluoride feed piping and manifold from existing energy recovery room to raw water chemical injection point in existing vault. Demolish existing fluoride injection quill assembly at chemical injection point to raw water piping.
6. Demolish and dispose of existing abandoned citric acid dual containment piping.

7. Demolish and dispose of existing citric acid storage area access stairs and landing.
8. Demolish existing caustic feed system control panel and associated conduits and wiring.
9. Demolish and replace existing emergency eyewash and shower station in existing citric acid storage area. Includes furnishing and installing new water supply piping and connecting new emergency eyewash and shower station to existing overhead domestic water supply piping in chemical storage bay area.
10. Removal and replacement of existing chemical storage bay perimeter fencing, area lighting, and metal roof sections as necessary to remove existing citric acid chemical storage tank and install new caustic chemical storage tank.
11. Furnish and install a new 4,400 gallon, double walled, crosslinked polyethylene caustic storage tank in place of existing citric acid chemical storage tank. Design, furnish and construct a new equipment pad with seismic anchoring/bracing for new tank. Include seismic design calculations stamped and signed by a registered professional Structural Engineer licensed in the state of California. Tank installation includes removal and reinstallation of existing chemical storage area metal roof, metal roof support cross-beams, area lighting, and other existing utilities. Roof removal requires submittal of roof removal and reinstallation work plan, and safety plan for review and approval by OMWD.
12. Furnish and install new caustic storage tank fill station assembly and associated piping/appurtenances. Furnish and install new citric acid storage tank fill station assembly and associated piping/appurtenances. Furnish and install new locking 316 stainless steel fill station box.
13. Relocate existing caustic chemical feed system pump skid (Blue-White M3 pump skid) and all associated appurtenances in place of the existing citric acid pumping system. Relocated caustic feed system will be used for chemical injection into CIP system.
14. Furnish and install new primary and backup caustic feed tubing within new clear double containment piping overhead from relocated caustic chemical feed skid to existing CIP system chemical injection point. Utilize existing overhead pipe supports/struts and provide new pipe straps.
15. Furnish and install new caustic chemical feed system pump skid (with Blue White MD-3 pumps, no equal) in new caustic chemical storage area. New caustic feed system will be used for chemical injection into plant raw untreated water influent piping as well as plant combined filter treated water effluent piping.
16. Furnish and install new primary and backup caustic feed tubing within existing repurposed clear double containment piping (previously fluoride feed double containment piping) overhead from new caustic feed system pump skid to plant raw untreated water chemical injection point near the energy recovery room. Utilize existing overhead pipe supports/struts and provide new pipe straps.
17. Furnish and install new primary and backup caustic feed tubing within new clear double containment piping overhead from new caustic feed system pump skid to plant combined filter treated water effluent piping. Utilize existing overhead pipe supports/struts and provide new pipe straps.
18. Coordination with OMWD operations staff for removal and demolition and disposal of existing injection quill within raw water chemical injection containment vault,

demolition and disposal of connecting fluoride feed piping in containment vault and adjacent utilities trench, demolition and disposal of existing fluoride feed valve manifold inside Energy Recovery Room, furnishing and installation of new caustic feed manifold and enclosure in Energy Recovery Room, furnishing and installation of new caustic feed piping and all associated valves and appurtenances from Energy Recovery Room to raw water chemical injection point, furnishing and installation of new caustic chemical injection quill.

19. Furnishing and installation of new containment vault flood float switch and associated signal cable and cable supports.
20. Grouting/sealing bottom of existing containment vault, and coating of existing vault interior.
21. Furnish and install new supply piping and manifold from new caustic storage tank to feed both new and relocated caustic feed system pump skids. Provide new pipe supports and pipe straps.
22. Furnish and install new caustic feed system controls, including power supply, digital/analog signals for alarms and signals. Integrate new caustic chemical feed/dosing systems to be controlled via existing treatment plant SCADA system. Provide all new conduit and wiring as necessary to provide fully functioning caustic chemical supply and feed systems.
23. Provide a temporary caustic storage, supply, and feed system to maintain/provide current caustic injection requirements to the existing treated water effluent stream during project construction. Contractor shall submit a detailed temporary caustic feed system and phasing plan to OMWD for approval prior to construction. At minimum, the temporary caustic feed system and phasing plan shall include all temporary equipment to be used, location and layout of temporary equipment, bypass plan, and construction phasing schedule.

B. Except where specifically noted otherwise, provide and pay for:

1. Insurance and bonds.
2. Labor, materials, and equipment.
3. Tools, equipment, and machinery required for construction.
4. Utilities required for construction.
5. Temporary facilities including sheeting, shoring, and bypass systems.
6. Other facilities and services necessary for the proper execution and completion of the Work.
7. Compliance with codes, ordinances, regulations, orders, and other legal requirements of public authorities having bearing on the performance of the Work.

C. The Work Site is located at:

David C. McCollom Water Treatment Plant  
19090 Via Ambiente Rd  
Escondido, CA 92029

### 1.03 COORDINATION OF WORK

- A. Maintain overall coordination of the Work.
- B. Obtain construction schedules from each subcontractor, and require each subcontractor to maintain schedules and coordinate modifications.
- C. Work Hours. All operations conducted on the premises, including the warming up, repair, arrival, departure or running of trucks, construction equipment, and any other construction associated vehicles shall be limited to the hours of 7:00AM to 4:00PM, Monday through Friday. No work shall be performed on Saturday, Sunday, or on Holidays.
- D. Water Treatment Plant Supervisor must be notified in writing two weeks in advance of any required shutdowns for chemical line, control system and/or potable water tie ins.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

## SECTION 01025 - MEASUREMENT OF WORK AND PAYMENT

### PART 1 - GENERAL

#### 1.01 WORK OF THIS SECTION

- A. The Section includes measurement and preparation of applications for Payment.

#### 1.02 RELATED SECTIONS

- A. The Work of the following Sections apply to Work of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of the Work.
  - 1. Bid Proposal Form
  - 2. Progress Estimate and Payment Form
  - 3. Section 01000 – Summary of Work

#### 1.03 SUBMITTALS

- A. Partial Billings
- B. Final Billing

#### 1.04 SUBMITTAL FORMAT

- A. Olivenhain Municipal Water District, Progress Estimate and Payment Form:

#### 1.05 MEASUREMENT - GENERAL

- A. Unless otherwise specified, quantities of work shall be determined from measurements or dimensions in horizontal planes. However, linear quantities of materials, such as pipe, piling, fencing and timber, shall be considered as the true length measured along a longitudinal axis.
- B. Unless otherwise specified, volumetric quantities shall be the product of the mean area of vertical or horizontal sections and the intervening horizontal or vertical dimensions.
- C. Materials and items of work which are to be paid for on basis of measurement shall be measured in accordance with methods stipulated in the particular sections involved.
- D. When payment is to be made on the basis of weight, the weighing shall be done on certified platform scales or, when approved by the Owner's Representative on a completely automated weighing and recording system. The Contractor shall furnish the Owner's Representative with duplicate weighmaster's certificates showing the actual net weights.
- E. Items of work indicated to be paid on a "Lump Sum", "L. S." or "Job" basis will be measured in the most logical units for the item as indicated on the Contractor's

Construction Schedule and Cost Breakdown as identified in Article 6-3 of the General Provisions.

#### 1.06 PAYMENT - GENERAL

- A. The quantities listed in the Bid Schedule will not govern final payment. Payment to the Contractor will be made only for actual quantities of Contract items constructed in accordance with the Plans and Specifications. Upon completion of construction, if the actual quantities show either an increase or decrease from the quantities given in the Bid Schedule, the Contract Unit Prices will prevail.
- B. The unit and lump sum prices to be paid shall be full compensation for the items of work and all appurtenant work, including furnishing all materials, labor, equipment, tools, and incidentals.
- C. Payment will not be made for materials wasted or disposed of in a manner not called for under the Contract. This includes rejected material not unloaded from vehicles, material rejected after it has been placed, and material placed outside of the Plan lines. No compensation will be allowed for disposing of rejected or excess material.
- D. Payment for work performed or materials furnished under an Assessment Act Contract will be made as provided in particular proceedings or legislative act under which such contract was awarded.
- E. Whenever any portion of the Work is performed by the Owner at the Contractor's request, the cost thereof shall be charged against the Contractor, and may be deducted from any amount due or becoming due from the Owner.
- F. Whenever immediate action is required to prevent injury, death, or property damage, and precautions which are the Contractor's responsibility has not been taken and are not reasonably expected to be taken, the Owner may, after reasonable attempt to notify the Contractor, cause such precautions to be taken and shall charge the cost thereof against the Contractor, or may deduct such cost from any amount due or becoming due from the Owner. Owner action or inaction under such circumstances shall not be construed as relieving the Contractor or its Surety from liability.
- G. Payment shall not relieve the Contractor from its obligations under the Contract; nor shall such payment be construed to be acceptance of any of the Work. Payment shall not be construed as the transfer of ownership of any equipment or material to the Owner. Responsibility of ownership shall remain with the Contractor who shall be obligated to store any fully or partially completed work or structure for which payment has been made; or replace any materials or equipment required to be provided under the Contract which may be damaged, lost, stolen or otherwise degraded in any way prior to acceptance of the Work.
- H. Guarantee periods shall not be affected by any payment.
- I. If, within the time fixed by law, a properly executed notice to stop payment is filed with the Owner, due to the Contractor's failure to pay for labor or materials used in the Work, all money due for such labor or materials will be withheld from payment to the Contractor in accordance with applicable laws.

- J. Partial payments made after the contract completion date will reflect the amount withheld for Liquidated Damages. Any such partial payments made to the Contractor, or its Sureties, will not constitute a waiver of the Owner's Liquidated Damages.
- K. If requested by the Owner's Representative, the Contractor shall provide such additional data as may be reasonably required to support the submitted Progress Estimate and Payment Form. Such data may include but is not limited to satisfactory evidence of payment for equipment, materials and labor including payments to Subcontractors and suppliers. Request for payment for delivered equipment and material shall be accompanied by certified paid invoice from the supplier. Such equipment and material shall be suitably and safely stored at the site of the Work.

#### 1.07 PAYMENT LINE ITEMS

- A. Payment for the various items of the Bid Proposal, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor and services, operations, and incidentals appurtenant to the items of Work being described, as necessary to complete the various items of the Work all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the California Division of Industrial Safety and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA) as administered by the state of California (CAL-OSHA). No separate payment will be made for any item that is not specifically set forth in the Bid Proposal, and all costs therefor shall be included in the prices named in the Bid Proposal for the various appurtenant items of Work.
- B. The Contractor shall provide all materials, equipment, and labor necessary to carry out the Work of the Project, complete and in-place, as indicated below and in the Bid Schedule contained in the Bidding Documents, of the Contract.

#### 1.08 WORK BREAKDOWN STRUCTURE (WBS) BID ITEM DESCRIPTIONS

A. Bid Item #1 – General Requirements:

- 1. Method of Payment: Lump Sum
- 2. Measure of Payment: Percent Complete
- 3. Description: Price shall constitute full compensation for costs and work necessary for mobilization/demobilization, bonds, permits, insurance, and cleanup. (Not to exceed 5% of the total base bid proposal price)

B. Bid Item #2 – Citric Acid System Improvements:

- 1. Method of Payment: Lump Sum
- 2. Measure of Payment: Percent Complete
- 3. Description: Price shall constitute full compensation for all work performed including, but not limited to all labor, supervision, materials, equipment, equipment delivery, etc. required for the proposed relocation and improvements to the citric acid storage and feed system. Activities and works include, but are not limited to, preparing submittals, demolition and disposal of the existing citric

acid tank, installation of OMWD's new citric acid tank and all its valves and appurtenances, design and furnishing of new tank concrete pad, design and furnishing of new tank seismic anchoring and restraint, relocation of existing citric acid pump and all of its valves, appurtenances, including seal flush system, demolition of the existing citric acid pump equipment pad, demolition of existing citric acid supply pipe concrete support blocks, furnishing of new concrete equipment pad for pump, furnishing and installation of all associated chemical supply and feed piping for a complete citric acid storage, supply, and feed system and all necessary supports and appurtenances in accordance with the Specifications and in accordance with the Contract Documents.

C. Bid Item #3 – Caustic Feed System Improvements:

1. Method of Payment: Lump Sum
2. Measure of Payment: Percent Complete
3. Description: Price shall constitute full compensation for all work performed including, but not limited to all labor, supervision, materials, equipment, equipment delivery, etc. required for the proposed relocation and improvements to the sodium hydroxide (caustic) chemical storage and feed system. Activities and works include, but are not limited to, preparing submittals, preparing a temporary caustic feed system and phasing plan (to be reviewed and approved by OMWD), decommissioning existing caustic storage tank and returning to OMWD, furnishing and installation of new caustic chemical storage tank and all its valves and appurtenances, design, furnishing, and installation of new tank concrete pad, design, furnishing and installation of new tank seismic anchoring and restraint, relocation and installation of existing Blue White M3 caustic feed system pump skid and all of its valves/appurtenances, furnishing of new fiberglass reinforced plastic equipment stand for pump skid, furnishing and installation of new Blue White MD3 caustic feed system pump skid and all of its valves/appurtenances, furnishing and installation of all associated chemical supply and feed piping for a complete caustic storage, supply, and feed system (caustic feed to raw water influent, caustic feed to treated water effluent, and caustic feed to membrane clean-in-place system), and all necessary supports and appurtenances in accordance with the Specifications and in accordance with the Contract Documents.

D. Bid Item #4 – Removal and Reinstallation of Chemical Storage Area Roof

1. Method of Payment: Lump Sum
2. Measure of Payment: Percent Complete
3. Description: Price shall constitute full compensation for all work performed including, but not limited to all labor, supervision, materials, equipment, transportation, etc. required for removal and reinstallation of chemical storage area roof. Activities and works include, but are not limited to, coordination with OMWD operations staff for roof removal requirements, preparing submittals including a roof removal and reinstallation work plan, removal of existing metal roof covers, removal of existing roof steel cross support beams, removal of existing area lighting and overhead utilities as appropriate to accommodate installation of new chemical storage tanks, reinstallation of overhead area lighting and overhead utilities, reinstallation of roof cross beams and metal roof covers and all necessary procedures to safely install the new chemical storage tanks in



accordance with the Specifications and in accordance with the Contract Documents.

E. Bid Item #5 – Chemical Storage Area Site Improvements

1. Method of Payment: Lump Sum
2. Measure of Payment: Percent Complete
3. Description: Price shall constitute full compensation for all work performed including, but not limited to all labor, supervision, materials, equipment, equipment delivery, etc. required for the proposed chemical storage area site improvements. Activities and works include, but are not limited to, preparing submittals, demolition of existing citric acid storage area access stairs and hand railing, demolition of existing emergency eyewash station, demolition of abandoned citric acid double containment piping, demolition of existing fluoride feed tubing from Fluoride feed skid through Energy Recovery Room, repurposing existing fluoride feed double containment piping, demolishing section of fluoride containment piping near sodium hypochlorite storage area, patching of wall penetrations in chemical storage area from removal of piping, repair of cinder block capstone in area of moved access stairs, cutting and patching of exposed equipment anchors and patching/re-coating floors in chemical storage area, furnishing and installation of new handrailing, furnishing and installation of new emergency eyewash station and associated piping, valves, and appurtenances to connect to existing domestic water system, and all necessary repair and patching of disturbed surfaces from equipment removal in accordance with the Specifications and in accordance with the Contract Documents.

F. Bid Item #6 – Raw Water Chemical Injection Containment Vault Improvements:

1. Method of Payment: Lump Sum
2. Measure of Payment: Percent Complete
3. Description: Price shall constitute full compensation for all work performed including, but not limited to all labor, supervision, materials, equipment, equipment delivery, etc. required to complete the proposed improvements to the raw water chemical injection containment vault. Activities and works include, but are not limited to, preparing submittals, coordination with OMWD operations staff for removal and demolition and disposal of existing injection quill within raw water chemical injection containment vault, demolition and disposal of connecting fluoride feed piping in containment vault and adjacent utilities trench, demolition and disposal of existing fluoride feed valve manifold inside Energy Recovery Room, furnishing and installation of new caustic feed manifold and enclosure in Energy Recovery Room, furnishing and installation of new caustic feed piping and all associated valves and appurtenances from Energy Recovery Room to raw water chemical injection point, furnishing and installation of new caustic chemical injection quill, furnishing and installation of new containment vault flood float switch and associated signal cable and cable supports, grouting/sealing bottom of existing containment vault, and coating of existing vault interior to provide complete dual containment of the caustic feed from the Energy Recovery Room to the raw water chemical injection point in accordance with the Specifications and in accordance with the Contract Documents.

G. Bid Item #7 – Chemical Feed Systems Electrical and Instrumentation Improvements:

1. Method of Payment: Lump Sum
2. Measure of Payment: Percent Complete
3. Description: Price shall constitute full compensation for all work performed including, but not limited to all labor, supervision, materials, equipment, equipment delivery, etc. required to complete the proposed electrical and instrumentation improvements associated with new chemical feed systems. Activities and works include, but are not limited to, preparing submittals, coordination with OMWD's electrician, furnishing, installation, and connection of new raw water chemical injection containment vault flood float switch to the treatment plant's existing SCADA system, furnishing, installation, and connection of the new tank level sensors/transducers to the treatment plant's existing SCADA system, furnishing and installation of power cables and conduits to provide/establish power to relocated and new caustic chemical feed pump skids from local electrical panel. Furnishing, routing, and installing signal wires/cables/conduits from relocated and new caustic chemical feed pump skids to treatment plant's ICP-2 panel and SCADA system, and all necessary appurtenances and supports to provide and integrate a complete, functioning caustic chemical dosing/feed system with alarms and communication with the existing SCADA system in accordance with the Specifications and in accordance with the Contract Documents.

H. Bid Item #8 – Start-up, Commissioning, and Operator Training:

1. Method of Payment: Lump Sum
2. Measure of Payment: Percent Complete
3. Description: Price shall constitute full compensation for all work performed including, but not limited to all labor, supervision, materials, equipment, transportation, etc. required to complete all start-up, commissioning, and operator training of the proposed equipment in conformance with Specifications and in accordance with the Contract Documents.

## PART 2 - PRODUCTS

### 2.01 CONSTRUCTION SCHEDULE AND COST BREAKDOWN

- A. The Contractor shall submit to Owner a Construction Schedule and Cost Breakdown in accordance Article 6-3 of the General Provisions.

## PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

## SECTION 01060 - SAFETY AND HEALTH

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

- A. Construction of this project may expose the Contractor's workmen to the hazard of stored hazardous chemicals and chemical feed equipment from adjacent existing facilities. The Contractor shall certify that he is experienced and qualified to anticipate and meet the safety and health requirements of this project. The Contractor shall require their personnel to observe proper safety and hygienic precautions.
- B. The Contractor shall be solely responsible for the storage, usage, handling and application of all hazardous materials encountered or provided as part of the Work.

#### 1.02 SAFETY AND HEALTH REGULATIONS

- A. The Contractor shall comply with Safety and Health Regulations for Construction, promulgated by the Secretary Standards Act, as set forth in Title 9, C.F.R. Copies of these regulations may be obtained from Labor Building, 14th and Constitution Avenue NW, Washington, DC 20013.
- B. The Contractor shall also comply with the provisions of the Federal Occupational Safety and Health Act, as amended, and with all applicable State of California, Department of Industrial Relations, Construction Safety Orders (Cal-OSHA) requirements.

### PART 2 - PRODUCTS (NOT APPLICABLE)

### PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

## SECTION 01118 – OWNER-FURNISHED EQUIPMENT

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. The Owner will furnish to the Contractor the following equipment and materials for the project:

Item	Size	Quantity	Spec	Project Component
Polyethylene Storage Tank (for Citric Acid)	76" Dia. X 138.7"H (1550 Gallon)	1	11440, Appendix A, Appendix B	Citric Acid Tank Replacement (see Contract Drawing M-03)

- B. Shop drawings for the Owner-furnished polyethylene storage tank are included as Appendix A of these Technical Specifications for reference.
- C. Seismic/structural calculations for tank anchorage (prepared and signed by B.A. Sims Engineering, Inc.) are included as Appendix B of these Technical Specifications for reference.
- D. The provided polyethylene storage tank includes wire cables and struts required for seismic bracing/anchoring. Contractor shall inventory the Owner provided materials and provide anchor bolts and any other materials or equipment required for the seismic bracing/anchoring system. Contractor is solely responsible for furnishing and installing the seismic bracing/anchoring for the Owner-furnished polyethylene citric acid storage tank as indicated on the Contract Documents. The cost of any additional materials or equipment required for a complete bracing/anchoring system shall be included in the Contractor's bid.
- E. All equipment and materials are located at the Owner's yard at: 19090 Via Ambiente Road, Escondido, CA 92029 (DCMWTP site).

#### 1.2 PICKUP AND DELIVERY OF EQUIPMENT AND MATERIALS

- A. The Contractor shall pickup all Owner Furnished Equipment and materials from the Owner's yard and deliver to the project site. The Contractor shall provide all equipment and labor to load and unload the equipment and materials at the Owner's yard and at the project site. All costs for the pickup and delivery of the materials shall be included in the Contractor's bid.

#### 1.3 CUSTODY

- A. The Contractor shall assume custody of the above equipment and materials upon receipt of them at the Owner's yard and shall assume liability for damage to the materials thereafter including during off-loading operations.

#### 1.4 INSPECTION

- A. Upon pickup of the Owner Furnished Equipment by the Contractor, the Contractor and the Owner's representative shall make a joint inspection of the condition of each piece of equipment and shall note, in writing, any defects in said equipment. Damage or loss of equipment and materials after the date of their transfer to the Contractor shall be repaired or replaced at the Contractor's expense to the satisfaction of the Owner.

END OF SECTION

## SECTION 01300 - RECORD DRAWINGS AND SUBMITTALS

### 1.01 RECORD DRAWINGS

Provide and maintain on the jobsite one complete set of prints of all Drawings which form a part of the project. Immediately after each portion of the work is installed, indicate all deviations from the original design shown on the Drawings either by additional sketches or marked in red thereon. Upon completion of the job, deliver this record set to the Owner's representative. The Engineer of Work or District Representative (as appropriate) will make the changes to the original Drawings indicating record conditions, and deliver them to the District for review and approval

### 1.02 APPROVED MATERIALS LIST

- A. Contractor to submit Approved Material List for project.

### 1.03 SHOP DRAWINGS

- A. Submittals are drawings, illustrations, schedules, performance charts, brochures, and other data which are prepared by the Contractor or any subcontractor, manufacturer, supplier, or distributor and which illustrates some portion of the work. Submit shop drawings where indicated. Place all required shop drawings in one complete package that illustrates the full scope of the project or as directed by the District's Representative. The intent of this requirement is to have one submittal package with all components of the project detailed in a single booklet.
- B. Submit one (1) legible electronic copy of submittals as directed by the District's Representative. Clearly indicate the name of the project, specification section and drawing number to which each shop drawing is referenced. Provide separate cover sheet for each set of shop drawings.
- C. Prior to submittal to the District's Representative, submittals shall be reviewed by the Contractor. Each copy of the submittal package shall be marked with an approval stamp, signed and dated by the Contractor.
- D. Submittals shall be complete in all respects. If the submittals show any deviations from the requirements of the Drawings and Standard Specifications because of standard shop practices or other reasons, the deviations and the reasons therefore shall be set forth in the letter of transmittal. By submitting submittals, the Contractor represents that material, equipment, and other work shown thereon conforms to the Drawings and Standard Specifications, except for any deviations set forth in the letter of transmittal.
- E. Within 30 calendar days after receipt of submittal package, the District's Representative will return the submittal packages to the Contractor with comments noted thereon. If resubmittal is not required, the District's Representative will return with the approval noted on the submittal package. If resubmittal is required, the District's Representative will return the submittal package and the Contractor shall correct the submittals. Resubmit the corrected submittal packages in the same manner as specified for the original submittal. The Contractor in the letter of transmittal accompanying resubmitted packages shall direct specific attention to revisions other than the corrections requested by the District's Representative on previous submittals.

- F. The review by the District's Representative is only of general conformance with the design concept of the project and general compliance with the Drawings and Standard Specifications and shall not be construed as relieving the Contractor of the full responsibility for: providing materials, equipment, and work required by the project; the proper fitting and construction of the work; the accuracy and completeness of the shop drawings; selecting fabrication processes and techniques of construction; and performing the work in a safe manner.
- G. No portion of the work requiring a submittal shall be commenced until the submittal has been reviewed by the District's Representative and returned with a notation indicating that resubmittal is not required.
- H. If the Contractor would like to use products other than those listed in the Approved Materials List, he shall submit to the District's Representative a completed New Product Submittal Form. The purpose of the submittal form is to provide adequate information to determine if a product meets District criteria.

END OF SECTION

## SECTION 01505 - MOBILIZATION / DEMOBILIZATION

### PART 1 - GENERAL

#### 1.01 GENERAL

- A. Mobilization shall include the acquisition of all permits; moving onto the site of all Contractor's plant and equipment; furnishing and erecting plant, temporary buildings, and other construction facilities; and implementing security requirements; all as required for the proper performance and completion of the Work. Mobilization shall include but not be limited to the following principal items:
1. Moving on to the site of all Contractors' plant and equipment required for construction operations.
  2. Installing temporary construction power, wiring, and lighting facilities.
  3. Establishing fire protection system.
  4. Developing construction water supply as required.
  5. Providing field office trailer for the Contractor (at Contractor's option).
  6. Providing all on-site communication facilities, including telephones and radios for Contractor personnel.
  7. Providing on-site sanitary facilities and potable water facilities for Contractor personnel.
  8. Arranging for and establishment of, Contractor's storage yard as required. Contractor is solely responsible for obtaining property owner agreements for use of any property, as necessary.
  9. Constructing and implementing security features and requirements in compliance with the Contract Documents.
  10. Obtaining all required permits.
  11. Having all OSHA required notices and establishment of safety programs.
  12. Submitting initial submittals.

#### 1.02 CONSTRUCTION FACILITIES PLAN

- A. Prior to commencement of any field work, the Contractor shall submit a Construction Facilities Plan to the Owner's Representative for approval. Said plan shall show the layout, equipment, materials and procedures the Contractor proposes for construction of temporary electrical, telephone, lighting, heating, water, sanitation, field offices and sheds, and other similar site facilities.
- B. The Contractor's site office and other construction facilities shall be of a temporary nature. The Contractor shall be wholly responsible for the security of their site office and laydown area, and for all its plant, materials, equipment and tools at all times.

#### 1.03 TEMPORARY CAUSTIC FEED SYSTEM BYPASS AND PHASING PLAN



- A. Prior to construction, Contractor shall submit a Temporary Caustic Feed System and Phasing Plan to OMWD for review and approval as indicated on the drawings and specifications. The temporary caustic feed system shall be furnished and implemented by the Contractor to maintain/provide current caustic injection requirements to the existing treated water effluent stream during project construction. Contractor shall submit a detailed temporary caustic feed system and phasing plan to OMWD for approval prior to construction. At minimum, temporary caustic feed system and phasing plan shall include all temporary equipment to be used, location and layout of temporary equipment, bypass plan, and construction phasing schedule.

#### 1.04 DEMOBILIZATION

- A. At the completion of the project, the Contractor shall perform the following activities:
1. Remove and properly dispose of all excess or waste materials, debris, rubbish, and temporary facilities from the site, structures and all facilities.
  2. Repair pavement, roads, landscaping, and all other areas affected by construction operations and restore them to original condition or to a minimum condition specified.
  3. Remove spatter, grease, stains, fingerprints, dust, labels, tags, packing materials, and other foreign items or substances from interior and exterior surfaces, equipment, signs, and lettering.
  4. Repair, patch, and touch up chipped, scratched, dented or otherwise marred surfaces to match existing or specified finish.
  5. Remove paint, clean and restore all equipment and material nameplates, labels and other identification markings.
  6. Clean all slabs, pavements and ground surfaces.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

## SECTION 01620 - PROTECTION OF MATERIALS AND EQUIPMENT

### PART 1 - GENERAL

#### 1.01 GENERAL DESCRIPTION

Materials and equipment shall be shipped, handled, stored, and installed by methods which will prevent damage to the items. Damaged items will not be permitted as part of the work except in cases of minor damages that have been satisfactorily repaired and are acceptable to the Owner.

#### 1.02 PIPE

Pipe and appurtenances shall be handled, stored, and installed as recommended by the manufacturer. Pipes with soft coatings, such as coal tar enamel or the like, or pipes of materials which are subject to deterioration by sunlight or heat, such as PVC pipe, shall be stored to protect the coating or pipe from physical damage or other deterioration and shall only be handled with padded, wide slings. Pipes shipped with interior bracing shall have the bracing removed only when recommended by the pipe manufacturer.

#### 1.03 EQUIPMENT

- A. Definition. For the purpose of this section, equipment means any mechanical, electrical, or instrumentation devices, and other items with one or more moving parts requiring an electrical, pneumatic, electronic or hydraulic connection.
- B. Packing and Marking. All equipment shall be adequately and effectively protected against damage from moisture, dust, handling, or other cause during transport from manufacturer's premises to site. Each item or package shall be clearly marked with the number unique to the specification reference covering the item. Each separate portion of plant shall receive, as far as practicable, a fitting or distinguishing mark which shall be shown on the packing lists. The bearings of motors shall be relieved of load during transport by means of jacks or some other method to prevent Brinelling. Stiffeners shall be used where necessary to maintain shapes and to give rigidity. Parts of equipment shall be delivered in assembled or sub-assembled units where possible.
- C. Identification of Equipment. All equipment items and valves with an assigned equipment number shall have affixed to them, in a prominent location, a label or tag displaying the assigned equipment number. Equipment item and valves lacking a number shall have a similar tag providing a unique description of the item. Markers shall be of stainless steel or aluminum, affixed to the item in question with stainless steel fasteners or as otherwise approved by the Engineer. Plastic tape labels will not be acceptable.
- D. Storage of Equipment. During the interval between delivery and installation, all equipment to be incorporated into the project shall be stored to prevent damage or deterioration. Environmental controls such as heaters or protective encapsulation shall be provided to ensure against condensation and moisture damage. Motor space heaters shall be operational at all times when motors are stored on site. In the event prolonged (more than 90 days) storage is required for any item of rotative equipment, the Contractor shall institute a preventive maintenance program which shall include grease

protection of bare metal surfaces, periodic indexing of rotating parts, renewal of grease in bearings and any procedures recommended by the manufacturer. The Contractor shall maintain adequate records to demonstrate full compliance with these requirements. All equipment shall be available for inspection by the Engineer.

To insure adequate protection of all electrical and instrumentation equipment and panels and electric motors, all such equipment shall be stored in a suitable enclosure designed to protect the equipment from dust and moisture. The Contractor shall be responsible for maintaining the storage facilities and equipment stored therein and shall make provision for all utilities required. Continuous access shall be provided to the Engineer for all equipment so stored.

- E. Protection of Equipment after Installation. After installation, all equipment shall be protected from damage, including but not limited to, dust, abrasive particles, debris and dirt generated by the placement, chipping, sandblasting, cutting, finishing and grinding of new or existing concrete, terrazzo and metal; and the fumes, particulate matter, and splatter from welding, brazing, and painting of new or existing piping and equipment. The Contractor is advised that as minimum, vacuum cleaning, blowers with filters, protective shielding, and other dust suppression methods will be required at all times to adequately protect all equipment. During concreting, including finishing, all equipment that may be affected by cement dust must be completely covered. During painting operations, all grease fittings and similar openings shall be covered to prevent the entry of paint. Electrical switchgear, unit substation, and motor load centers shall not be installed until after all concrete work and sandblasting in those areas have been completed and accepted.

#### 1.04 STRUCTURES

The Contractor shall remove existing structures, including curbs, gutters, pipelines, roofing and fencing, as may be necessary for the performance of the work, and shall rebuild these structures thus removed in as good a condition as found with the requirements specified. Contractor shall also repair existing structures which may be damaged as a result of the work under this contract.

#### 1.05 ROADS

Unless otherwise specified, roads in which the surface is removed, broken, or damaged, or in which the ground has caved or settled during the work under this contract, shall be resurfaced and brought to original grade and section. Roadways used by the Contractor shall be cleaned and repaired on a weekly basis as directed by the Owner.

#### 1.06 CULTIVATED AREAS AND OTHER SURFACE IMPROVEMENTS

Cultivated or planted area and other surface improvements which are damaged by actions of the Contractor shall be restored as near as possible to their original condition at the Contractor's expense. Existing guard posts, barricades, and fences shall be protected and replaced if damaged.

#### 1.07 PROTECTION OF EXISTING INSTALLATIONS

The Contractor shall, as his/her own expense, immediately correct or replace existing equipment, controls or systems which are damaged as a result of his/her operations.

#### 1.08 DELIVERY OF MATERIAL OR EQUIPMENT

The Owner's personnel or representatives of the Owner will not accept materials or equipment deliveries for the Contractor.

#### 1.09 WARRANTY REQUIREMENTS

- A. Manufacturer's instructions and warranty requirements for delivery, storage, and handling of products shall be strictly followed.

PART 2 - PRODUCTION (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

## SECTION 01734 - OPERATING AND MAINTENANCE INFORMATION

### PART 1 - GENERAL

#### 1.01 WORK OF THIS SECTION

- A. The Contractor shall provide operating and maintenance instructions for all equipment and devices furnished under this contract. Refer to Section 01300 Submittals. The operating and maintenance material supplied shall be original printed copies of manufacturer's brochures and/or manuals. Photocopied material will not be acceptable. Operating and maintenance instructions for each item of equipment and each equipment assembly shall consist of:
1. Cover Page: Equipment name, Equipment tag number, project name, Owner's name, and appropriate data.
  2. Table of Contents: General description of information provided within each tab section, including equipment numbers, and page numbers.
  3. Names and addresses of manufacturer, nearest representative of manufacturer, and nearest supplier of manufacturer's equipment and parts.
  4. For equipment requiring lubrication, the manufacturer's recommended lubricants and lubrication schedule.
  5. For equipment containing integral electrical controls, diagrams showing internal and connection wiring, including logic diagrams, wiring diagrams for control panels, ladder logic for computer base systems, and connection between existing systems and new addition, and adjustments such as calibrating and set points for relays, and control or alarm contact settings.
  6. Specified operating and maintenance information. This information shall include, but not necessarily be limited to, the following items:
    - a. Equipment Summary: Provide type of equipment, Model number and electrical and mechanical specifications.
    - b. Start-up Procedures: These instructions shall include equipment manufacturer's recommendations regarding installation, adjustment, calibration and trouble-shooting.
    - c. Operating Procedures: These instructions shall include the equipment manufacturer's recommended step-by-step procedures for starting, operating and stopping the equipment under all modes of operation. Include safety precautions and emergency operating shutdown instructions.
    - d. Preventive Maintenance Procedures: These instructions shall include the equipment manufacturer's recommendations regarding the steps and schedules to be followed in maintaining the equipment.
    - e. Parts List: This list shall include generic title and identification number of each component part of the equipment, including bearing manufacturer's, model and ball or roller pass frequency of each bearing.
    - f. Exploded Views: These shall be provided where appropriate.

- g. Spare Parts List: This list shall include the manufacturer's recommendations of number of parts which should be stored by the Owner.
  - h. Overhaul Instructions: These instructions shall consist of the manufacturer's directions for the disassembly, inspection, repair and reassembly of the equipment; safety precautions, recommended tolerances, and special tools that are required.
  - i. Provide electrical and instrumentation schematic record drawings.
  - j. Factory Test Results: Provide copies of factory test reports as specified in Technical Specifications.
  - k. Field Test Results: After field testing is completed, insert field test reports as specified in the equipment section.
  - l. Operation and maintenance trouble shooting information.
  - m. Approved shop drawings
  - n. Any other specific information as required in Technical Specifications.
7. Provide all procedures in electronic format at final submittal. Provide those portions of the O&M manual prepared for this project in MS Word in the original MS Word Version 2010 format. PDF files of the documents prepared in MS Word will not be accepted.

## 1.02 CONTRACTOR SUBMITTALS

- A. Operating and maintenance (O&M) instructions shall be submitted with the submittal transmittal form described in Section 01300 and the O&M summary sheet at the end of this Section in paper and digital form to the Owner's Representative accompanied.
- B. Paper copies of the O&M instructions shall be comprised of five copies of the specified operating and maintenance information. For ease of identification, each manufacturer's brochure and manual shall be appropriately labeled with the equipment name, equipment number and specification number, as it appears in the contract documents. The information shall be organized in binders in numerical order by the specification section 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. Each numerical section shall contain a complete itemized data list with equipment name and equipment number for the information contained in that section. Binders shall be of the three-post type with metal piano hinges, back and locking slide bar assembly and be capable of extending to a maximum of 6 inches but used as 4-inch binders. All binders shall be similar and be National 98-381; Wilson Jones catalog covers No. 564-64 LH, or equal.
- C. Digital copies of the O&M instructions shall be in the latest Microsoft Word version.
- D. Contractor may submit operating and maintenance instructions by individual specification section or in final form according to the above instructions.
- E. If the Contractor chooses to submit the O&M instructions by individual specification section, the following procedure shall be used:

1. Contractor shall submit two (2) copies of O&M instructions, along with a good quality photocopy of associated Equipment Maintenance Summary sheets, for each specification section for review.
  2. Submittals will be returned with a review sheet and comments.
  3. Contractor shall resubmit, if requested by the Owner's Representative, and retain all copies of approved submittals until all sections have been approved.
  4. When all sections have been approved, Contractor shall organize and bind the manuals for all the sections of the contract specifications according to the above instructions and submit one complete set of O&M instructions for final review. Contractor shall submit separately and unbound the completed original Equipment Maintenance Summary sheets.
  5. Final review will be for the organization and binding of a complete set of manuals as specified and will not include review of previously approved material.
  6. When the complete set is approved, the Contractor shall submit six (6) complete sets to the Owner's Representative as approved and specified.
- F. If the Contractor chooses to submit the O&M instructions in final form, without previous approval of individual specification sections, the following procedure shall be used:
1. Contractor shall submit two (2) complete sets of O&M instructions, along with a good quality photocopy of associated Equipment Maintenance Summary sheets, organized and bound according to the above instructions for review. Equipment Maintenance Summary sheets shall be placed with their associated specification sections for review.
  2. The set will be returned with review sheets and comments pertaining to the manual organization and binding, as well as the contents.
  3. Contractor shall continue to resubmit the two (2) complete sets of O&M instructions, as requested by the Owner's Representative, until entirely approved.
  4. When the complete set is approved, the Contractor shall submit six (6) complete sets to the Owner's Representative as approved and specified. Contractor shall submit separately and unbound, the completed original Equipment Maintenance Summary sheets.
- G. If the manufacturer's standard brochures and manuals are used to describe O&M 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 FIELD CHANGES

- A. Following the acceptable installation and operation of an equipment item, the item's O&M instructions shall be modified and supplemented by the Contractor to reflect any field changes or information required by field conditions.

#### 1.04 PAYMENT

- A. Acceptable O&M information must be delivered to the Owner's Representative before the Contractor can be paid for more than 80 percent of the purchase value of that equipment and prior to installation of the equipment. Purchase value shall be the net

price for the equipment as given on the paid invoice. Acceptable O&M information for the project must be delivered to the Owner's Representative prior to the project being 75 percent complete. Progress payments for work in excess of 75 percent completion will not be made until the specific acceptable O&M information has been delivered to the Owner's Representative.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION



## SECTION 02050 - DEMOLITION AND REMOVAL

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

- A. This section specifies demolition and removal of structures, portion of structures, utilities, and other items shown on the contract drawings.
- B. Do not begin demolition until authorization has been received from the City's Representative. Remove rubbish and debris so as not to allow accumulation at the site.

#### 1.02 RELATED WORK

- A. Standard Drawings
- B. Record Drawings and Submittals: STD SPEC 01300
- C. Excavation and Earthwork: Section 02200

#### 1.03 QUALITY ASSURANCE

- A. General: All work shall be performed in accordance with the local building codes, State Industrial Safety Orders and requirements of the Occupational Safety and Health Act requirements.
- B. Protection: Demolition shall be performed in such a manner as to not harm adjacent structures, utilities, systems, equipment, existing landscaping or natural vegetation. The Contractor shall assume full responsibility for such disturbance. All costs for such repair, rehabilitation, or modifications shall be incurred by the Contractor at no additional cost to the District.
- C. Contractor shall provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for the protection of all personnel during the demolition and removal activities.
- D. Contractor shall maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.
- E. Prevent spread of flying particles and dust. Contractor shall sprinkle rubbish and debris with water to keep dust to a minimum.

#### 1.04 UTILITY SERVICES

- A. Demolish and remove outside utility service lines shown.
- B. Remove abandoned outside utility lines that would interfere with installation of new utility lines and new construction.

## 1.05 WORKPAYMENT

- A. Payment for the Work in this Section shall be included as part of the lump-sum or unit-price bid amount for which such Work is appurtenant thereto, including all Work and materials specified herein and as may be required to complete this portion of the Work.
- B. Include all costs for Work including all labor, supervision, materials, professional services, transportation, etc.

## PART 2 - MATERIALS (NOT APPLICABLE)

## PART 3 - EXECUTION

### 3.01 GENERAL REQUIREMENTS

- A. Contractor shall notify the District's Representative when demolition and removal activities are complete.

### 3.02 PERFORMANCE

- A. Demolition: Completely demolish and remove equipment, buildings and structures shown, including all appurtenances related or connected thereto, as noted below:
  - 1. As required for installation of new utility service lines.
  - 2. To full depth of structure, utility, or equipment shown.

Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed by him/her, off the property.

Where adjoining structures are to be kept in place, the demolition limit lines shall be neatly saw-cut. Sections to be removed shall be broken out, and the remaining face shall be chipped back to the saw-cut line. The Contractor shall do the necessary work to provide the remaining face with a finish compatible with the surrounding surfaces.

- B. Equipment and Piping Removal: All equipment and piping to be removed shall be properly disconnected from structures, piping, electrical and instrumentation systems. The Contractor shall do all resurfacing and other work as necessary to comply with the above requirements.
- C. Pavement Removal: All pavements shall be saw-cut on a neat line at right angles to the curb face.
- D. Utility Interference: Where existing utilities interfere with the prosecution of the work, Contractor shall relocate them.
- E. Electrical Equipment Removal: All electrical equipment, conduit, wiring, etc. to be removed shall be properly de-energized, made safe, and disconnected from all sources of power prior to demolition. All remaining electrical equipment, located within the demolition area, shall be labeled and indicated as energized.

### 3.03 SALVAGE

- A. District has the right to salvage any items scheduled for removal. The Contractor shall notify the District's Representative five (5) days prior to any salvage or demolition work to determine the disposition of items to be removed. The District's Representative will mark items to be salvaged. Such items shall be properly disconnected, removed from their foundations, cleaned and stored at a location on the plant site as specified or as directed by the District's Representative.

Contractor shall utilize care so not to damage equipment to be salvaged and reused onsite. Any damage caused by Contractor while salvaging equipment shall be repaired at Contractors expense.

### 3.04 BACKFILL

- A. Holes, trenches or depressions in the ground remaining after demolition of structures, pipelines, or equipment shall be filled with compacted backfill materials as specified in Section 02200.

### 3.05 CLEAN-UP

- A. The Contractor shall leave site in clean condition satisfactory to the District's Representative. Clean- up shall include but not be limited to disposal of all items, materials, debris and rubbish. Contractor shall remove items, material, debris, and rubbish to a legal off-site landfill.

END OF SECTION

## SECTION 03000 - GENERAL CONCRETE CONSTRUCTION

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

This section includes materials, installation, and testing of formwork, reinforcing steel, joints, concrete, and finishing and curing for general concrete construction.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Standard Drawings.
- B. Record Drawings and Submittals: STD SPEC 01300.
- C. Painting and Coating: STD SPEC 09900.

#### 1.03 SUBMITTALS

- A. Submit submittal packages in accordance with Standard Specification Section 01300.
- B. Submit manufacturer's catalog data and descriptive literature for form ties, spreaders, corner formers, form coatings and curing compound, bond breakers, joint sealant, backing rod, joint filler, control joints, expansion joint dowels, epoxy bonding compound, floor hardener, color additive, and rapid set cement.
- C. Submit mill test certificates identifying chemical and physical analyses of each load of reinforcing steel delivered. If mill test reports are unavailable and the quantity of steel for a structure exceeds 5 tons, provide a laboratory test to prove conformance with the specified ASTM standard.
- D. Submit reinforcing bending lists and placing drawings for all reinforcing. Placing drawings shall indicate all openings (mechanical, electrical, equipment, and architectural) including additional reinforcing at openings and corner bar arrangements at intersecting beams, walls, and footings indicated in the typical detail and structural drawings. Placing drawings shall be coordinated with the concrete placing schedule. Each bending list and placing drawing submitted shall be complete for each major element of a structure (grade slabs, footings, walls, deck, floor, or roof slabs) including dowels and corner bars. Furnishing such lists shall not be construed that the lists will be reviewed for accuracy. The Contractor shall be wholly and completely responsible for the accuracy of the lists and for furnishing and placing reinforcing steel in accordance with the details shown on the plans and as specified.
- E. Submit concrete mix design at least 15 days before placing concrete.
- F. Submit six copies of a report from a testing laboratory verifying that aggregate material contains less than 1% asbestos by weight or volume and conforms to the specified gradations or characteristics.

## PART 2 - MATERIALS

### 2.01 FORMWORK

- A. Design forms according to ACI 347.
- B. Class I Forms: Use steel forms, ply form, or smooth-surface plywood 3/4-inch minimum thickness for straight surfaces and 1/2-inch minimum thickness for curved surfaces.
- C. Class II Forms: Use plywood in good condition, metal, or smooth-planed boards free from large or loose knots with tongue and groove or ship lap joints. Forms shall be oiled.
- D. Class II forms may be used for exterior concrete surfaces which are 1 foot or more below finished grade. Use Class I forms for all other surfaces.

### 2.02 BOND BREAKER

Bond breaker shall be a nonstaining type which will provide a positive bond prevention, such as Williams Tilt-Up Compound, as manufactured by Williams Distributors, Inc., Seattle, Washington; Silcoseal 77, as manufactured by SCA Construction Supply Division, Superior Concrete Accessories, Franklin Park, Illinois; or District approved equal.

### 2.03 FORM RELEASE AGENT

- A. Form release agent shall effectively prevent absorption of moisture and prevent bond with the concrete. Agent shall be nonstaining and nontoxic after 30 days.
- B. For steel forms, release agent shall prevent discoloration of the concrete due to rust.

### 2.04 REINFORCING STEEL

- A. Reinforcement shall conform to ASTM A 615, Grade 60.
- B. Fabricate reinforcing in accordance with the current edition of the Manual of Standard Practice, published by the Concrete Reinforcing Steel Institute. Bend reinforcing steel cold.
- C. Deliver reinforcing steel to the site bundled and tagged with identifying tags.

### 2.05 WELDED WIRE FABRIC

Welded wire fabric shall conform to ASTM A 185.

### 2.06 TIE WIRE

Tie wire shall be 16gauge minimum, black, soft annealed and not come within 2" of any form.

### 2.07 BAR SUPPORTS

Bar supports in beams and slabs exposed to view after form stripping shall be galvanized and plastic coated. Use concrete supports for reinforcing in concrete placed on grade.

## 2.08 BAR COUPLERS

Reinforcing steel bar splicing couplers shall be a mechanical type as manufactured by Dayton Barsplice Inc. or District approved equal. Use couplers which do not reduce tensile or ultimate strength of bars.

## 2.09 JOINT SEALANT

Joint sealant shall be a multipart, gray, nonstaining, nonsagging, polyurethane sealant, which cures at ambient temperature to a firm, flexible, resilient, tear-resistant rubber. Sealant shall be RC 270 of Products Research and Chemical Corporation, Mameco International Vulkem 227, Multi-Chem MC287, or District approved equal.

Technical Requirements	
Consistency	Gun grade
Tack free time	24 hours at 75°F and 50% R.H.
Pot life	1 to 3 hours
Hardness	35 Shore A, $\pm 5$
Elongation	700%
Tensile strength, ASTM D 412	300 psi
Peel strength on concrete	No loss of bond after 24 hours at 150% elongation
Temperature service range	-40°F to +175°F
Immersion in water	Continuous

## 2.10 BACKING ROD FOR EXPANSION JOINTS

Backing rod shall be an extruded closed-cell polyethylene foam rod, such as Minicel backer rod, manufactured by Industrial Systems Department, Plastic Products Group of Hercules, Inc., Middletown, Delaware; Ethafoam SB, as manufactured by Dow Chemical Company, Midland, Michigan; or District approved equal. The rod shall be 1/4-inch larger in diameter than the joint width. Where possible, provide full length sections for the joint; minimize splices. Apply backup rod and bond breaker tape in expansion joints.

## 2.11 BOND BREAKER TAPE

Bond breaker tape shall be an adhesive-backed glazed butyl or polyethylene tape which will adhere to the premolded joint material or concrete surface. The tape shall be the same width as the joint. The tape shall be compatible with the sealant.

## 2.12 PREFORMED CONTROL JOINT

Preformed control joint shall be a one-piece, flexible, PVC joint former, such as Kold-Seal Zip-Per Strip KSF-150-50-50, manufactured by Vinylex Corp., Knoxville, Tennessee, or a one-piece steel strip with preformed groove, such as Keyed Kold Retained Kap, manufactured by Burke Concrete Accessories, Inc., San Mateo, California, or District approved equal. Provide the preformed control joint material in full length unspliced pieces.

## 2.13 PREMOLDED JOINT FILLER

Joint filler shall be preformed, nonextruded type constructed of closed-cell neoprene conforming to ASTM D 1752, Type I, as manufactured by W. R. Grace Company of Cambridge, Massachusetts; W. R. Meadows, Inc., Elgin, Illinois; or District approved equal.

## 2.14 STEEL EXPANSION JOINT DOWELS

- A. Steel expansion joint dowels shall conform to one of the following:
- B. Epoxy coated steel bar dowels with a 12-mil coating thickness. Steel bar dowels shall conform to ASTM A 36 or ASTM 615, plain rounds, Grade 40. Epoxy coating shall be in conformance with ASTM A 775; or
- C. Stainless steel bar dowels conforming to ASTM A 276, Type 302.
- D. Exposed portion of expansion joint dowels shall be thoroughly greased prior to casting of adjoining wall or slab.

## 2.15 CEMENT

Cement shall conform to ASTM C 150, Type II, with maximum tricalcium aluminate not to exceed 8%. The maximum percent alkalis shall not exceed 0.6%.

## 2.16 AGGREGATES

Aggregates shall comply with ASTM C 33 and shall contain less than 1% asbestos by weight or volume and be free from any substances that will react with the cement alkalis.

## 2.17 COLOR ADDITIVE FOR EXTERIOR ELECTRICAL DUCT ENCASEMENT

For exterior electrical duct concrete encasements, use a color additive for identification purposes: brick red "Colorfull," as manufactured by Owl Manufacturing Company, Arcadia, California; coral red "Chromix C-22," as manufactured by L. M. Scofield Company, Los Angeles, California; or District approved equal. Add the color additive while the concrete is being mixed using the quantity per cubic yard of concrete recommended by the manufacturer for the class of concrete indicated.

## 2.18 CONCRETE ADMIXTURES

- A. Concrete shall contain an air-entraining admixture. Admixture shall conform to ASTM C 260, except it shall be nontoxic after 30 days and shall contain no chlorides. Admixtures shall be Master Builders MB-AE 10, Sika AER (Sikamix 104), or District approved equal.

- B. Concrete shall contain a water-reducing admixture. The admixture shall conform to ASTM C 494, Type A or D, except it shall contain no chlorides, shall be nontoxic after 30 days, and shall be compatible with the air-entraining admixtures. The amount of admixture added to the concrete shall be in accordance with the manufacturer's recommendations. Admixtures shall be Master Builders Pozzolith polymer-type normal setting; Plastocrete (Sikamix 160) Normal Set, Sika Chemical Corporation; or District approved equal.
- C. Do not use any admixture that contains chlorides or other corrosive elements in any concrete.

## 2.19 GROUT

- A. Nonshrink grout shall conform to the Corps of Engineers Specification for Nonshrink Grout, CRD-C621-83, and to these Standard Specifications. Use a nongas-liberating type, cement base, premixed product requiring only the addition of water for the required consistency. Grout shall be UPCON High Flow, Master Flow 713, or District approved equal. Components shall be inorganic.
- B. Ordinary type grout (dry pack) shall consist of one part portland cement to two parts sand (100% passing a No. 8 sieve). Add sufficient water to form a damp formable consistency.
- C. Expansive Grout: Premixed, cementitious mixture with a minimum 28-day strength of 3,500 psi. Provide air-entraining content as recommended by the manufacturer.
- D. Epoxy Grout:
  - 1. Mix the two components of epoxy bonding compound in compliance with the manufacturer's instructions.
  - 2. Use sand that is oven dry and meets the following gradation requirements for epoxy grout:

Sieve Size:	No. 8	No. 50	No. 100
% Passing:	100	30 ±15	5 ±5

## 2.20 MORTAR

- A. Mortar or grout placed on horizontal construction joints shall be a mixture of cement, sand, and water in the same proportions used in the concrete but with coarse aggregate omitted.
- B. Mortar used for repair of concrete shall be made of the same materials as used for concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than one part cement to two and one-half parts sand by damp loose volume. The quantity of mixing water shall be no more than necessary for handling and placing.

## 2.21 BONDING COMPOUND

- A. Epoxy bonding compound shall be Concreseive 1001 LPL, Adhesive Engineering Company, San Carlos, California; Sikadur Hi-Mod (Sikastix 370), Sika Chemical Corporation,



Lyndhurst, New Jersey; Epoxtile 2391 by W. R. Grace and Company; Euco Epoxy 463 by Euclid Chemical Company; or District approved equal.

- B. Non-epoxy bonding compound shall be Weldcrete by Larsen Products Corp., Link by Sta-Dry Manufacturing Corp., Euco Weld by Euclid Chemical Co., or District approved equal. The compound shall be rewettable for up to two weeks.

## 2.22 CONCRETE MIX DESIGN

- A. All concrete to be transit mix only.
- B. Rapid set concrete to be non-corrosive and per OMWD's latest approved mix designs.
- C. Conform to ASTM C 94, except as modified by these Standard Specifications.
- D. Air content as determined by ASTM C 231 shall be  $4\% \pm 1\%$ .
- E. Maximum water-cement ratio for Class A concrete = 0.45 by weight.
- F. Use classes of concrete as described in the following table:

Class	Type of Work	28-Day Compressive Strength (in psi)	Minimum Cement Content (in lbs per C.Y.)
A	Concrete for all structures and concrete not otherwise specified. Concrete fill at structure foundations, cradle, supports across pipe trenches.	4,000	564
B	Pavement.	3,000	500
C	Floor grout, miscellaneous unreinforced concrete.	2,000	376

- G. Measure slump in accordance with ASTM C 143. Slump shall be as follows:

Slab on grade or heavy sections wider (in plan view) than 3 feet	3 inches max.
Footings, walls, suspended slabs, beams, and columns	4 inches max.
Pavement	2 inches max.
Floor grout, miscellaneous unreinforced concrete	4 inches max.

Proportion and produce the concrete to have a maximum slump as shown. A tolerance of up to 1-inch above the indicated maximum shall be allowed for individual batches provided the average for all batches or the most recent 10 batches tested, whichever is fewer, does

not exceed the maximum limit. Concrete of lower than usual slump may be used provided it is properly placed and consolidated.

- H. Aggregate size shall be 3/4-inch maximum for slabs and sections 8 inches thick and less. Aggregate size shall be 1-inch maximum for slabs and sections greater than 8 inches and smaller than 17 inches. Aggregate size shall be 1-1/2 inches maximum for all larger slabs and sections. Aggregate size for floor grout shall be maximum 3/8-inch.
- I. Combined aggregate grading shall be as shown in the following table:

	Maximum Aggregate Size			
	<u>1-1/2-inch</u>	<u>1-inch</u>	<u>3/4-inch</u>	<u>3/8-inch</u>
Aggregate Grade per ASTM C 33	467	57	67	8

- J. Mix design for pumped concrete shall produce a plastic and workable mix. The percentage of sand in the mix shall be based on the void content of the coarse aggregate.

## 2.23 CONCRETE TESTS

- A. The District will require the Contractor to test for concrete quality as described below.
  1. Frequency of Sampling: Cast four concrete test cylinders from each 50 cubic yards, or fraction thereof, of each class of concrete placed in any one day. Sampling and curing of cylinders shall conform to ASTM C 31.
  2. Strength Testing: Test cylinders in accordance with ASTM C 39. Test one cylinder at 7 days for information; test two cylinders at 28 days for acceptance; and hold one cylinder for verification. Strength acceptance will be based on the average of the strengths of the two cylinders tested at 28 days. If one cylinder of a 28-day test manifests evidence of improper sampling, molding, or testing, other than low strength, discard it and use the fourth cylinder for the test result.
  3. Determine concrete slump by ASTM C 143 with each strength test sampling and as required to establish consistency.
  4. Determine air content of the concrete using ASTM C 231 to verify the percentage of air in the concrete immediately prior to depositing in forms.
  5. The average value of concrete strength tests shall be equal to or greater than the specified 28-day strength. No test shall be less than 90% of the specified 28-day strength.
  6. If the 28-day strength tests fail to meet the specified minimum compressive strength, the concrete will be assumed to be defective and one set of three cores from each area may be taken as selected by the District's Representative and in accordance with ASTM C 42. If the average compressive strength of the set of three concrete cores fails to equal 90% of the specified minimum compressive strength or if any single core is less than 75% of the minimum compressive strength, the concrete will be

considered defective. The District may require additional coring, nondestructive load testing, or repair of defective concrete. Costs of coring, testing of cores, load testing, and required repairing pertaining thereto shall be paid by the Contractor at no extra cost to the District.

- B. To facilitate concrete sampling and testing, the Contractor shall:
  - 1. Furnish labor, equipment, and materials to assist the District's Representative in obtaining and handling samples at the project site.
  - 2. Advise the District's Representative in advance of concrete placing operations to allow for scheduling and completion of quality testing.
  - 3. Provide and maintain facilities for safe storage and proper curing of concrete test specimens on the project site, as required by ASTM C 31.

#### 2.24 CURING COMPOUND

- A. Curing compound shall conform to ASTM C 309.
- B. Curing compound shall be compatible with required finishes and coatings and shall meet the State of California Clean Air Quality Standards which limit the quantity of volatile organic compounds to 250 grams per liter.

#### 2.25 CLEAR FLOOR HARDENER (SURFACE APPLIED)

Floor hardener shall be a colorless, aqueous solution of zinc and/or magnesium fluosilicate. Each gallon of the fluosilicate solution shall contain not less than 2 pounds of crystals. Hardener shall be Saniseal, a product of Master Builders Company, Cleveland, Ohio; Hornolith, a product of Grace Construction Materials, Cambridge, Massachusetts; Lapidolith, a product of Sonneborn, Minneapolis, Minnesota; or District approved equal. The solution shall be delivered ready for use in the manufacturer's original sealed containers.

#### 2.26 MATS, PAPER, AND SHEETING FOR CURING

- A. Burlap mats shall conform to AASHTO Specification M182.
- B. Sisal-kraft paper and polyethylene sheets shall conform to ASTM C 171.

### PART 3 - EXECUTION

#### 3.01 FORM TOLERANCES

- A. Failure of the forms to produce the specified concrete surface and surface tolerance shall be grounds for rejection of the concrete work. Rejected work shall be repaired or replaced at no additional cost to the District.
- B. The following table indicates tolerances or allowable variations from dimensions or positions of structural concrete work:

	Maximum Tolerance
Sleeves and inserts	+1/4" - 1/4"
Projected ends of anchors	+1/4" -0.0"
Anchor bolt setting	+1/4" -1/4"
Finished concrete, all locations	+1/4" -1/4" in 10 feet
	Max $\pm 1"$ in total length

- C. The planes or axes from which the above tolerances are to be measured shall be as follows:

Sleeves and inserts:	Centerline of sleeve or insert.
Projected ends of anchors:	Plane perpendicular to the end of the anchor as located on the Drawings.
Anchor bolt setting:	Centerline of anchor bolt.
Finish concrete:	The concrete surface as located on the Drawings.

- D. Where equipment is to be installed, comply with manufacturer's tolerances if more restrictive than above.

### 3.02 FORM SURFACE PREPARATION

- A. Clean form surfaces to be in contact with concrete of foreign material prior to installation.
- B. Coat form surfaces in contact with concrete with a release agent prior to form installation.

### 3.03 FORM REUSE

Reuse only forms which provide a uniform surface texture on exposed concrete surfaces. Apply light sanding or other surface treatment between uses for uniform texture. Plug unused tie rod holes with corks, shave flush, and sand the concrete surface side. Do not patch forms other than filling tie rod holes, except in the case of Class II forms. Do not use metal patching discs on Class I forms.

### 3.04 REMOVAL OF FORMS

- A. Forms and shoring for elevated structural slabs or beams shall remain in place until the concrete has reached a compressive strength equal to the specified 28-day compressive strength as determined by test cylinders. Do not remove supports and reshore. The

following table indicates the minimum allowable time after the last cast concrete is placed before forms, shoring, or wall bracing may be removed:

Sides of footings and encasements	24 hours
Walls, vertical sides of beams, girders, columns, and similar members not supporting loads	48 hours
Slabs, beams, and girders	10 days (forms only)
Shoring for slabs, beams, and girders	Until concrete strength reaches specified 28-day strength
Wall bracing	Until top or roof slab concrete reaches specified 28-day strength

- B. Do not remove forms from concrete which has been placed with outside air temperature below 50°F without first determining if the concrete has properly set without regard for time. Do not apply heavy loading on green concrete. Immediately after forms are removed, the surface of the concrete shall be carefully examined and any irregularities in the surface shall be repaired and finished as specified.

### 3.05 FORMED OPENINGS

Openings shall be of sufficient size to permit final alignment of pipes or other items without deflection or offsets of any kind. Allow space for packing where items pass through the wall to ensure watertightness. Provide openings with continuous keyways and waterstops. Provide a slight flare to facilitate grouting and the escape of entrained air during grouting. Provide formed openings with reinforcement as indicated in the typical structural details. Reinforcing shall be at least 2 inches clear from the opening surfaces and encased items.

### 3.06 EMBEDDED ITEMS

Set anchor bolts and other embedded items accurately and hold securely in position until the concrete is placed and set. Check all special castings, channels, or other metal parts that are to be embedded in the concrete prior to and again after concreting. Check all nailing blocks, plugs, and strips necessary for the attachment of trim, finish, and similar work prior to concreting.

### 3.07 PIPES AND WALL SPOOLS CAST IN CONCRETE

- A. Install pipes, wall spools, and wall anchors before placing concrete. Do not weld, tie or otherwise connect the pipes, spools or anchors to the reinforcing steel.
- B. Support pipe and fabricated fittings, to be encased in concrete, on concrete piers or pedestals.

### 3.08 BEVELED EDGES (CHAMFER)

Form 3/4-inch beveled edges on exposed concrete edges and corners, beam soffit corners, and where indicated on the Drawings. Reentrant corners in concrete members shall not have fillets, unless otherwise shown in the Drawings. The top edges of slabs, walkways, beams, and walls may be beveled with an edging trowel in lieu of using chamfer strips.

### 3.09 CONSTRUCTION JOINTS

- A. Layout of construction joints shall be as shown in the Drawings and according to the following guidelines:
  - 1. Provide horizontal construction joints at top of foundation members and slabs-on-grade and at the soffit of supported slabs and beams.
  - 2. Space the construction joints at a maximum horizontal distance of 25 feet and a maximum vertical distance of 16 feet.
  - 3. Space the corner vertical construction joints between 4 and 8 feet from the corner of walls or wall intersections.
  - 4. Space horizontal construction joints at least 8 inches below bottom of slabs.
- B. For slabs-on-grade that are not subject to hydraulic loading, use formed construction joints. Maximum size of pour shall be 30 feet each way for slabs with wire mesh reinforcement and 75 feet each way for slabs with bar reinforcement. Allow 24 hours between pours of adjacent slabs. Provide joints as specified or shown. Set continuous expansion joint strips between slabs and abutting vertical surfaces as indicated in the Drawings.
- C. Place expansion joint fillers every 30 feet in straight runs of walks, at right-angle turns, and wherever concrete walks butt into vertical surfaces.
- D. For control joints of nonstructural slabs, provide partial depth plastic strips set flush with finished surface or 1/8-inch-wide joints cut with a diamond saw. Use control joints one-quarter to one-third the depth of the slab unless otherwise indicated.
- E. Construction joints shall be keyed, unless otherwise detailed. Form keyways by beveled strips or boards placed at right angles to the direction of shear. Except where otherwise shown on the Drawings or specified, keyways shall be at least 1-1/2 inches in depth over at least 25% of the area of the section.
- F. When it is necessary to make a joint because of an emergency, furnish and place reinforcing dowels across the joint. Embed dowels 48 bar diameters each side of the joint. Size and number of dowels shall match reinforcing in the member. Furnishing and placing such reinforcing steel shall be at the Contractor's expense.
- G. After the pour has been completed to the construction joint and the concrete has hardened, thoroughly clean the entire surface of the joint of surface laitance, loose or defective concrete, and foreign material, and expose clean aggregate by sandblasting the surface of construction joints before placing the new concrete. Cover horizontal construction joints

with mortar. Spread uniformly and work thoroughly into all irregularities of the surface. The water-cement ratio of the mortar in place shall not exceed that of the concrete to be placed, and the consistency of the mortar shall be suitable for placing and working.

- H. In case of emergency, place additional construction joints. (An interval of 45 minutes constitutes cause for an emergency construction joint.)

### 3.10 EXPANSION JOINTS

Provide expansion joints with continuous edge reservoirs, which shall be filled with a joint sealant. Leave the material used for forming the reservoirs in place until immediately before the grooves are cleaned and filled with joint sealant. After removing edge forms from the reservoir, remove grout, loose concrete, and fins; then sandblast the slots. Allow the reservoirs to become thoroughly dry; then blow out the reservoirs and immediately prime and fill with the expansion joint sealant and backup materials. The primer used shall be supplied by the same manufacturer supplying the joint sealant.

### 3.11 TIME BETWEEN POURS

At least two hours shall elapse after depositing concrete in the columns or walls before depositing in beams, girders, or slabs supported thereon. Place beams, girders, brackets, column capitals, and haunches monolithically as part of the floor or roof system, unless otherwise indicated on the Drawings.

### 3.12 INSTALLATION OF PREMOLDED JOINT FILLER

Install in joint accurately as shown. Attach to concrete with a bonding agent recommended by the joint sealant and joint filler manufacturer for compatibility.

### 3.13 INSTALLATION OF JOINT SEALANTS

- A. Immediately before installing the joint sealant, clean the joint cavity by sandblasting or power wire brushing. Install bond breaker tape per manufacturer's instructions.
- B. After the joints have been prepared as described above, apply the joint sealant. Apply the primer, if required, and joint sealant only with the equipment and methods recommended by the joint sealant manufacturer. Application criteria for the sealant materials, such as temperature and moisture requirements and primer cure time, shall be in accordance with the recommendations of the sealant manufacturer.
- C. Apply masking tape along the edges of the exposed surface of the exposed joints. Trowel the joints smooth with a tuck pointing tool wiped with a solvent recommended by the sealant manufacturer.
- D. After the sealant has been applied, remove the masking tape and any sealant spillage.

### 3.14 INSTALLATION OF STEEL EXPANSION JOINT DOWELS

Install parallel to wall or slab face, perpendicular to the joint face, and in true horizontal position. Secure tightly in forms with rigid ties. Orient dowels to permit joint movement.

### 3.15 PLACING REINFORCEMENT

- A. Place reinforcing steel in accordance with the current edition of Recommended Practice for Placing Reinforcing Bars, published by the Concrete Reinforcing Steel Institute.
- B. Place reinforcing in accordance with the following, unless otherwise indicated:
  - 1. Reinforcement indicated on the drawings is continuous through the structure to the farthest extent possible. Terminate bars 2 inches clear from faces of concrete.
  - 2. Splices may be used to provide continuity due to bar length limitations. Minimum length of bars spliced for this reason is 40 feet. Splicing of reinforcement which is detailed to be continuous on the Drawings is not permitted.
- C. Reinforcing steel, before being positioned and just prior to placing concrete, shall be free from loose mill and rust scale and from any coatings that may destroy or reduce the bond. Clean reinforcing steel by sandblasting or wire brushing and remove mortar, oil, or dirt to remove materials that may reduce the bond.
- D. Do not straighten or rebend reinforcing steel in the field. Do not use reinforcing with bends not shown in the Drawings.
- E. Position reinforcing steel in accordance with the Drawings and secure by using annealed wire ties or clips at intersections and support by concrete or metal supports, spacers, or metal hangers. Do not place metal clips or supports in contact with the forms. Bend tie wires away from the forms to provide the specified concrete coverage. Bars additional to those shown on the Drawings, which may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position, shall be provided by the Contractor at his own expense.
- F. Place reinforcement a minimum of 2 inches clear of any metal pipe or fittings.
- G. Secure reinforcing dowels in place prior to placing concrete. Do not press dowels into the concrete after the concrete has been placed.
- H. Roll welded wire fabric used for reinforcement flat before placing concrete. Extend fabric to within two inches of the slab edges and lap splices at least 1-1/2 courses of the fabric and a minimum of 6 inches. Tie laps and splices at ends and at 24 inches on center. Pull the fabric into position as the concrete is placed by means of hooks, and work concrete under the fabric to ensure that it is placed at the proper distance above the bottom of the slab.
- I. Position dowels for masonry walls to occur at reinforced block cells.

### 3.16 SITE-MIXED CONCRETE

Conform to ACI 304.

### 3.17 READY-MIXED CONCRETE

Conform to ASTM C 94.



### 3.18 PLACING CONCRETE

- A. Conform to ACI 304.
- B. Place ready-mixed concrete within the specified delivery time after initial batching based on the outside temperature. Ready-mixed concrete exceeding the delivery time will be rejected by the District's Representative.

<u>Outside Temperature</u>	<u>Delivery Time</u>
Below 40 degrees F (4 degree C)	See Cold Weather Placing
40 to 85 degrees F (4 to 29 degrees C)	90 Minutes
86 to 90 degrees F (30 to 32 degrees C)	75 Minutes
Above 90 degree F (32 degree C)	60 Minutes

### 3.19 PUMPING CONCRETE

Conform to ACI 304.2R-71.

### 3.20 WEATHER REQUIREMENTS

- A. Conform to ACI 305 for placing during hot weather.
- B. Conform to ACI 306 for placing during cold weather.
- C. Do not place ready-mixed concrete in the rain or at times when rain is expected or forecasted. The District's Representative in his sole judgement may reject any concrete work that is affected by rain.

### 3.21 BONDING TO OLD CONCRETE

Coat the contact surfaces with epoxy bonding compound. The method of preparation and application of the bonding compound shall conform to the manufacturer's printed instructions and recommendations for specific application for this project.

### 3.22 BACKFILL AGAINST WALLS

Do not place backfill against walls until the concrete has obtained a compressive strength equal to the specified 28-day compressive strength. Where backfill is to be placed on both sides of the wall, place the backfill uniformly on both sides.

Do not backfill the walls of structures that are laterally restrained or supported by suspended slabs or slabs on grade until the slab is poured and the concrete has reached the specified compressive strength.

### 3.23 CONCRETE FINISHES

Complete concrete surfaces in accordance with the following schedule:

<u>Finish Designation</u>	<u>Area Applied</u>
F-1	Beams, columns, and exterior walls not exposed to view.
F-3	Beams, columns, and walls of structures or buildings exposed to view. Underside of formed floors or slabs.
F-4	Exterior and interior surfaces to be coated.
S-1	Slabs and floors to be covered with concrete or grout.
S-4	Slabs and floors of structures or buildings exposed to view.
S-5	Slabs and floors at slopes greater than 10% and stairs.
E-1	Exposed edges. EXCEPTION: edges normally covered with earth.
E-2	Top of walls, beams, and similar unformed surfaces.

- A. Finish F-1: Repair defective concrete, fill Depressions deeper than 1/2-inch, and fill tie holes.
- B. Finish F-3: In addition to Finish F-1, remove fins, fill depressions 1/4-inch or deeper, fill depressions and airholes with mortar. Dampen surfaces and then spread a slurry consisting of one part cement and one and one-half parts sand by damp loose volume, over the surface with clean burlap pads or sponge rubber floats. Remove any surplus by scraping and then rubbing with clean burlap.
- C. Finish F-4: Repair defective concrete, remove fins, fill depressions 1/16-inch or deeper, fill tie holes, remove mortar spatter, and remove bulges higher than 1/16-inch.
- D. Finish S-1: Screed to grade without special finish.
- E. Finish S-4: Steel trowel finish without local depressions or high points and apply a light hair-broom finish. Do not use stiff bristle brooms or brushes. Leave hair-broom lines parallel to the direction of slab drainage.
- F. Finish S-5: Steel trowel finish without local depressions or high points. Apply a stiff bristle broom finish. Leave broom lines parallel to the direction of slope drainage.

- G. Finish E-1: Provide chamfer or beveled edges.
- H. Finish E-2: Strike smooth and float to an F-3 or F-4 finish.

### 3.24 CURING CONCRETE

- A. Conform to ACI 308.
- B. Water cure with burlap mats unless optional curing methods are permitted.
- C. Do not use curing compound on surfaces which are to be coated with clear floor hardener.
- D. It is the responsibility of the Contractor to select the appropriate curing method in response to climatical and/or site conditions occurring at the time of concrete placement. Take appropriate measures as described in ACI 305 and 306 for protecting and curing concrete during hot and cold weather.

### 3.25 REPAIR OF DEFECTS

- A. Do not repair defects until concrete has been reviewed by the District's Representative.
- B. Surface Defects: Repair surface defects that are smaller than 1-foot across in any direction and are less than 1/2-inch in depth.

Repair by removing the honeycombed and other defective concrete down to sound concrete, make the edges perpendicular to the surface and at least 3/8-inch deep, thoroughly dampen the surface, work into the surface a bonding grout (one part cement to one part fine sand), fill the hole with mortar, match the finish on the adjacent concrete, and cure as specified.

- C. Severe Defects: Repair severe defects that are larger than surface defects but do not appear to affect the structural integrity of the structure.

Repair by removing the honeycombed and other defective concrete down to sound concrete, make the edges of the hole perpendicular to the surface, sandblast the surface, coat the sandblasted surface with epoxy bonding compound, place nonshrink grout, match the finish on the adjacent concrete, and cure as specified.

- D. Major Defects: If the defects are serious or affect the structural integrity of the structure or if patching does not satisfactorily restore the quality and appearance to the surface, the District may require the concrete to be removed and replaced, complete, in accordance with the provisions of this section.

### 3.26 REPAIR OF CRACKS

- A. Repair cracks in concrete structures that are wider than 1/10-inch in width by cutting out a square edged and uniformly aligned joint 3/8-inch wide by 3/4-inch deep, preparing exposed surfaces of the joint, priming the joint, and applying polyurethane joint sealant.

- B. If the cracks are serious or affect the structural integrity or function of the element, the District's Representative may require the concrete to be removed and replaced, complete, in accordance with the provisions of this section.

### 3.27 CLEAR HARDENER APPLICATION (SURFACE APPLIED)

- A. Cure, clean, and keep floors dry to receive hardener. Complete work immediately above floors prior to applying hardener. Apply hardener evenly, using three coats, allowing 24 hours between coats. The first coat shall be one-third strength, second coat one-half strength, and third coat two-thirds strength. Apply each coat so as to remain wet on the concrete surface for 15 minutes. Apply proprietary hardeners in conformance with the manufacturer's instructions. After the final coat is completed and dry, remove surplus hardener from the surface by scrubbing and mopping with water.
- B. Apply hardener to the surfaces designated in the Drawings.
- C. Apply hardener to risers and treads of concrete stairs as described above.

### 3.28 ALUMINUM SURFACES IN CONTACT WITH CONCRETE

Coat aluminum surfaces in contact with concrete per Standard Specification Section 09900, System No. 51.

END OF SECTION

## SECTION 05121 - MISCELLANEOUS METALWORK

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

This section includes materials, fabrication, and installation of structural steel, connecting bolts, pipes, galvanizing, welding electrodes, guard posts, ladders, covers and frames, vents, air valve enclosures, supports, eyebolts, anchors, and other miscellaneous metalwork.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Standard Drawings.
- B. Record Drawings and Submittals: STD SPEC 01300.
- C. Painting and Coating: STD SPEC 09900.
- D. Thermally Sprayed Metallic Coating (Flame Spray): STD SPEC 09965.

#### 1.3 SUBMITTALS

- A. Submit submittal packages in accordance with Standard Specification Section 01300.
- B. Submit drawings of fabricated items, such as pipe supports, vents, and air valve enclosures. Show dimensions and reference materials of construction by ASTM designation and grade.
- C. Submit manufacturer's catalog data and dimensional drawings for lifting eyebolts and inserts; ladders with safety post; manhole covers and frames; and anchor bolts.

### PART 2 - MATERIALS

#### 2.1 STRUCTURAL STEEL

Material for bolted or welded construction shall conform to ASTM A 36.

#### 2.2 BOLTS

Steel anchor and connection bolts shall conform to ASTM A 307, unless noted otherwise. Provide galvanized bolts. Provide with galvanized self-locking nuts or lockwashers and plain nuts.

#### 2.3 STEEL PIPE

Pipe for guard posts and vault vents shall be standard weight (Schedule 40) conforming to ASTM A 53 or A 120, and hot dipped galvanized.

## 2.4 GALVANIZING

Zinc coating for plates, bolts, anchor bolts, and threaded parts shall be in accordance with ASTM A 153. Structural steel shall be zinc coated in accordance with ASTM A 123.

## 2.5 WELDING ELECTRODES

Welding electrodes for structural steel shall conform to AWS A5.5. Use electrodes in the E-70 series.

## 2.6 GUARD POSTS

Use standard weight (Schedule 40) steel pipe, hot dipped galvanized, and 6 feet long. Coat aboveground surfaces per Standard Specification Section 09900, System No. 20. Finish color to be OSHA Yellow. Guard post will be filled with concrete with a dome top finish.

## 2.7 VAULT LADDERS

- A. Ladders shall be 16 inches wide between rails, welded steel construction, and galvanized after fabrication. Minimum diameter of rungs shall be 3/4-inch. The distance between rungs shall not exceed 12 inches and shall be uniform throughout the length of the ladder. Provide galvanized steel supports at the top and bottom of the ladder and anchor to the precast concrete vault with adhesive anchor bolts. Ladders and supports shall be Alhambra Foundry Company No. A-3885, or District approved equal.
- B. Mount on the ladder rungs below the vault cover a telescoping safety post. The post shall be fabricated of steel with telescoping tubular section that locks automatically when fully extended. The upward and downward movement shall be controlled by a stainless steel spring balancing mechanism. The unit shall be galvanized with special alloy spring and be complete with fasteners for securing to the ladder rungs. The telescoping safety posts shall be a Model LU-2 Bilco Ladder UP, or District approved equal.

## 2.8 COVERS AND FRAMES

Vault covers and frames shall be cast iron and designed for traffic loading. Castings shall be smooth, clean and free from blisters, blowholes, and shrinkage. Covers shall seat firmly into the frames without rocking. Frames shall be provided with anchor bolts and neoprene gasket. Covers shall be provided with stainless steel cap screws and lifting holes. Dip castings in a preparation of asphalt or coal tar and oil to form a firm and tenacious coating. Covers and frames shall be Alhambra Foundry Company No. A-1106, or District approved equal.

## 2.9 VAULT VENTS

- A. Fabricate vault vents as shown on the Drawings. Vault vents shall be of welded steel construction and hot dipped galvanized after fabrication. Coat vault vents per Standard Specification Section 09900, System No. 20. Finish color to be OSHA Blue.
- B. Use standard weight (Schedule 40) steel pipe with one threaded end for the riser section. At the plain pipe end, cut three 5-inch long by 3-inch high window openings evenly spaced along the circumference of the pipe. Locate top of window 1-inch from end of pipe. Place

10 x 10 steel wire cloth over the window openings on the inside surface of the pipe and tack weld.

- C. Use 10-gauge steel pipe for the hood. Center a circular cut 1/4-inch thick plate on the plain pipe end of the riser section. Attach the plate to the riser with a full circle fillet weld.

## 2.10 PIPE SUPPORTS

Fabricate pipe supports as shown on the Drawings. Pipe supports shall be of welded steel construction and flame spray coated after fabrication per Standard Specification Section 09965. Coat supports per Standard Specification Section 09900, System No. 10. Color shall match adjacent piping.

## 2.11 LIFTING EYEBOLTS

- A. Locate eyebolts and inserts over the centerline of the piping at the locations shown on the Drawings. Eyebolts and inserts shall have a minimum safety factor of 3:1 and be rated for a working load of 3,000 pounds.
- B. Provide drop forged steel eyebolts with shoulder pattern and hot dipped galvanized. Provide eyebolts with 1-inch diameter by 2-1/2-inch long shank and fully threaded. Provide a 4-inch square by 3/8-inch thick galvanized steel plate washer for each eyebolt.
- C. Provide inserts of the ferrule wing nut design with National Course threads to match the eyebolts. Cast the inserts in the roof slab of the vault at the locations identified in the Drawings.

## 2.12 THREADED INSERTS

Threaded inserts to be cast into the precast concrete vaults shall be of ductile iron construction with Standard N.C. threads. Provide 5/8-inch diameter inserts for the end walls. Inserts shall be Burke Hi-Tensile Threaded Inserts, or District approved equal. Inserts shall be cast in place at the locations identified in the Drawings.

## 2.13 ADHESIVE ANCHORS

Adhesive anchors shall be a two component system consisting of an all threaded anchor rod with nut and washer, and the adhesive capsule. Anchor rods shall be Type 304 stainless steel conforming to ASTM F 593 with nuts conforming to ASTM F 594. The adhesive capsules shall contain a vinylester resin and hardener within a sealed glass capsule. Adhesive anchors shall be Hilti HVA Adhesive Anchor System, or District approved equal.

## 2.14 WEDGE ANCHOR BOLTS

Anchor bolts for use in concrete shall be a stud type expansion anchor with a single piece wedge that performs as three independent wedges. Stud and wedge shall be Type 304 stainless steel conforming to ASTM A 276. Nut shall be Type 304 stainless steel conforming to ASTM F 594 with washer of similar material. Wedge anchor bolts shall be Hilti Kwik Bolt II, or District approved equal.

## PART 3 - EXECUTION

### 3.1 STORAGE OF MATERIALS

Store structural material, either plain or fabricated, above ground on platforms, skids, or other supports. Keep material free from dirt, grease, and other foreign matter and protect from corrosion.

### 3.2 FABRICATION AND ERECTION

- A. Fabricate miscellaneous metal items to straight lines and true curves. Drilling and punching shall not leave burrs or deformations. Continuously weld permanent connections along the entire area of contact. Exposed work shall have a smooth finish with welds ground smooth. Joints shall have a close fit with corner joints coped or mitered and shall be in true alignment. Unless specifically indicated on the Drawings, there shall be no bends, twists, or open joints in any finished member nor any projecting edges or corners at intersections. Conceal fastenings wherever possible. Built-up parts shall be free of warp. Exposed ends and edges of metal shall be slightly rounded. All boltholes shall be 1/16-inch in diameter larger than bolt size.
- B. Clean the surfaces of metalwork to be in contact with concrete of rust, dirt, grease, and other foreign substances before placing concrete.
- C. Set embedded metalwork accurately in position when concrete is placed and support it rigidly to prevent displacement or undue vibration during or after the placement of concrete.
- D. Repair or replace metal items with damaged galvanized surfaces. Accomplish repairs with a field applied, cold galvanizing repair compound. Apply in accordance with the manufacturer's instructions.

### 3.3 WELDING

- A. Contractor shall submit welding procedure along with welder certifications for approval by the District Representative. Welder certifications must be current within the last year.

### 3.4 BOLTING

- A. Use steel bolts to connect structural steel members.
- B. Drive bolts accurately into the holes without damaging the thread. Protect boltheads from damage during driving. Boltheads and nuts shall rest squarely against the metal. Where self-locking nuts are not furnished, bolt threads shall be upset to prevent the nuts from backing off.
- C. Bolts shall be of the length that will extend entirely through but not more than 1/4-inch beyond the nuts. Draw boltheads and nuts tight against the work. Tap boltheads with a hammer while the nut is being tightened. After final tightening, lock the nuts.



### 3.5 ADHESIVE ANCHORS

Drill hole in concrete by means of a percussion hammer drill. Blow compressed air in resulting hole and remove dust. Insert adhesive capsule into hole. Screw stud halfway into nut, screw drive unit into nut/stud assembly, and secure drive unit into chuck of rotary percussion hammer drill. Break capsule with chamfered end of stud. Using a rotary hammer drill, drive stud to bottom of hole. Release friction lock and remove drill. Allow resin to cure for the time recommended by the capsule anchor manufacturer before loading stud.

END OF SECTION

## SECTION 11001 - GENERAL EQUIPMENT PROVISIONS

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. This section specifies general equipment provisions, in general, for all equipment furnished under this contract including equipment specified in other sections. For specific requirements of chemical feed system metering pumps, see Specification Section 11430.
- B. This specification shall supplement the individual equipment specifications.
  - 1. In case of conflict the individual equipment specifications shall govern.
  - 2. All interpretations of conflict shall be based on the Owner's sole judgment.
  - 3. The Contractor shall be responsible for ensuring that all sub-contractors and suppliers or vendors have reviewed all requirements of equipment furnished and installed under Division 11.

#### 1.02 ADAPTATION OF EQUIPMENT

- A. Equipment shall be readily adaptable for installation and operation as shown on the plans. No responsibility for alteration of a planned structure to accommodate other types of equipment shall be assumed by the Owner. Equipment which requires alteration of the structures shall be considered only if the Contractor assumes all responsibility for costs associated with design changes including, but not limited to, engineering design, production of plan revisions, and verification of equality to specified equipment. All such alterations, including required engineering reviews by the Engineer, shall be made at the Contractor's expense.
- B. Equipment approved as being of equal quality, performance, integrity, etc., may be used in place of that specified. Any revisions to structures, piping, electrical or other work made necessary by such substitution is subject to review by the Engineer. All costs associated with such revisions, including engineering and administration costs, shall be paid by the Contractor. The Owner shall be the sole judge of equivalency. Any revisions to structural, piping, electrical or other work made necessary by deviations from approved submittals shall be paid by the Contractor including engineering and administration costs.
- C. Contractor is responsible for designing and furnishing anchoring and bolting systems for all equipment, unless such systems are shown or specified.

#### 1.03 SUBMITTALS

- A. Submit the following items for each equipment item:
- B. Deviation from Specification: A copy of this specification section with all addenda and all referenced specification sections shall be submitted, with each paragraph check-marked by the Manufacturer to indicate specification compliance or marked to indicate deviations

from the specification requirements. Failure to include the required specification sections and the justification for deviations will indicate non-compliance and shall be rejected without further consideration.

1. Check marks shall indicate complete compliance with the paragraph requirements.
  2. Deviations from the specification shall be indicated by underlining the deviation and marking the paragraph or line with a number or letter. The remainder of the paragraph not marked as a deviation shall indicate compliance with the requirements of the paragraph.
  3. The Manufacturer shall prepare a detailed justification for each deviation.
- C. References: Submit references as required by the paragraph of this specification entitled "Manufacturer's Qualifications".
- D. Anchor Bolt Calculations and Drawings: Anchor bolt seismic and wind design calculations and drawings for each piece of equipment shall be submitted by the Contractor. All anchor bolt seismic and wind design calculations and drawings shall be stamped and signed by a Registered Structural Engineer licensed in the State of California. Calculations shall demonstrate that equipment bolting, mounting, and anchoring meets requirements of the California Building Code considering site-specific seismic criteria.
- E. Shop Drawings:
1. Dimensions, elevations, and materials for all equipment and/or components covered in this specification
  2. Installation and layout of equipment and appurtenances
  3. Anchoring details for all equipment signed and sealed by a registered Structural Engineer in the State of California
  4. Detailed field assembly drawings
  5. Details of support members
  6. Field connection locations
  7. Total equipment weight and lifting points
  8. Drawings showing sizes and location for all wiring connecting to external devices. Number all terminal blocks.
  9. Controls and wiring diagrams:
    - a. Wiring diagrams of all electrical and control components
    - b. Method of anchoring control panels, and design of supportive structures and electrical connection details
- F. Factory Test Results:
1. Certified equipment and motor test data.
  2. Copies of torsional and critical speed analysis (only for variable speed devices).
- G. Field Test Results: Submit all results of field tests.

- H. Spare Parts: Submit a list of the spare parts to be provided.
- I. Operation and Maintenance Data: Submit Operations and Maintenance Manuals in accordance with Section 01300.
- J. Installation and Start-up Instructions: Submit written installation and start-up instructions.
- K. Warranty Information: Submit all guarantee and warranty information described in the Paragraph entitled "Warranty."
- L. Manufacturer's Certification and Reports:
  - 1. Obtain a written certification from the Manufacturer that the Manufacturer guarantees the equipment units being furnished will meet or exceed the design requirements specified in the Design Requirements paragraph of the applicable specification.
  - 2. Provide all manufacturer's certification and reports required in Part 1 of this Section.
  - 3. Report on field tests including vibration tests.
  - 4. Acceptance of any report or certification by the Owner shall not relieve the Contractor from his responsibility to meet the requirements of the Contract Documents.
  - 5. Manufacturers of products supplied within the scope of the equipment specifications or the Manufacturer's authorized repair facility shall show evidence of part stock within an area extending no further than Southern California.
  - 6. For variable speed machines only, provide certification from the manufacturer of the driven equipment that the variable frequency drive being supplied is appropriate for the control of the motor and equipment being furnished.
- M. Manufacturer's Field Report: All field data collected by the Manufacturers or Manufacturer's representative of the equipment during start-up services, where required in the Specifications, shall be submitted by the Contractor to the Owner within fourteen (14) days after the start-up services are complete.
  - 1. The test and field data shall be submitted whether specified or not in the detailed equipment specifications and shall include but not be limited to tolerance and alignment measurements where applicable to certify equipment has been satisfactorily installed, and all other information collected by the Manufacturers/Suppliers to satisfy themselves that equipment has been properly installed.
  - 2. In cases where the Manufacturers/Suppliers believe equipment is not properly installed, Manufacturers and Suppliers shall include with this submittal a punch list detailing the problems noted.
- N. Alternative System Design: In the event that the Contractor proposes to furnish a mechanical system that requires significant modifications to the mechanical layout on the Drawings, Contractor shall submit revised mechanical, electrical, and structural layout from the system supplier that shows the revised piping, conduit, and support plans. Revised plan shall show detailed dimensions and material call-outs. Revised layouts will not be considered acceptable until approved by the Owner.

O. Pump Data: Submittals for pumping equipment shall include the following:

1. Pump performance curves showing head vs. capacity at varying speeds, efficiency, brake horsepower, and NPSHR.
  - a. The Manufacturer shall indicate on the head vs. capacity curves the operating envelop recommended for stable operation, within which the pumps are to be operated to prevent surging, cavitation, and vibration.
  - b. The stable operating envelop shall be based on actual hydraulic and mechanical characteristics of the units.
2. Specific Speed of Pump
3. Required inlet submergence
4. Torque and thrust from shut-off head to minimum head conditions
5. Data on pump losses including column and discharge head hydraulic friction losses and horsepower required for shaft friction and thrust bearings
6. Minimum and Maximum rotative speed of pumps.
7. Seal type and materials
8. Type, manufacturer and model numbers of bearings.
9. Bearing life calculations
10. Coupling Data
11. Pressure Limitations
12. Pump Can Sizing
  - a. The Pump Manufacturer shall perform calculations and submit the required minimum pump can dimensions to maintain velocities within the can and submergence on the pump impeller in accordance with Hydraulic Institute Standards.
  - b. The Pump Manufacturer shall review the pump can shop drawings prior to fabrication and provide a certification stating that the can dimensions conform to their recommendations.

P. Motor Data: Submittals for motors shall include the following:

1. For each motor furnish a certified motor data sheet for the actual motor or for a previously manufactured electrically duplicate motor which was tested. Provide the following minimum data:
  - a. Speed-torque relationship.
  - b. Efficiency at 1/2, 3/4 and full load.
  - c. Power factor at 1/2, 3/4 and full load.
  - d. Slip at full load.
  - e. Running light, full load and locked rotor current.
  - f. Temperature rises and results of dielectric tests.
  - g. Type and frame size.
  - h. Bearing type and lubrication medium.

- i. Insulation and enclosure type.
  - j. Safe running time-current curves.
- 2. All Electric Motors shall also have the following submitted:
  - a. Name of Manufacturer,
  - b. Motor Horsepower,
  - c. Full load speed,
  - d. Design letter,
  - e. Temperature rise and class of insulation system,
  - f. Service factor,
  - g. Voltage, frequency, number of phases,
- Q. Thrust Bearing Data, where applicable: Type, specification, lubricant specification, maximum applied load, capacity, bearing load and life (minimum) at rated speed and shut-off head.
- R. Protective Coating Data: Submittals for equipment supplied with protective coatings shall include product data sheets, color charts, and safety data sheets.
- S. Gear Reducer Data: Submittals for equipment with gear reducers shall include service factor, efficiency, torque rating, and materials of construction for all gear reducers.
- T. Lubrication Data: Submittals for equipment with lubrication shall include
  - 1. Lubrication requirements
  - 2. Recommended lubrication manufacturer and product
- U. Equipment Control Panel Data: Submittals for equipment supplied with control panels shall include:
  - 1. Control descriptions, schematics, and diagrams for control panel.
  - 2. Material spec sheets for pilot device, wiring, and appurtenances.
  - 3. Layout
  - 4. Control sequence description
- V. Torsional and Critical Speed Analysis: Where specified in individual equipment specifications, Torsional and Critical Speed Analysis shall include:
  - 1. Contractor shall retain manufacturer of driven equipment to perform vibration and critical frequency analysis of all pumping unit components. Analysis shall include but not be limited to the natural resonance of the motors (coupled and uncoupled to the shaft) equipment shafts, pump/equipment head, pump/equipment columns, and pump/equipment base.
  - 2. The analysis shall demonstrate that the driven units will not be subject to harmful vibrations at any point on the equipment operating curves during start-up, shutdown, and normal operating speed(s) ranging from the minimum operating speed as identified in the equipment specifications and the maximum operating speed as identified in the equipment specifications.

#### 1.04 MANUFACTURER'S NAMES

- A. Manufacturer's name and catalog numbers are for the convenience of the Contractor. The detailed specifications shall apply in the event of a conflict. If detailed specifications have not been given, the Manufacturer's name and catalog number shall determine the design criteria for comparison should an equal be submitted.

#### 1.05 QUALITY ASSURANCE

A. Manufacturer Experience Qualifications:

1. Experience in manufacturing equipment of the same size as or larger than the equipment and motors specified
2. Meet the following installation requirements, unless otherwise specified in the individual specifications:
  - a. Minimum number of equipment installed and in operation: Five
    - (1) Location: United States of America
    - (2) Facility type: Municipal Water Treatment
    - (3) Size: Substantially similar to specified equipment
    - (4) Minimum duration of operation: Five years

- B. Equipment Quality: All equipment specified herein shall be new and of current manufacturer. The equipment furnished shall be designed and constructed in accordance with the best practices and methods and shall operate satisfactorily when installed as shown on the Drawings and operated per the Manufacturer's recommendations. All workmanship and materials used shall be of the highest quality and of proven reliability. All equipment furnished under this Section shall be of a design and manufacture that has been used in similar applications and it shall be demonstrated to the satisfaction of the Owner that the quality is equal to equipment made by that Manufacturer specifically named therein.

- C. Equipment Operational and Maintenance Requirements: All equipment shall be able to operate continuously 24 hours per day, seven days per week, for a 12 -month period with minimal servicing and maintenance.

D. Unit responsibility:

1. All components complete with motors and all other specified accessories and appurtenances shall be furnished by the Equipment Manufacturer to ensure coordination, compatibility, integrity, operation of the individual components and system, and provide the specified warranty for all components. The Equipment Manufacturer shall be the source of information on all equipment furnished.
2. Equipment or systems made up of two or more components shall be provided as a working unit by the responsible manufacturer (unit responsibility manufacturer). The unit responsibility manufacturer shall coordinate selection, design and shall provide all mechanical components, including local control panels such that all equipment components furnished under the equipment specification and the contract drawings for the equipment assembly, and all components specified elsewhere but referenced in the equipment assembly specification, is compatible and operates reliably and properly to achieve the specified design requirements. Unless otherwise indicated, the Contractor shall obtain each system from the

supplier of the driven equipment, which supplier shall provide all components of the system to enhance compatibility, ease of construction and efficient maintenance. The Contractor is responsible to the Owner for performance of all systems as indicated here and in the specific Specification references and contract drawings. The unit responsibility manufacturer is designated in the individual equipment specifications found in these contract documents.

E. Source Quality Control:

1. The equipment shall be factory assembled and factory tested prior to being shipped to ensure satisfactory operation. The Engineer and/or Owner may, at their option and own expense, witness the factory testing by reporting intent to do so to the Contractor. The Contractor shall notify the Owner in writing, at least fourteen (14) calendar days prior to testing by the Manufacturer. The written notifications shall specify the exact date and location the tests shall be conducted, and all testing shall be performed during normal working hours.
2. The individual equipment components that shall be factory tested include, but are not limited to:
  - a. Pump
  - b. Motor
  - c. Control Panel and Instrumentation
3. Pump Shop Tests:
  - a. Pump columns, discharge heads, volutes, and bowl assemblies shall be hydrostatically tested to twice the design total head or one-and-a-half times the shut-off head, whichever is greater.
  - b. Each pump shall be operated from zero to maximum capacity. Results of the tests shall be shown in a plot of test curves showing bowl head, total head, flow, pump input power, net positive suction head required, pump efficiency, and pump efficiency at design running speed(s). Recording and computation of test results shall be in accordance with AWWA E102 or E103 as applicable. Readings shall be taken at a minimum of 5 evenly spaced capacity points including shutoff, design point, minimum and maximum head for which pump is designed to operate.
  - c. When specified in the individual pump specification section, the test shall be witnessed by a registered Professional Engineer, who may be an employee of the manufacturer. The engineer shall sign and seal all copies of curves and test reports and shall certify that hydrostatic tests were performed. Test shall be conducted in conformance with the methods described in the Hydraulic Institute Standards. The pump manufacturer shall notify the Owner, in writing, at least fourteen (14) calendar days prior to testing. The written notifications shall specify the exact date and location the tests will be conducted, and shall define the test procedures to be utilized. Testing shall be performed during normal working hours.
  - d. Pumps shall not be shipped until the Owner has approved all test reports.
4. Test tolerances for rate of flow, total head, power, and efficiency shall meet Acceptance Grade 1U as specified in ANSI/HI 11.6 or 14.6.
5. Motor Shop Tests (for all motorized equipment):



Each motor shall be given a short commercial test to demonstrate that it is free from defects and to provide assurance that it meets specified requirements. Tests shall include as a minimum:

- (1) No load running current and current balance.
- (2) Locked rotor current.
- (3) Winding resistance.
- (4) High potential test.
- (5) Bearing inspection.
- (6) Vibration test.

b. When specified in the individual equipment specification section, the test shall be witnessed by a registered Professional Engineer; who may be an employee of the manufacturer. The engineer shall sign and seal all copies of curves and test reports. The equipment manufacturer shall notify the Owner, in writing, at least fourteen (14) calendar days prior to testing. The written notifications shall specify the exact date and location the tests will be conducted, and shall define the test procedures to be utilized. Testing shall be performed during normal working hours.

c. Motors shall not be shipped until the Owner has approved the test reports.

6. Field Tests: See individual equipment specifications for field test requirements.

F. Reference Standards: All equipment and equipment installation shall comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

- |             |   |
|-------------|---|
| 1. AGMA     | American Gear Manufacturer's Association              |
| 2. ANSI     | American National Standards Institute                 |
| 3. ASCE     | American Society of Civil Engineers                   |
| 4. ASME     | American Society of Mechanical Engineers              |
| 5. ASTM     | American Society for Testing and Materials            |
| 6. AWS      | American Welding Society                              |
| 7. AWWA     | American Water Works Association                      |
| 8. AFBMA    | Anti-Friction Bearing Manufacturer's Association      |
| 9. Cal/OSHA | California Division of Occupational Safety and Health |
| 10. CBC     | California Building Code                              |
| 11. CMC     | California Mechanical Code                            |
| 12. HI      | Hydraulic Institute                                   |
| 13. IEEE    | Institute of Electrical and Electronic Engineers      |
| 14. IPCEA   | Insulated Power Cable Engineer's Association          |
| 15. NACE    | National Association of Corrosion Engineers           |
| 16. NEC     | National Electric Code                                |
| 17. NEMA    | National Electrical Manufacturer's Association        |

- 18. NFPA            National Fire Protection Association
- 19. NSF            National Sanitation Foundation
- 20. OSHA           Federal Occupational Safety and Health Act
- 21. SSPC           Steel Structures Painting Council, American National Standards Institute
- 22. SSPWC        Standard Specifications for Public Works Construction ("Greenbook")
- 23. UBC            Uniform Building Code
- 24. UL             Underwriters Laboratory

- G. Existing Conditions: Contractor shall field verify existing conditions for new equipment installed on or adjacent to existing structures. Submit this info to equipment manufacturer for fabrication of sole plates and all other devices attached to existing structures.

#### 1.06 WARRANTY

- A. The Contractor shall guarantee all equipment against (a) faulty or inadequate design, (b) improper assembly or erection, (c) defective workmanship or materials, and (d) leakage, breakage, or other failures. The guarantee period shall be as specified herein and in the detailed equipment specifications.
- B. For all equipment, the Contractor shall obtain from the equipment Manufacturer a warranty for all motors, controls, and appurtenances for one year from the date of Final Acceptance, unless otherwise specified in the individual specification sections.
  - 1. During the warranty period, the Contractor shall provide the services of a trained manufacturer's representative to make all adjustments, repairs and replace all defective material and equipment at no cost to the Owner.
  - 2. The Contractor shall include all costs incurred by the manufacturer, including travel and expenses, under the terms of the warranty.
- C. The Manufacturer shall guarantee that the equipment is suitable for the site conditions and will meet or exceed the design requirements specified in the individual specifications.
  - 1. A written certification of the design requirements guarantee from the Manufacturer shall be submitted.
  - 2. In the event the design requirements are not met, the Manufacturer shall make all modifications or additions required to bring the equipment into compliance at no additional cost to the Owner.

#### 1.07 EXTRA MATERIALS AND SPARE PARTS

- A. The Manufacturer shall furnish the spare parts identified in the individual specification sections:
- B. All spare parts shall be individually packaged with detailed itemized inventory list with part numbers, parts descriptions, and pricing.

- C. Spare parts shall be paid for separately within the schedule of values and delivery and shall be delivered to and signed by the Owner's Representative.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Painting. Painting shall be as required in Division 09 of these Specifications.
- B. Galvanizing. Galvanizing shall conform to the applicable requirements of Section 210-3 "Galvanizing" of the Standard Specifications for Public Works Construction, latest edition.
- C. Anchor Bolts. All anchor bolts, nuts, and washers shall be 316L stainless steel.
- D. Electrical Work. Electrical work shall be as specified in Division 16 of these Specifications.
- E. Piping and Valves. Piping, valves, and fittings shall be as specified in Division 15 of these Specifications.
- F. Motor Enclosure and Drives. Motor enclosures shall be TEFC unless specified otherwise. For all equipment provide motors with a service factor of 1.15. Variable speed motors shall be rated for inverter duty. Variable speed motors shall also be rated for conformance with NEMA MG-1 Part 31.
- G. Motor Size. Electric motor drives shall be sized to be non-overloading throughout the pump performance conditions as defined in this Specification. Motors shall comply with the requirements specified in Division 16 and the General Equipment Provisions.

### 2.02 WORKMANSHIP AND MATERIALS

- A. All equipment shall be designed, fabricated and assembled in accordance with the best modern engineering and shop practice and in accordance with applicable standards including ASTM, ANSI and AMA. Individual parts shall be manufactured to standard sizes and gauges so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units, shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except as required for tests.
- B. In various locations on the drawings, Manufacturer's names have been used for clarity and to establish minimum product standards only. The Contractor shall be responsible for selection and coordination of all materials required for construction.
- C. All parts and components of mechanical equipment shall be designed for satisfactory service under continuous duty without undue wear under the specified and indicated operating conditions for the period of time specified in these Documents. Any part of mechanical equipment that shows undue or excessive wear or fails due to wear under normal operating conditions within the warranty period shall be considered as evidence of defective material or defective workmanship, and it shall be replaced by the Contractor with equipment or parts to meet the specified requirements at no cost to the Owner.

- D. Materials shall be suitable for the service conditions to be encountered. Unless otherwise specified, structural steel shall conform to ASTM A36. All mechanisms or parts shall be amply proportioned for the stresses which may occur during operation or for any other stresses which may occur during fabrication, erection, and transportation.
- E. Unless otherwise specified, all materials shall conform to the structural and miscellaneous standards of the American Institute of Steel Construction.
- F. Bronze which shall be in contact with water or any liquid, used in the manufacture of any equipment shall not contain aluminum nor more than 6 percent zinc, and shall conform to ASTM B62, or equivalent.
- G. All steel bars, shapes, and plates shall be clean and straight before being worked. Straightening or flattening, if necessary, shall be done by a process and in a manner that shall not injure the metal. Sharp kinks or bends shall be cause for rejection. Steel that has been heated partially shall be annealed, unless it is to be used in minor parts. Finished members shall be true to line and free from twists, bends, and other joints.
- H. Tolerances and clearances shall be as indicated on the Shop Drawings and these tolerances and clearances shall be closely followed to secure proper operation of the equipment.
- I. All flanges on equipment and appurtenances furnished shall conform in dimensions and drilling to ANSI B16.1, Class 125 unless otherwise specified.
- J. All specific requirements of these specifications must be adhered to, and modifications shall be made at the Contractor's expense to the specified model of manufacturer's equipment to make it conform to the specific requirements of these specifications if the standard product does not fulfill all requirements.
- K. Equipment input power requirements shall not exceed the motor nameplate brake horsepower at any point on the equipment operating curve from shutoff to runout.
- L. Pump characteristic curves shall continuously rise from minimum head to shutoff with no intermediate dips.
- M. Pumping units shall be designed for continuous stable operation at all points on their operating curves from shut-off to run-out head at all speeds between the minimum specified speed and the maximum specified speed.
- N. Machine Unit Vibration (for variable speed machines only):
  - 1. Equipment shall be designed so there are not damaging vibrations or lateral or torsional critical speeds, or abnormal noise at any point on the operating curve from shutoff to run-out head at all operating speeds.
  - 2. The vibration of the installed equipment shall comply with the recommended limits defined in ANSI/HI 2.4, latest edition. Contractor shall perform tests to confirm compliance with vibration limits.
  - 3. If the installed equipment experiences vibration exceeding the Hydraulic Institute limits, equipment manufacturer shall modify equipment components as necessary to correct the deficiencies, at no additional cost to the Owner.

O. Bearings:

1. Unless otherwise specified, all equipment bearings shall be oil or grease lubricated, ball or roller antifriction type of standard manufacture. Bearings shall be conservatively designed to withstand all stresses of the service specified. Each bearing, except as otherwise noted, shall be rated in accordance with the latest revisions of Anti-Friction Bearing Manufacturer's Association's (AFBMA) Methods of Evaluating Load Ratings of Ball and Roller Bearings for B-10 rating life of 100,000 hours.
2. All grease lubricated bearings, except those specified to be factory sealed lubricated, shall be fitted with easily accessible grease supply, flush, drain and relief fittings of the standard hydraulic type. Extension tubes shall be provided for easy access.
3. 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 50 degrees C and shall be equipped with a filler pipe and an external level gauge. Fittings for pressure lubrication shall be 1/4-inch straight-type.
4. To avoid work hardening or "Brinelling" damage from vibration, bearings shall be separately packed or otherwise suitably protected during transport.
5. Thrust Bearings (where applicable) shall have AFBMA rated (minimum) life of not less than five years when operated continuously at highest rated speed of motor and at total load consisting of the weight of the motor rotor plus combined dead weight and hydraulic thrust load imposed on motor by equipment, when equipment is operating at shutoff head. (Average life is five times minimum life). Bearings shall be adequate to carry thrust Loads existing under all conditions of equipment operation from shutoff to run-out.

P. Motors:

1. Motors shall be constructed in accordance with current NEMA, IEEE and ANSI Standards, where applicable. Motors shall be fully capable of performing in accordance with the manufacturer's nameplate rating and free from defective material and workmanship.
2. Motors shall be induction type, with a service factor of 1.15. Variable speed motors shall be inverter duty rated and shall comply with NEMA Standard MG1-31.
3. Motors shall operate on 460 volt, 3 phase electric power.
4. Motors shall be of sufficient size so that there will be no overload on the motor above rated nameplate horsepower under any condition of operation from shut-off to zero head. Motors shall be suitable electrically and mechanically for application. Motors shall be designed for continuous operation at full load and rated voltage with a frequency variation of  $\pm 5$  percent and a voltage variation of  $\pm 10$  percent. For variable speed equipment, motors shall be suitable for use with a variable frequency drive. The starting, accelerating and operating torques of the motors shall be sufficient to start and operate the equipment over a speed range from the minimum specified operating speed to the maximum specified speed.

5. Motor horsepower ratings noted in individual equipment specifications are estimates only and it is the responsibility of the Contractor to furnish motors, electric circuits, and other equipment of ample horsepower capacity to operate the equipment furnished without exceeding the nameplate full-load current at rated nameplate voltage. Full-load amps information shall be furnished with submittal.
6. For variable speed machines, maximum vibration limit for motors shall be 0.002 inches peak to peak unfiltered, when measured in accordance with NEMA Publication MGI-20.54.
7. Motor enclosures shall be TEFC unless otherwise specified. Comply with noise requirements of detailed equipment specifications.
8. Motor shall be equipped with 110 volt, single phase space heaters and N.C. temperature switches.
9. Motor shall be capable of carrying full load current continuously without injurious temperature rise in an ambient temperature of 40 °C.
10. Motor Construction:
  - a. Rotor shall be made from high grade steel laminations adequately fastened together and to the shaft. Squirrel cage shall be either cast aluminum or bar type with brazed or welded end rings.
  - b. Insulation shall be minimum Class B braced for repeated full voltage starts.
11. The maximum temperature rise of windings as measured by the resistance method shall not exceed 90°C when the motor is operated continuously at service factor horsepower, rated voltage and frequency and with an ambient temperature not exceeding 40 ° C.
12. Motors shall be equipped with stainless steel hardware throughout. All windings, stators and rotor parts subject to wear due to airborne abrasives shall be treated with abrasion resistant material. Bearings shall be provided with dust-tight seals.
13. Provide corrosion resistant guard screens to cover openings.
14. Provide an engraved stainless steel name plate for each motor. The nameplate shall include as a minimum:
  - a. Manufacturer.
  - b. Type.
  - c. Frame.
  - d. Insulation Class.
  - e. Horsepower.
  - f. RPM.
  - g. W Model.
  - h. KVA Code.
  - i. Voltage.
  - j. Locked Motor Current.

- k. Full Load Current.
  - l. Serial Number.
  - m. Date of Manufacture.
15. Locked rotor currents shall be as specified in NEMA standards.
16. Motor Thrust Bearings (where applicable):
- a. Type: Angular contact or spherical roller oil lubricated. Water cooling shall not be allowed.
  - b. Lubrication: Provide oil level sight gage with permanent safe oil level gage markings. Provide fill and drain plugs.
  - c. Mounting: Mount to accommodate all loading conditions including any transient up thrust.
- Q. Fasteners: All fasteners supplied with equipment shall be 316L stainless steel.

## 2.03 LUBRICATION AND LUBRICATION FITTINGS

- A. Equipment shall be adequately lubricated by systems which require attention no more often than weekly during continuous operation. Lubrication systems shall not require attention during start-up or shutdown and shall not waste lubricants. Lubricants of the type recommended by the equipment manufacturer shall be provided in sufficient quantity for consumption prior to completion of required testing and acceptance of equipment by the Owner. The Contractor shall provide the Owner, prior to equipment start-up, four (4) copies of a list showing the proper lubricants for each item of mechanical equipment, approximate quantities needed per year of continuous operation, and recommended lubrication intervals. Wherever possible, the types of lubricants shall be consolidated with the manufacturer's approval to minimize the number of different lubricants required for plant maintenance.
- B. Equipment lubrication fittings shall be extended with piping beyond obstructions such as guards or covers to provide ease of lubrication without disassembly of the unit.
- C. All lubrication fittings shall be constructed of 304 L stainless steel and shall be brought to the outside of all equipment so they are readily accessible from the outside without the necessity of removing covers, plates, housing, or guards. Fittings shall be of button head type. Lubrication fittings shall be mounted together wherever possible and shall be made of factory-mounted multiple fitting assemblies. Fittings shall not be individual fittings field-mounted together.

## 2.04 GAUGES AND GAUGE CONNECTIONS

- A. Pump Suction and Discharge Pressure Gauge Connections: Except where permanent pressure gauges are shown on the plans, a 1/2" NPT connection and 316 stainless steel isolation cock shall be furnished and installed on the suction and discharge piping of all pumps. Unless connections are provided on the pump casing at the suction and discharge, the connections shall be provided immediately upstream of the pump suction connection and immediately downstream of the pump discharge connection. All gauges shall be furnished per Division 17 "Instrumentation and Control Requirements". NPT connection shall be furnished and installed on the suction and discharge piping of all

pumps, immediately upstream of the pump suction connection and immediately downstream of the pump discharge connection.

## 2.05 ELECTRICAL EQUIPMENT

- A. All electrical equipment shall be capable of operating successfully at full-rated load, without failure, at an ambient air temperature of 32°F to 120° F.

## 2.06 CONTROL CABINETS AND PANELS

- A. All control cabinets and panels located outdoors or in corrosive environments shall be minimum NEMA 4X unless otherwise specified or noted on the Contract Drawings or in the Specifications.

## 2.07 SAFETY REQUIREMENTS

- A. Belt or chain drives, fan blades, couplings, exposed shafts and other moving or rotating parts shall be covered on all sides by safety guards which conform to the General Industry Safety Orders of the California Division of Industrial Safety. Safety guards shall be fabricated from 15 USS gauge or heavier 316 stainless steel. Each guard shall be designed for easy installation and removal. Necessary supports and accessories shall be provided for each guard. Safety guards in outdoor locations shall be designed to prevent the entrance of rain and dripping water. Drawings of safety guards shall be submitted to the Owner for approval prior to fabrication or delivery.

## 2.08 EQUIPMENT NAMEPLATES

- A. The equipment manufacturers shall provide equipment nameplates for each equipment item and shall be fastened to the equipment in an accessible location.
- B. The nameplate shall include manufacturer's name and contact information, equipment model number, identification tag number, shop order number, drive speed, motor horsepower, and rated capacity, and date of manufacture. Nameplates for pumps shall also include rated total dynamic head and impeller size where applicable. Equipment power requirements including horsepower, voltage, frequency, and phases shall be stated.
- C. Equipment nameplates shall be stamped on stainless steel and fastened to the equipment with No. 4 or larger oval head stainless steel screws or drive pins.

## 2.09 IDENTIFICATION PLATES

- A. The Contractor shall furnish and install identification plates and shall mount on or adjacent to each item of equipment and device including tanks, gates, motor operated valves, electrical and instrumentation items and all other mechanical equipment items.
- B. The identification plates shall identify the equipment function, title, equipment number, and Owner asset number bar code.
- C. Identification plates shall be approximately 1-inch by 3-inches made from phenolic material having a black exterior and white center. Letters shall be engraved and shall not be smaller than 3/16-inch high. All plates shall be fastened with 316 stainless steel pins



or screws as approved by the Owner. The plates shall be supplied by a single Manufacturer.

- D. The Contractor shall be responsible for compiling a list of all equipment titles and equipment numbers (where required by the Contract Documents) as they will appear on the identification plates. The Contractor shall submit the list of titles along with a sample identification plate to the Owner for review.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Installation of equipment shall be in accordance with the Manufacturer's written recommendations.
- B. Skilled craftsmen experienced in installation of the equipment or similar equipment shall be used. Applicable specialized tools and equipment, such as precision machinist levels, dial indicators, and gauges shall be utilized as required in the installations. The work shall be accomplished in a workmanlike manner to produce satisfactory equipment installation free of vibration or other defects.
- C. Install in a manner and to the tolerances recommended by the equipment manufacturer. The Contractor shall obtain installation instruction booklets or other recommendations from the equipment manufacturers as to procedures for, sequence of, and tolerances allowed in equipment installation. In particular, the Manufacturer's recommendations as to grout spaces required, type of grout to be used, and tolerances for level and alignment, both vertical and horizontal, shall be obtained and followed. One (1) copy of this material shall be given to the Owner prior to the installation of the equipment.
- D. Whenever applicable, the Contractor shall obtain the services of a Manufacturer's representative specifically trained in erection of his equipment to supervise the installation. The Contractor shall be responsible for the proper alignment of all installed driven equipment and drives in accordance with the tolerance recommendation of the manufacturers for both Owner furnished and Contractor furnished equipment.
- E. Installation shall include furnishing and applying an initial supply of grease and oil, recommended by the manufacturer.
- F. The Contractor shall furnish and install all on-site wiring and piping.
- G. Support piping independent of equipment.
- H. Check and align unit components.
- I. Make all electrical connections in conformance with requirements of Division 16, Electrical.
- J. Plug all taps and orifices not required for equipment operation and controls.
- K. Install Type 316 stainless steel pipe or tubing on each pump to convey leakage to nearest drainage inlet.

- L. The Contractor shall install all Owner furnished equipment where required by the Contract Documents, in accordance with the installation instructions, shop drawings and submittals provided by the equipment manufacturers and available at the Owner offices for the Contractor's use.
- M. Prior to installation of equipment, all sacking and concrete preparation shall be completed and the work area shall be maintained in a broom-clean condition during the equipment installation.

### 3.02 COORDINATION

- A. The Contractor shall take all measurements for his work at the installation sites, verify all subcontractor's and Manufacturer's drawings and be responsible for the proper installation within the available space of the apparatus specified and shown on the drawings and must inform the Owner of any variations and shall submit all proposed changes for review before making any changes.
- B. The Contractor shall provide at least seven (7) days written notice of all work that shall tie into existing facilities. The method(s) used to tie into existing facilities shall be reviewed by the Owner prior to execution of the work. All costs associated with tie-ins shall be included with the Contractor bids.

### 3.03 CONCRETE EQUIPMENT PADS

- A. Unless otherwise specified or noted on the Contract Drawings, all equipment shall be provided with a reinforced concrete pad consisting of an eight (8) inch thick slab with a minimum of #4 re-bars at 8 inches on centers each way and 316 stainless steel anchor bolts as required to accommodate the equipment.

### 3.04 ANCHOR BOLTS AND JACKING SCREWS

- A. All anchor bolts and anchoring hardware shall be of Type 316 stainless steel. All fasteners and anchor bolts shall meet the requirements of Specification Section 0121, Miscellaneous Metalwork.
- B. All threaded fasteners shall be coated with a nickel based anti-seize thread lubricant prior to assembly.
- C. Alternate methods of anchoring including those shown on the plans and specified herein shall meet the requirements of these Specifications and shall be submitted to the Owner for review. Submittals on alternate anchoring methods shall be done in accordance with Section 01300 and the requirements of this specification section.
- D. All equipment shall be anchored to supporting members by bolts or other connections to accommodate all operating forces and satisfy the seismic restraint requirements of the California Building Code considering site-specific seismic criteria. Unless otherwise indicated in the individual equipment specifications, the Contractor shall be responsible for furnishing anchoring and bolting systems for the equipment. Anchor bolts and hardware sizes and installation shall conform to the seismic design calculations and drawings submitted to the Owner.
- E. Seismic design calculations and drawings shall be completed for each equipment item unless anchor sizing, embedment, and spacing for the specific piece of equipment is

shown or specified in the Contract Documents. The Contractor shall submit all seismic design calculations and drawings per the requirements of the paragraph of this specification entitled "Submittals." The Contractor shall be responsible for preparing and providing the seismic anchor bolt calculations and drawings for all equipment, unless indicated in the individual equipment specifications that seismic anchor bolt calculations and drawings are to be prepared and provided by the equipment manufacturer or supplier.

- F. Jacking screws shall be provided in the heavy equipment bases and where required elsewhere to aid in leveling during installation.
- G. Anchor bolt setting drawings, shall be delivered sufficiently early to permit setting the anchor bolts when the structural steel support frame is fabricated by others.
- H. Where supported on grade, the area under the pad shall be graded and compacted as required prior to placement of the pad. Pads shall not be placed on top of asphalt concrete paving. All asphalt in the pad area including any additional area required for formwork shall be saw cut and removed to grade. The area under the pad shall be graded and compacted as required prior to placement of the pad.
- I. Where pads are required on top of existing concrete slabs, the surface of the existing slab shall be roughened and reinforcing steel shall be doweled into the existing slab prior to forming and placement of the equipment or tank pad.

### 3.05 EQUIPMENT BASES

- A. A heavy cast iron or welded steel base shall be provided for each item of equipment that is to be installed on a concrete base. Bases shall be provided with machined support pads, tapered dowels for alignment of mating or adjacent items, adequate openings to facilitate grouting, and openings for electrical conduits. Seams and contact edges between steel plates and shapes shall be continuously welded and ground smooth.

### 3.06 BASE GROUTING

- A. After assembly and installation on the concrete base, each unit shall be leveled using a precision level and aligned in place, but not grouted until after the initial fitting and alignment of connecting piping. Each unit shall then be grouted to the concrete base. Each base shall be completely filled with grout. The grout shall extend to the edge of each base and shall be beveled at 45 degrees all around the unit. Grout that is exposed at horizontal surfaces shall be rounded to provide drainage to appropriate points. After grout has set, jacking screws shall be removed and nuts on anchor bolts shall be tightened, followed by an overall check on leveling and alignment. Should equipment not meet tolerances of leveling and alignment, as recommended by the manufacturer, corrective measures shall be taken to obtain the tolerances required. Reciprocating equipment shall be grouted with non-shrinking epoxy grout as manufactured by Embeco, or equal.

### 3.07 IDLER SPROCKETS

- A. Idler sprockets shall be installed so that not less than one-quarter of the total adjustment is available for future use.

### 3.08 PAINTING

- A. All exterior surfaces and all interior wetted surfaces shall receive surface cleaning and preparation, prime coat, and applied finish coats as specified by the equipment manufacturer.
- B. Surfaces requiring painting or coating for corrosion protection shall be smooth, free from sharp edges, burrs, and projections, and shall have all welds ground smooth and all edges and corners of structural members rounded. Non-conformance shall be grounds for rejection of equipment as determined by the Owner.
- C. Nameplates shall not be painted.
- D. Non-ferrous, stainless steel and moving parts shall not be painted.
- E. All ferrous surfaces of equipment, except for machined or bearing surfaces and stainless steel surfaces, shall be cleaned and shop primed. Machined, polished, and other ferrous and non-ferrous surfaces which are not to be painted shall be coated with corrosion and/or rust preventative compound, Dearborn Chemical "NO-Ox-Id", Houghton "Rust Veto 344", Rust-oleum "R9", or approved equal. Should rust occur during shipment and/or storage, the contractor shall be responsible for correction as determined by the Owner.
- F. All galvanizing, where called for on the plans and/or the Specifications, shall be hot dip process conforming to ASTM A-123 and the appropriate American Hot Dip Galvanizers Association, Inc. Specifications and the Standard Specifications for Public Works Construction (SSPWC). Galvanized metal surfaces are to be solvent cleaned of residual oils and primed with an approved galvanized metal primer before shipment.
- G. The stainless steel structural components and enclosure panels shall be passivated after fabrication to remove embedded iron, surface rust and weld burn.
- H. Copper, bronze, chromium plate, nickel, stainless steel, aluminum, monel metal, lead, lead coated copper, brass and plastic are not to be painted or finished unless called for in other parts of this Specification or on the drawings or as recommended by the manufacturer.
- I. Equipment shall be shop primed prior to delivery to the jobsite unless otherwise specified in the Detailed Equipment Specification. Surfaces of equipment that will be inaccessible after assembly shall be painted or otherwise protected before assembly by a method that provides protection for the life of the equipment.
- J. All metallic surfaces requiring a shop applied primer shall be primed with an approved priming system that has been verified with the Section 09900 (Painting) subcontractor as being compatible with the Section 09900 coating systems proposed and shall be applied in accordance with the recommendations of the paint manufacturer. Submittals for all equipment specified in Division 11 shall include the following:
  - 1. Coating manufacturers "Cut-sheet" describing components, surface preparation requirements, recommended mill thicknesses, and application procedures for the proposed primer.

2. A letter from the equipment supplier stating that he has contacted the (Painting) subcontractor and confirmed that the proposed primers are compatible and that the primer will be applied per the coating manufacturers requirements. In addition, the letter shall certify that the appropriate surface preparations will be made prior to primer application.
- K. Date of factory prime coat shall be listed on final Bill of Material with equipment delivery. Field coating shall be completed within the allowable overcoat or recoat time per the coating manufacturer. All surfaces shall be prepared in accordance with coating manufacturer's written recommendations.
- L. Electric motors, drives, and other equipment that would be damaged by sandblasting shall be cleaned by hand cleaning or power tool cleaning as directed by the Owner. Following cleaning, the components shall be shop-primed with a rust inhibitive primer and finish coated with a high quality industrial alkyd enamel. The equipment supplier shall certify, by letter included with the equipment submittal, that the Section 09900 (Painting) subcontractor was consulted and confirmed that the proposed primer and finish coating described above is compatible with the approved Section 09900 painting scheme.
- M. After delivery to the job site, equipment surfaces shall be inspected and evaluated by the Owner. Touch-up all painted parts that have been damaged during shipping. Touch-up or complete removal of shop priming, by sandblasting or other approved method, may be required as determined by the Owner, based on the condition of the equipment primer prior to final, in place, finish coat application. The Contractor shall furnish brand new equipment to replace any equipment which the Owner determines to be damaged beyond repair by rust or mishandling, etc., while in storage or during installation by the contractor.
- N. Field touch-up, final surface preparation, and final finish coatings will be applied by the (Painting) subcontractor.
- O. Motors and gear reducers shall be painted the same color.
- P. Paint all equipment together with piping after installation to match Owner color code.

### 3.09 DISSIMILAR METALS

- A. Where aluminum surfaces come in contact with dissimilar metals, except Type 304 or 316 stainless steel, aluminum surfaces shall be kept from direct contact with said metal by use of neoprene gaskets or washers, polyethylene self-adhesive tape (two wraps of 20-mil tape), or washers. Galvanizing or paint shall not be considered as adequate protection.
- B. All stainless steel bolt and screw surfaces in contact with aluminum shall be coated with Never-Seez by Never Seez Compound Corp., or equal.

### 3.10 MACHINED FIBERGLASS

- A. All machined fiberglass edges shall be sealed to prevent wicking.

### 3.11 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. Each container or piece of equipment shall be clearly marked with the Contractor's name, project name and location.
- B. Deliver materials to the site to ensure uninterrupted progress of the work. Deliver anchor bolts and anchorage devices which are to be embedded in cast-in-place concrete in ample time not to delay that work.
- C. Handle all equipment and materials very carefully. Protection and maintenance of materials and equipment stored on the jobsite shall be the sole responsibility of the Contractor. The Contractor shall protect and exercise all stored materials and equipment in strict accordance with the manufacturer's recommendations and as instructed by the Owner. Damaged equipment and materials will not be acceptable. Any loss, or damage to stored materials or equipment shall be the responsibility of the Contractor. The Contractor shall replace missing or damaged materials or equipment at the Contractor's expense. All Owner furnished equipment after unloading by the Contractor shall be the sole responsibility of the Contractor and shall be installed and maintained by the Contractor as specified herein.
- D. The Contractor shall store and temporarily support equipment prior to installation in strict accordance with the Manufacturer's recommendations and instructions. Equipment shall be stored on raised supports protected from exposure to the elements and shall be kept thoroughly dry at all times. Pumps, motors, drives, electrical equipment, and other equipment having anti-friction or sleeve bearings shall be stored in weathertight storage facilities such as warehouses. Covering with visquine or similar material will not be considered as a weathertight enclosure. All material and equipment shall be covered or stored in a manner which will prevent entry of deleterious matter.
- E. Protect all exposed surfaces. Protect all equipment from being contaminated by dust, dirt, vibration and moisture. Protect all bolt threads, etc. from damage and corrosion.
- F. Finished surfaces of all exposed flanges shall be protected by wooden blank flanges, strongly built and securely bolted thereto.
- G. Protect all factory applied coatings from damage during shipment, unloading, storage and installation. Painted surfaces shall be protected against impact, abrasion, discoloration and other damage. Painted equipment surfaces that are damaged prior to acceptance shall be repainted in entirety to the satisfaction of the Owner.
- H. Power cables and control panels shall be covered and stored in a manner which will protect them from dirt, moisture, and abrasion.
- I. Electrical equipment, controls, and isolation shall be protected against moisture or water damage. Temporarily connect equipment with built in space heaters to a power source and keep heaters in operation.
- J. Rotate all shafts that have bearings on at least a monthly basis.

- K. The contractor shall be responsible for work, equipment, and materials until inspected, tested and finally accepted. Keep records of the storage parameters and the dates that storage procedures were performed.
- L. After hydrostatic or other tests, all entrapped water shall be drained from equipment and appurtenances prior to shipping, and proper care shall be taken to protect parts from the entrance of water during shipment, storage and handling.

### 3.12 SCHEMATIC DIAGRAMS

- A. Schematic diagrams are provided for the Contractor's guidance in fulfilling the operational intent of the Contract Drawings and the Specifications.
- B. It shall be the Contractor's responsibility to meet all safety and electrical codes and to provide all equipment, appurtenances and specialty items required to provide for complete and operable systems.
- C. Review of control schemes submitted by the Contractor shall not relieve the Contractor of his contractual responsibility to provide complete and successfully operating systems.

### 3.13 VFD COORDINATION

- A. For each piece of VFD driven equipment, the Contractor shall have the responsibility for the satisfactory operation of the entire system including driven equipment, motors, variable frequency drives, and controls as specified by the Contract Documents. The Contractor shall submit an acceptance letter from the driven equipment and motor manufacturers stating that the VFDs will fully meet all starting and operating requirements of each driven equipment/motor combination. The Contractor shall submit a letter from the VFD manufacturer stating that they have reviewed the driven equipment requirements and that the VFD will successfully meet all operating requirements of all driven equipment. VFD model number, motor model number, and driven equipment model number shall be specifically listed in each letter. The Contractor shall be responsible for coordinating all motor amperage requirements with the amperage ratings of each VFD.

### 3.14 START-UP AND FIELD TESTS

- A. Contractor shall verify that structures, pipes and equipment are compatible.
- B. Make adjustments required to achieve optimum operation.
- C. The Contractor shall furnish all labor, materials, equipment and incidentals required to supply, modify, install, test, troubleshoot, and place in satisfactory operation the products, complete with all motors and accessories as applicable, such that it functions automatically in accordance with requirements of the Contract Documents.
- D. The equipment shall be field tested after erection in the presence of the Owner and Engineer to confirm and verify the following:
  - 1. Structural and mechanical integrity
  - 2. The equipment operates without jamming, overheating, or vibration
  - 3. Verification of correct equipment and motor rotation.

4. The equipment operates in the manner intended and performs the specified functions satisfactorily
  5. Compliance with performance criteria in this specification and with factory performance tests
  6. Compliance with vibration limitations
  7. Motor and cable insulation for submersible pumps shall be tested for moisture content or insulation defects.
  8. Demonstrate that the completed installation meets specified requirements and that all controls and safety shutdowns are operational.
- E. Field test using job supplied flow meters and pressure.
- F. Vibration Testing (for variable speed machines only):
1. Provide services of specialist in this field to conduct the tests.
  2. Test each installed piece of equipment and motor at each operating speed for compliance with specified vibration and critical frequency limits.
  3. Perform bump tests on each pump in each of two orthogonal planes to determine critical frequency.
  4. Determine the natural frequency of the support structure at each equipment location by a bump test and an analyzer with a frequency finder.
  5. Perform vibration measurements at each operating speed in each of two orthogonal horizontal directions, one of which shall be in the plane of greatest vibration. Modify units and/or dynamic balance, if required to meet specified vibration limits or to correct excessive vibration.
- G. The Contractor shall notify the Owner seven (7) days prior to the scheduled day for initial startup.

### 3.15 MANUFACTURERS' FIELD SERVICES

- A. Retain factory trained equipment and motor manufacturer's representatives with demonstrated ability and experience in the installation and operation of the equipment and motors and accessories to perform the services listed below:
1. Pre-Installation Inspection:
    - a. Ensure that the equipment shipped to the job-site has been handled according to the manufacturer's recommendations and has arrived in good working order.
    - b. Ensure that all equipment has been stored and protected according to the manufacturer's recommendations.
    - c. Inspect and verify the structures or surfaces on which the equipment will be installed have no defects which would adversely affect the installation.
    - d. The Contractor shall promptly report, in writing, defects which may affect the work to the Owner. A copy of the manufacturer's field report shall be provided to the Owner.



2. Installation:

- a. Provide technical assistance to Contractor during installation of the equipment.
- b. The equipment and motor manufacturers shall check and approve the installation during construction and prior to initial operation.
- c. Check alignment and inspect the installation prior to final grouting and start-up.
- d. Prior to initial start-up, a written statement shall be provided by the manufacturers stating the equipment has been installed by the Contractor in accordance with the Drawings, Specifications and manufacturer's recommendations and is ready to be placed into operation.

3. Startup and Testing:

- a. Assist in initial start-up, adjustments and field testing, including vibration testing.
- b. Be present when the equipment is placed in operation.
- c. The manufacturer shall test operate the system in the presence of the Owner and shall verify the equipment conforms with the specified requirements. The manufacturer shall re-visit the job-site as often as necessary until all deficiencies are corrected and the installation and operation is satisfactory to the Owner.
- d. Perform all tests in the presence of the Owner and the equipment manufacturer's representative.

4. Manufacturer's Field and Test Data Reporting:

- a. After installation supervision service by the Manufacturer, the Manufacturer shall submit the following to the Owner within 14 days:
  - (1) A letter, on the Manufacturer's letterhead, certifying that the equipment was installed per the Manufacturer's recommendations and shall state that the equipment (1) has been properly installed and lubricated, (2) is in accurate alignment, (3) is free from any undue stress imposed by connecting piping or anchor bolts, and (4) has been operated under full load conditions and it operated satisfactorily.
  - (2) Copies of all test and field data collected by the manufacturers/suppliers of equipment during installation supervision and start-up services including, but not be limited to, the motor amperage readings to verify drives are properly sized, tolerance and alignment measurements where applicable to verify equipment has been satisfactorily installed, and all other information collected by the manufacturers/suppliers to satisfy themselves that equipment has been properly installed. The test and field data shall be submitted whether specified or not in the detailed equipment specifications.
- b. In cases where the manufacturer/supplier feels equipment is not properly installed, he shall include with this submittal a punch list detailing the problems noted. The information required under this section shall be furnished for all equipment and devices requiring installation and start-up

services as specified in these Specifications including the detailed mechanical, electrical and instrumentation specifications.

- c. The costs for this work shall be included in the prices quoted by equipment suppliers. The Contractor shall perform all work required to install and place into operation the equipment in accordance with the manufacturer's recommendations.

5. Operation and Maintenance Personnel Instruction:

- a. Instruct Owner's personnel in the operation and user maintenance of all components in accordance with the requirements of Section 01734, Operating and Maintenance Information.
  - b. Each supplier of equipment as required in these Specifications shall provide a qualified manufacturer's representative for a minimum of one 8-hour day to instruct Owner's Operation and Maintenance (O&M) personnel in the operation and maintenance of the equipment furnished unless specified otherwise. Training shall be scheduled within 3 months prior to startup.
  - c. All costs for the O&M instruction program shall be included in Contractor's Bid.
  - d. The scheduling of O&M services shall be coordinated with the Owner.
6. Supervise the correction of any defective or faulty Work before and after acceptance by Owner.

- B. The installation, testing, and start-up services shall be coordinated with the Owner.

END OF SECTION

## SECTION 11430 - CHEMICAL FEED SYSTEMS

### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Diaphragm metering pumps
  - 1. Caustic Soda Metering Pump No. 1 (P-5443)
  - 2. Caustic Soda Metering Pump No. 2 (P-5444)
- B. Fabricated skid systems
  - 1. Caustic Soda skid system (two pumps)

#### 1.02 RELATED SECTIONS

- 1. Section 05121, Miscellaneous Metalwork
- 2. Section 11001, General Equipment Provisions
- 3. Section 15290, Polyvinyl Chloride (PVC) Pipe and Fittings
- 4. Section 16050, Basic Electrical Materials and Methods
- 5. Section 16080, Acceptance Testing

#### 1.03 REFERENCES

- A. Definitions
  - 1. Caustic Soda: 50-percent Sodium Hydroxide solution
- B. Reference Standards
  - 1. SAE International (SAE)

#### 1.04 SUBMITTALS

- A. See Section 11001 General Equipment Provisions for additional equipment submittal requirements.
- B. Product Data:
  - 1. Diaphragm metering pumps
    - a. Pump, motor, finish, and enclosure data
    - b. Warranty information
    - c. Pump performance data
  - 2. Fabricated skid system
    - a. Materials of construction
    - b. Piping, valves, and appurtenances

c. Warranty information

C. Shop Drawings:

1. Dimensions and materials for all equipment items and appurtenances listed in this specification.
2. Complete dimensioned arrangement drawings showing the assembled equipment, piping, valves, appurtenances, connections, supports, and major components of the pump skid system.
3. Weight of the complete skid system.

D. Quality Assurance/Control Submittals

1. Skid fabricator references
  - a. List of five references meeting requirements of the "Quality Assurance" article in this specification section.
  - b. Agency name, contact name, contact phone number, and email address.
  - c. Brief description of skid system and date of installation for each reference.

E. Closeout Submittals

1. Detailed assembly, installation, and start-up procedures.
2. Operation and maintenance manuals
3. Manufacturer Field Reports

1.05 QUALITY ASSURANCE

A. See Section 11001, General Equipment Provisions

B. Skid Fabricator Experience Qualifications

1. Experience in manufacturing skid systems of similar type and size to the systems specified, which can meet the following installation requirements:
  - a. Minimum number of equipment installed and in operation: Five
    - (1) Location: California
    - (2) Facility type: Municipal Water Treatment
    - (3) Minimum duration of operation: Three years

1.06 SITE CONDITIONS

A. Location:

1. Chemical containment area

B. Exposure:

1. Corrosive environment due to chemicals
  - a. Sodium hypochlorite
  - b. Sodium hydroxide

- c. Fluoride
- 2. NEC-Area Classification: Unclassified
- C. Temperature range: 32° Fahrenheit to 105° Fahrenheit.
- 1.07 WARRANTY
  - A. Provide warranty and performance guarantee for all equipment and appurtenances per the requirements of Section 11001 General Equipment Provisions.
    - 1. Pump Warranty Period: five years from the date of Final Acceptance.
    - 2. Skid Warranty Period: two years from the date of Final Acceptance.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Diaphragm Metering Pumps
  - 1. Blue-White Industries MD-3, no equal
- B. Fabricated Skid System
  - 1. D&H Water Systems, no equal

### 2.02 DESCRIPTION

- A. Diaphragm Metering Pumps
  - 1. Pumps Caustic Soda to plant raw untreated water influent injection point
  - 2. Pumps Caustic Soda to plant combined filter treated water effluent
- B. Fabricated Skid System
  - 1. Fabricated system to house diaphragm metering pumps, chemical piping, valves, and appurtenances in a compact footprint.

### 2.03 PERFORMANCE CRITERIA

- A. Caustic Soda Feed Systems
  - 1. Operating range: Pump shall be able to operate at a minimum flowrate of 0.5 gallons per hour (gph) to a maximum flowrate of 34.6 gph at 140 psig

### 2.04 DIAPHRAGM METERING PUMPS

- A. Design
  - 1. Dual-Diaphragm type pump with a brushless variable speed DC motor and no loss motion positive pull-back cam drive mechanism
  - 2. Double ball inlet and outlet cartridge type check valves
  - 3. Integral diaphragm leak detection system

4. The inlet and outlet adapters shall be available for ½" male NPT or ½" ID hose barb connections in elbow or straight configurations
5. Capable of 2,000:1 turndown ratio
6. Dual diaphragm design shall provide near continuous chemical output with less than 3 seconds of interrupted output at 0.05% motor speed
7. Capable of running dry without damage
8. Capable of 23 feet of suction lift (water)
9. Pump shall be rated for continuous duty
10. Quiet, low pulsation/low velocity output
11. Maximum fluid viscosity shall be 10000 centipoises

#### B. Materials

1. Pump Head
  - a. Natural PVDF Material
  - b. The diaphragm shall be manufactured from a single layer of natural PVDF material. Laminated diaphragms shall not be used.
  - c. The inlet and outlet pump head valve housings shall be manufactured from natural PVDF material.
  - d. The dual pump head inlet valve housings and outlet valve housings shall be connected with a PVDF manifold pipe.
  - e. The pump inlet (suction) adapter and the outlet (discharge) adapters may be installed in the field on either the left or right side of the pump.
  - f. There shall be four check valve cartridge assemblies per pump head, two located in the inlet valve assembly and two located in the outlet valve assembly. Each cartridge check valve assembly shall contain a ceramic ball, static seal o-ring and ball seat o-ring. O-ring ball seats shall be manufactured from T/FEP (optional EP) elastomer material. Static adapter fitting seals shall be manufactured from FKM (optional EP) elastomer material. An optional Hastelloy spring-loaded single ceramic ball check valve shall be available.
  - g. The pump head front shall be covered with a 316 Stainless Steel metal pressure support plate
  - h. The pump head shall be positively secured to the pump housing with 8 each 10-32 stainless steel socket head screws and washers.
2. Connection Fittings - PVDF
3. Motor
  - a. Brushless DC gear motor rated for continuous duty.
  - b. Motor shall include overload protection.
  - c. The maximum gear motor RPM shall be 190 RPM.
4. Drive System Enclosure

- a. Pressure cast aluminum with acidic liquid iron phosphate three-stage clean and coat pretreatment and exterior grade corrosion resistant polyester polyurethane powder coat
  - b. Shall be factory installed and totally enclosed in a NEMA 4X, (IP66) wash-down enclosure. Capable of operating on any input power from 96VAC to 250VAC, 50/60 Hz single phase supply without user configuration or selection switches. Power consumption shall be less than 180 watts. 316 Stainless Steel level mounting brackets and hardware
  - c. Provided with 316SS floor/shelf level mounting brackets and hardware.
  - d. A wiring compartment shall be provided for connection of input/output signal wires and alarm output loads to un-pluggable type terminal block connectors. Terminal board shall be positively secured to the rear of the pump housing by two polymeric screws and fully enclosed by the wiring compartment cover. The terminal board shall not be disturbed by the removal of the wiring compartment cover. Ribbon cables shall not be used in the wiring compartment. Conduit hubs, liquid-tight connectors, connector through holes and tapped holes shall be sized in U.S. inches.
  - e. Provide a clear, polycarbonate thermoplastic drive cam cover that includes an imbedded magnetic safety interlock which will engage the software maintenance mode and limit the motor rotation speed to 6 RPM when removed. The clear cover shall be positively secured to the drive assembly using a four thumb screws. Tools shall not be required to remove the drive cam cover.
  - f. Provide an LED light for viewing the internal drive mechanism to confirm drive operation.
5. Drive Mechanism
- a. The drive cam shall apply force to a drive linkage which in turn moves two diaphragms through the suction and discharge strokes.
  - b. The drive cam shall provide the force for both the suction and discharge strokes resulting in no loss of motion during the stroke.
  - c. The diaphragm stroke length shall be 0.190 inches at all times. Stroke length adjustment shall not be provided.

#### C. Controls

- 1. All control circuitry shall be integral to the pump and capable of adjusting the pump motor speed
- 2. The pump output shall be capable of being manually controlled via front panel user touchpad controls.
- 3. Capable of remote control via 4-20mA analog input.
- 4. The pump output shall be capable of being remotely control via 0-10 VDC input.
- 5. The pump output shall be capable of being remotely control via TTL/Cmos digital high speed pulse type input and an AC sine wave type pulse input in the range of 0 to 1000 Hz.
- 6. The pump output shall be capable of being remotely control via pulse triggered batching.

7. Cycle timer capable of automatically cycling pump on and off.
  8. Capable of dispensing upon demand.
  9. Capable of automatically calculating pump motor speed proportional to fixed or variable system flow-rate.
  10. 11-button front panel user touchpad control for stop/start, configuration menu access and navigation, operating mode selection, auto-priming, display options selection, tube life data, and reverse direction.
  11. Multi-color VGA graphic LCD display for menu driven configuration settings, pump output value, service alerts, tube failure detection system alarm status, remote input signal values, and tubing life timer value.
  12. Green display color indicating normal operation, blue display color when in stand-by, and red display color in alarm condition.
  13. Provide for remote stop/start pump via 6-30 VDC powered loop or non-powered contact closure loop.
  14. User selectable 4-20mA and 0-1000 Hz output signal, scalable, and proportional to pump output volume
  15. Four contact closure alarm outputs. Three rated at 1A-115VAC, 0.8A-30VDC and one rated at 6A-250VAC, 5A-30VDC. Each alarm output assignable to monitor TFD system, motor run/stop, motor failed to respond to commands, motor running in reverse, general alarm (over current), input signal failure, output signal failure, remote/local control status, revolution counter (tube life) set-point, or monitor which pump operating mode is active.
  16. Four-digit password protected configuration menu.
  17. Provide a flow verification system with programmable alarm delay time from 1-255 seconds.
  18. Provide a stroke counter set-point display with user programmable alarm set-point value from 1 to 999,999,999 strokes which can be assigned to any one of the 4 contact closure alarm outputs.
  19. User programmable maximum RPM set-point
  20. User adjustable response delay time for remote start/stop input and contact closure alarm outputs.
  21. User programmable power interruption pump restart option to automatically restart or require a user restart if AC main power is interrupted.
- D. Flow Verification Sensor - Shall output high speed digital pulse signal, while pump is running only, to verify chemical injection.
- E. Safety
1. The pump shall be certified to NSF Standard 61 Drinking Water System Components, UL standard 778 as a motor operated pump and CSA standard C22.2 as process control equipment.
  2. Diaphragm Failure Detection (DFD) system sensors shall be wholly located in the pumphead. DFD system will stop the pump within three seconds of leak



detection. To prevent false alarms due to rain, wash-down, condensation, etc., tube failure detection system shall not trigger with water contact.

## 2.05 FABRICATED SKID SYSTEMS

### A. Design

1. Two side walls, two pump mounting bases, and one rear back plate
2. Chemical containment built into skid
3. Two chemical inlet ports
4. Two chemical outlet ports
5. Flow indicator as shown on drawings to provide a visual indication of fluid movement through the system
6. Piping layout per Drawings
7. Piping shall be ½" diameter schedule 80 CPVC
8. One drain shall be provided on the chemical suction side of the metering pumps.
9. System shall have a five-year manufacturer's warranty on all chemically welded joints. Any leaks shall be repaired, on site, at the manufactures expense.

### B. Material

1. Skid
  - a. Marine grade high density polyethylene with tensile strength greater than 4100 psi.
  - b. The polyethylene sheet material shall be 100% UV inhibited. Molded skids shall not be accepted
2. Mounting brackets and hardware
  - a. Two 316 stainless steel pump mounting brackets with four mounting slots shall be provided per pump. Pump mounting brackets shall be secured to the skid structure with 316 stainless steel hardware.
  - b. All piping shall be securely mounted to the polyethylene skid with secure plastic mounts and 316 stainless-steel fasteners. Ball valves shall be mounted with polyethylene mounting plates and four 316 stainless steel fasteners.
3. Piping, Valves, and Appurtenances
  - a. Piping shall be ½" diameter schedule 80 CPVC unless otherwise specified. Caustic skid inlet piping shall be 1" schedule 80 CPVC with double containment.
  - b. CPVC per Section 15067 CPVC Piping, Valves, and Appurtenances.
  - c. True union ball valves shall be schedule 80 PVC (or CPVC) with PTFE shaft bearings and seals. Seals and O-rings shall be selected by the skid fabricator to be compatible with the chemical being used. All ball valves shall be Asahi type 21.
  - d. Seals specified as EPDM.

- e. All socket weld joints shall be chemically welded with gray CPVC 724 industrial pipe cement with the use of P-70 industrial primer for chemical applications. All joints shall be squared, beveled and 100% seated. All socket welded joints shall have a full five year field replacement warranty by the manufacture.
  - f. To prevent leaks, no threaded joints shall be permitted on the skid assembly.
- 4. Flow indicator
  - a. A flow indicator shall be located in the discharge side of the piping system to provide a visual indication of fluid movement through the system.
  - b. Machined from clear cast acrylic with a ceramic ball indicator and polypropylene ball stop.
  - c. The flow indicator shall be secured to the piping system with PVC socket weld connectors and half unions.
- 5. Calibration column
  - a. Clear PVC with PVC solvent weld end caps
  - b. A calibration column fill line / discharge valve shall be included to assist in filling the calibration column and relieving pressure on the discharge side of the pumps. This line shall be vented back to the storage tank.
  - c. Valves shall permit the cylinder to be filled by gravity. A by-pass line shall be provided to allow the metering pump to be used to fill the calibration cylinder.
  - d. Calibration cylinders shall be located in the inlet side of the system to permit metering pump output volume calibration.
- 6. Pressure gauge
  - a. Pressure gauge and guard shall be located in the discharge side of the system to indicate system pressure.
  - b. The liquid filled gauge shall be stainless steel and include a blow-out plug.
  - c. The gauge shall be bottom mounted to the guard with ¼" NPT stainless steel threads.
  - d. The temperature compensated oil filled gauge guard shall be PVC with ½" socket weld bottom connection.
  - e. Pressure gauge shall have 2.5" dial, stainless steel case and 316 stainless steel Internals with 1.6% accuracy.
  - f. The pressure gauge shall be Ashcroft model 1008S, or approved equal
- 7. Diaphragm Check Valves
  - a. Diaphragm check valves shall be located at the discharge side of each peristaltic pump to prevent the back flow of fluid through the pump.
  - b. The diaphragm check valve shall be PVC with a 1.0 – 1.5 PSI cracking pressure.
  - c. The maximum inlet working pressure shall be 150 PSI.

- d. Seals specified as EPDM.
- e. Ball check valves shall not be permitted for this application.
- 8. Pressure Relief Valves (PRV)
  - a. A PRV shall be located on the discharge side of each pump to prevent excessive pressure in the system. Fluid shall be returned to the inlet side of the system if the pre-set maximum system pressure is exceeded.
  - b. The PRV shall be PVC, CPVC with a PTFE diaphragm seal.
  - c. The PRV shall have infinite adjustment increments from 15 to 150 psi.
  - d. The PRV shall have a 3 year manufacturer's warranty.
  - e. Pressure relieve valve shall be by Griffco.
- 9. Back Pressure Valves (PRV)
  - a. A BPV shall be located on the discharge side of the skid system to maintain constant back pressure on the discharge side of the diaphragm metering pumps, unless otherwise indicated on the Contract Drawings.
  - b. The BPV shall be PVC, CPVC with a PTFE diaphragm seal.
  - c. The BPV shall have infinite adjustment increments from 15 to 150 psi.
  - d. The BPV shall have a 3 year manufacturer's warranty.
  - e. Pressure relieve valve shall be by Griffco, or approved equal.
- 10. Inlet Y Strainer - shall be located on the suction side of the piping system. The Y-strainer shall be PVC with removable screen.

## 2.06 ACCESSORIES

- A. See requirements of Section 11001 General Equipment Provisions

## SOURCE QUALITY CONTROL

- B. See Section 11001, General Equipment Provisions
- C. Factory test all equipment, motors, and controls

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. See Section 11001 General Equipment Provisions

END OF SECTION

## SECTION 11440 - HIGH DENSITY CROSS-LINKED POLYETHYLENE STORAGE TANKS

### PART 1 - GENERAL

#### 1.01 REQUIREMENTS

- A. The CONTRACTOR shall provide double wall, high density cross-linked polyethylene chemical storage tanks and accessories per section 2.05, complete and in place, in accordance with the Contract Documents.
- B. Unit Responsibility: The CONTRACTOR shall be responsible for furnishing the double wall tank(s) and its accessories for chemical storage as indicated.

#### 1.02 REFERENCES, CODES AND STANDARDS

- A. American Society of Testing Materials (ASTM).
  - 1. D638                      Tensile Properties of Plastics
  - 2. D883                      Standard Definitions of Terms Relating to Plastics
  - 4. D1505                     Density of Plastics by the Density-Gradient Technique
  - 5. D1525                     Test Method for Vicat Softening Temperature of Plastics
  - 6. D1693                     ESCR Specification Thickness 0.125" F50-10% Igepal
  - 7. F412                      Standard Terminology Relating to Plastic Piping Systems
- B. ANSI Standards: B-16.5, Pipe Flanges and Flanged Fittings
- C. Building Code: International Building Code, IBC 2012
- D. ARM: Low Temperature Impact Resistance (Falling Dart Test Procedure)
- E. NSF/ANSI Standard 61, AWWA – Drinking Water System Components
- F. ASTM D-1998, Standard Specification for Polyethylene Upright Storage Tanks

#### 1.03 SUBMITTALS

- A. Shop Drawings: Shop drawings shall be approved by the engineer or contractor prior to the manufacturing of the double wall tank(s). Sufficient data shall be included to show that the product conforms to Specification requirements. Submit the following as a single complete initial submittal.
  - 1. Double Wall Tank and Fitting Material
    - a. Resin Manufacturer Data Sheet
    - b. Fitting Material
    - c. Gasket style and material (EPDM)
    - d. Bolt material
  - 2. Dimensioned Tank Drawings

OMWD

DCMWTP pH CONTROL SYSTEM

HIGH DENSITY CROSS-LINKED POLYETHYLENE STORAGE TANKS

11440 - 1

- 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 registered, third party engineer in the state of the installation.
  - a. Wall thickness. Hoop stress shall be calculated using 600 psi @ 100 degrees F.
  - b. Tank restraint system. Show seismic and wind criteria.
- B. Manufacturer's warranty
- C. Manufacturer's unloading procedure
- D. Manufacturer's installation instructions
- E. Supporting information on Quality Management System.
- F. Supporting documentation of Manufacturer's certification to NSF/ANSI Standard 61 – Drinking Water System Components for water treatment chemicals.
- G. Manufacturer's Qualifications: Submit to engineer a list of 5 installations in the same service as proof of manufacturer's qualifications.
- H. Electrical heat tracing and foam insulation data sheets as required.
- I. Factory Test Report
  - 1. Material, specific gravity rating at 600 psi @ 100 degrees F. design hoop stress.
  - 2. Wall thickness verification.
  - 3. Fitting placement verification.
  - 4. Visual inspection
  - 5. Impact test
  - 6. Gel test
  - 7. Hydrostatic test

#### 1.04 QUALITY ASSURANCE

- A. The Contractor shall supply double wall tanks constructed of high density cross-linked polyethylene. Tanks furnished under this Section shall be supplied by Poly Processing Company, or approved equal.
- B. Tanks shall be manufactured from virgin materials.
- C. Tanks shall be manufactured from materials certified to NSF/ANSI Standard 61 for chemical storage, and submit form from NSF supporting chemical certification.

## 1.05 WARRANTY

- A. The warranty shall be provided upon request for the specific service application.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Tanks shall be rotationally-molded, high density cross-linked polyethylene, double wall, flat bottom tanks. The assembly shall consist of one cylindrical, closed top inner primary tank and one cylindrical, open top containment outer tank. Each tank shall be a rotationally molded one-piece seamless constructed tank. The tanks shall be designed for above-ground, vertical installation and shall be designed to store approved chemicals at atmospheric pressures. The assembly shall be designed to prevent rainwater and debris from entering the containment tank. Tanks shall be adequately vented. 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 APPROVED MANUFACTURERS

- A. Poly Processing Company
- B. Core-Rosion Products
- C. Engineer approved equal

### 2.03 POLYETHYLENE STORAGE TANKS

- A. Service: Chemical storage tanks shall be suited for the following operating conditions per this section
- B. 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.
- C. For sodium hypochlorite and sulfuric acid storage, resin shall include additional medium density polyethylene (OR-1000) with four times the antioxidant properties of a standard polyethylene bonded to the interior surface during the manufacturing process. Resin to be certified NSF/ANSI 61 for chemical storage.
- D. Wall thickness for a given hoop stress is to be calculated in accordance with ASTM D 1998. 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 D 1998.

- 1. 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

- a. 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" thick.
2. 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. In most cases, flat areas shall be provided for attachment of large fittings on the dome of the tank.
3. 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	1-1/2

4. 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.
  - a. Unless otherwise indicated by Contract drawings, for indoor pneumatic fill, manways shall be 24-in diameter or greater and equipped with an emergency pressure relief device with pressure relief at 6" water column to prevent over-pressurization. The manway shall be chemically compatible with the chemical being stored. Gaskets shall be closed cell, cross-linked polyethylene foam, or EPDM materials. For NSF/ANSI 61 certification EPDM gaskets shall be supplied.
  - b. Unless otherwise indicated by Contract drawings, for outdoor pneumatic fill, manways shall be 24-in diameter or greater. Manway must be capable of relieving a volume flow rate of up to 2650 ACFM. Gaskets shall be closed cell, cross-linked polyethylene foam, or EPDM materials. For NSF/ANSI 61 certification EPDM gaskets shall be supplied.
  - c. Unless otherwise indicated, tanks less than 2,000 gallons in non-pneumatic applications shall have a manway cover 17-in or smaller of Polyethylene material with a coarse thread. Gaskets shall be closed cell, cross-linked polyethylene foam, or EPDM materials. For NSF/ANSI 61 certification EPDM gaskets shall be supplied.

- d. NOTE: Tanks must be vented to allow for performance at atmospheric pressure, in accordance with the following matrix:

Venting Requirements For Polyethylene Tanks									
Mechanical Pump Fill	Pneumatic Fill								
IF ≤ 1000 gallons	IF - Vent length ≤ 3 feet			IF - Vent length > 3' and ≤ 30'			IF - Scrubber Application		
Vent size should equal size of largest fill or discharge fitting	AND - Vent screen mesh size ≥ 1/4" or no screen used			AND - 3 or less 90° elbows with no other restrictions or reduction in pipe size			Vent pipe size throughout scrubber system <b>CANNOT</b> be reduced! Centerline of dispersion pipe not to be submersed > 6 inches		
IF > 1000 gallons	Emergency Pressure Relief Cover Required			Emergency Pressure Relief Cover Required			Perforated dispersion pipe must be same diameter or larger, as vent. Sum of perforations ≥ cross sectional area of pipe		
Vent size should exceed the largest fill or discharge fitting by 1 inch	Tanker Discharge	Inlet/Fitting Size	Minimum Vent Size	Tanker Discharge	Inlet/Fitting Size	Minimum Vent Size	Tanker Discharge	Inlet/Fitting Size	Minimum Vent Size
	2"	2"	4"	2"	2"	6"	2"	2"	6"
	3"	2"	6"	3"	2"	6"	3"	2"	8"
	3"	3"	6"	3"	3"	8"	3"	3"	10"

(2) 2 inch vents DO NOT EQUAL 4 inch venting capacity

For detailed venting guidelines, please visit our Technical Resources at [www.polyprocessing.com](http://www.polyprocessing.com)

rev. Nov 2006

- e. Tank colors shall be natural (un-pigmented) or as specified by the ENGINEER with written agreement by the tank manufacturer.

## 2.04 TANK ACCESSORIES

### A. Ladder:

- Fiberglass access ladders shall be provided with the polyethylene chemical storage tanks at locations as shown. FRP ladders to be constructed with 1 3/4" x 1/4" square tube side rails and 1 1/4" fluted tube rungs. Ladders to have 18" rung width configuration with 12" rung spacing.
- All FRP ladders systems shall be provided using premium grade polyester resins with flame retardant and U.V. inhibitor additives. All shall be colored safety yellow.
- Ladders must be secured to the tank and secured to the concrete to allow for tank expansion/contraction due to temperature and loading changes. Use proper chemical resistant materials when anchoring to tank dome or sidewall. See Poly Processing Company's Tank Installation Manual.
- Safety cages shall be added to ladders as required by OSHA. All ladders shall be designed to meet applicable OSHA standards. Reference: OSHA 2206; 1910.27; fixed ladders.

### B. Restraint System:

- Metal components to be 316 stainless steel edge softeners, and tension ring with 316 stainless steel cables and clamps.
- Tank restraint system shall be supplied and the design of same certified by a Structural Engineer registered in the State of tank installation. Design 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.



## 2.05 TANKS:

### A. Tank Schedule per the following specifications

Tank Tag number	Qty.	Product stored	Tank capacity	Diameter	Height	Manway size
TK-5500	1	Sodium Hydroxide	4,400 gal	10' (nominal)	10'-0"	24" dia. minimum

Note 1: Approximate overall height is measured along the straight cylindrical portion of the tank and includes the dome top.

### B. Fittings

Tank tag number	Fill	Drain/outlet	Vent	Overflow	Level	Spare	Ladder	Restraints
TK-5500	3"	3"	3"	3"	3"	3"	FRP	316 Stainless Steel

1. Tank fittings shall be according to the fitting schedule in 2.05B above. Threaded fittings shall use American Standard Pipe Threads. If tanks are insulated, fittings shall be installed at the factory prior to application of the insulation.
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. For NSF/ANSI 61 certification, EPDM GF gaskets shall be supplied.
3. For sodium hypochlorite and sulfuric acid storage, Bolted One-Piece Sure Seal (B.O.S.S.), double flange fittings constructed of virgin polyethylene shall be supplied. Bolts will be welded to a common backing ring and encapsulated with polyethylene preventing fluid contact with the metal material. Flange will have one full face gasket to provide a sealing surface against inside tank wall. All materials shall be compatible with chemical service and as indicated in the fitting schedule above. For NSF/ANSI 61 certification, EPDM gaskets shall be supplied.
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 PVC or material compatible with the chemical stored.
5. U-Vents: Each tank must be vented for the material and flow and withdrawal rates expected. Vents should comply with OSHA 1910.106(F)(iii)(2)(IV)(9). U-vents shall be sized by the tank manufacturer and be furnished complete with insect screen if required (Insect screen lessens the vent capacity by 1/3) in accordance with the venting schedule listed above.
6. On dual wall tank(s) greater than 1,000 gallons, bottom fitting(s) must be designed to maintain 110% secondary containment integrity. Bottom containment fitting must include PTFE expansion joint designed to accommodate movement of primary tank in

design accordance with ASTM-D 1998 tolerances. All secondary containment fittings and parts shall be resistant to chemical fume corrosion. Fitting shall include the option to connect a secondary containment pipe over primary pipe.

7. All fittings on the 1/3 lower sidewall of tanks with capacities  $\geq 1,000$  gallons shall have 100% virgin PTFE Flexi-joint expansion joint. Expansion joint to have 3 convolutions, stainless steel limit cables, FRP composite flanges and meet the following minimum performance specifications. Galvanized parts will not be accepted. Expansion joints to meet the following minimum performance requirements:

Axial Compression  $\geq 0.67$ "

Axial Extension  $\geq 0.67$ "

Lateral Deflection  $\geq 0.51$ "

Angular Deflection  $\geq 14^\circ$

Torsional Rotation  $\geq 4^\circ$

## 2.06 LEVEL INDICATION

- A. Float Indication: The level indicator shall be assembled to the tank and shall consist of PVC float, indicator, polypropylene rope, perforated interior pipe, PVC roller guides, clear UV resistant PVC sight tube EnviroKing by C.F. Harvel, and necessary pipe supports. The level indicator shall act inversely to the tank contents and shall not allow entrance of tank contents into the sight tube at any time. Indicator shall be neon orange color for visual ease for onsite operators.
- B. Ultrasonic Level Indicator: The ultrasonic level indicator shall be a level controller/transmitter manufactured by Siemens, model The Probe, or approved equal.

## 2.07 FACTORY TESTING

### A. Material Testing

1. Perform gel and low temperature impact tests in accordance with ASTM D 1998 on condition samples cut from each polyethylene chemical storage tank.
2. Degree of Crosslinking. Use Method C of ASTM D 1998- Section 11.4 to determine the ortho-xylene 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 D 1998. Fitting placement tolerance shall be  $\pm 1/2$ -in vertical and  $\pm 2$  degree radial.
2. Visual: Inspect for foreign inclusions, air bubbles, pimples, crazing, cracking, and delamination.
3. Hydrostatic test: Following fabrication, the 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, inspect the tank(s) and accessories for damage in transit. If damage has occurred, notify tank manufacturer immediately.

### 3.02 INSTALLATION

- A. Install the tanks in strict accordance with the tank manufacturer's Installation Manual and shop drawings.
- B. Installation shall be inspected by tank manufacturer to verify system flexible connections, venting and fittings are properly installed. In addition to on-sight inspection tank system(s) to be reviewed using tank manual check list as supplied by manufacture as listed below.
- C. Manufacturer to provide 1-hour training session to prepare operators to service and maintain the tank system. Included in training session will be two (2) training manuals.
- D. Manufacturer's trained technician to do 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 will be supplied when equipment passes installation checklist.
- E. Tank manuals will consist of installation check lists, tank drawing(s) as built, fitting drawings referencing nozzle schedule on tank drawing, materials of construction, and recommended maintenance program.

### 3.03 FIELD TESTING

- A. All tanks shall be hydro-tested up to overflow connection for 24 hours prior to commissioning.

END OF SECTION

## SECTION 15050 - GENERAL PIPING REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

This section includes the general requirements for selecting bolts, nuts, washers, and gaskets for flanges used in the various piping services in the Standard Specifications.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Standard Drawings.
- B. Record Drawings and Submittals: STD SPEC 01300.
- C. Painting and Coating: STD SPEC 09900.
- D. Cold Applied Wax Tape Coating and Polyethylene Sheet or Tube Encasement: STD SPEC 09952.

#### 1.3 SUBMITTALS

- A. Submit submittal packages in accordance with Standard Specification Section 01300.
- B. Submit affidavit of compliance with referenced standards (e.g., AWWA, ANSI, ASTM, etc.).
- C. Submit certified copies of mill test reports for bolts and nuts, including coatings if specified. Provide recertification by an independent domestic testing laboratory for materials originating outside of the United States.
- D. Submit manufacturer's data sheet for gaskets supplied showing dimensions and bolting recommendations.

### PART 2 - MATERIALS

#### 2.1 THREAD FORMING FOR STAINLESS STEEL BOLTS

Form threads by means of rolling, not cutting or grinding.

#### 2.2 BOLTS AND NUTS FOR STEEL OR DUCTILE IRON FLANGES

- A. Bolts and nuts for Class 150 flanges (including AWWA C207, Class E) located indoors; outdoors above ground; in vaults and structures; or where buried and wrapped with polyethylene material shall be carbon steel, ASTM A 307, Grade B.
- B. Bolts and nuts for AWWA C207 Class F flanges and ANSI B16.5 and B16.47 Class 300 flanges located indoors; outdoors above ground; in vaults and structures; or where buried and wrapped with wax tape shall conform to ASTM A 193, Grade B7, with nuts conforming to ASTM A 194, Grade 2H.

- C. Bolts and nuts for Class 150 flanges and Class E flanges exposed to water or in direct contact with earth shall be Type 316 stainless steel conforming to ASTM A 193, Grade B8M, for bolts and ASTM A 194, Grade 8M, for nuts.
- D. Bolts and nuts for Class 300 flanges and class F flanges exposed to water or in direct contact with earth shall be Type 316 stainless steel conforming to ASTM A 193, Grade B8M, Class 2, for bolts and ASTM A 194, Grade 8M, for nuts.
- E. Bolts used in flange insulation kits shall conform to ASTM A 193, Grade B7. Nuts shall conform to ASTM A 194, Grade 2H.
- F. Provide washers for each nut. Washers shall be of the same material as the nuts.

## 2.3 BOLTS AND NUTS FOR FLANGES USED IN COPPER PIPE OR TUBE

- A. When both aboveground or buried adjoining flanges are bronze, use bronze bolts and nuts. Bolts shall conform to ASTM F 468, Grade C65100 or C63000. Nuts shall conform to ASTM F 467, Grade C65100 or C63000.
- B. When only one of the aboveground adjoining flanges is bronze, use Type 316 stainless steel bolts and nuts conforming to ASTM A 193, Grade B8M for bolts and ASTM A 194, Grade 8M for nuts.
- C. Connect to buried ferrous flanges with flange insulation kits. Bolts used in flange insulation kits shall conform to ASTM B 193, Grade B7. Nuts shall comply with ASTM A 194, Grade 2H. If the adjoining buried flange is bronze, use bronze bolts and nuts as described above, without a flange insulation kit.
- D. Provide washers for each nut. Washers shall be of the same material as the nuts.

## 2.4 LUBRICANT FOR STAINLESS STEEL BOLTS AND NUTS

Lubricant shall be chloride free and shall be submitted for approval by the District.

## 2.5 GASKETS FOR FLANGES USED IN STEEL PIPING FOR WATER SERVICE

Gaskets for flat face and raised face flanges shall be 1/8-inch thick and shall be one of the following nonasbestos materials:

- A. Cloth-inserted rubber with a Shore "A" hardness of 75 to 85. Gaskets shall be suitable for a working pressure of 200 psi at a temperature of 180°F. Products: Per OMWD AML.
- B. Acrylic or aramid fiber bound with nitrile. Products: Per OMWD AML. Gaskets shall be suitable for a pressure of 500 psi at a temperature of 400°F.

## 2.6 GASKETS FOR FLANGES USED IN STEEL PIPING FOR SEWAGE SERVICE

Gaskets shall be full face, 1/8-inch thick, and shall be one of the following nonasbestos materials:

- A. Buna-N having a hardness of 55 to 65 durometer. Gaskets shall be suitable for a working pressure of 200 psi at a temperature of 180°F. Products: Per OMWD AML.

- B. Acrylic or aramid fiber bound with nitrile. Products: Per OMWD AML. Gaskets shall be suitable for a water pressure of 500 psi at a temperature of 400°F.

## 2.7 GASKETS FOR FLANGES USED IN DUCTILE-IRON PIPING AND FITTINGS FOR WATER SERVICE

Gaskets shall be full face, 1/8-inch thick, cloth-inserted rubber, with a Shore "A" hardness of 75 to 85. Gaskets shall be suitable for a working pressure of 200 psi at a temperature of 180°F. Gaskets shall have "nominal" pipe size inside diameters not the inside diameters per ANSI B16.21. Products: Per OMWD AML.

## 2.8 GASKETS FOR FLANGES USED IN DUCTILE-IRON PIPING AND FITTINGS FOR SEWAGE SERVICE

Gaskets shall be full face, 1/8-inch thick, Buna-N having a hardness of 55 to 65 durometer. Gaskets shall be suitable for a working pressure of 200 psi at a temperature of 250°F. Gaskets shall have "nominal" pipe size inside diameters not the inside diameters per ANSI B16.21. Provide per OMD AML.

## 2.9 GASKETS FOR FLANGES USED IN COPPER PIPE OR TUBE

Gaskets shall be full face, 1/8-inch thick, and shall be one of the following nonasbestos materials:

- A. Cloth-inserted rubber with a Shore "A" hardness of 75 to 85. Gaskets shall be suitable for a working pressure of 200 psi at a temperature of 180°F. Products: Per OMWD AML.
- B. Acrylic or aramid fiber bound with nitrile. Products: Per OMWD AML. Gaskets shall be suitable for a pressure of 500 psi at a temperature of 400°F.

# PART 3 - EXECUTION

## 3.1 RAISED FACE AND FLAT FACE FLANGES

Where a raised face flange connects to a flat-faced flange, replace one of the flanges so the two match (either both raised face or both flat face)

## 3.2 INSTALLING ABOVEGROUND OR EXPOSED PIPING

- A. Provide pipe hangers and supports as detailed in the Drawings and the Standard Specifications.
- B. Install pipe without springing, forcing, or stressing the pipe or any adjacent connecting valves or equipment.

## 3.3 INSTALLING FLANGED PIPING

- A. Set pipe with the flange bolt holes straddling the pipe horizontal and vertical centerline. Install pipe without springing, forcing, or stressing the pipe or any adjacent connecting valves or equipment. Before bolting up, align flange faces to the design plane within

1/16-inch per foot measured across any diameter. Align flange bolt holes within 1/8-inch maximum offset.

- B. Clean bolts, nuts, washers and flange faces by wire brushing before installing gasket and adjoining flange. Inspect gasket seating surfaces, gasket, each bolt, nut, washer, and facing on which the nuts will rotate. Replace any damaged item.
- C. Lubricate threads of carbon steel bolts and nuts with oil and graphite prior to installation. Assemble all bolts, nuts, and washers in the flange, then tighten nuts in a progressive diametrically opposite sequence, and torque with a calibrated torque wrench. All clamping torque shall be applied to the nuts only.
- D. Bolt lengths shall extend completely through their nuts and with a minimum of two (2) threads shall be exposed. Any which fail to do so shall not be considered acceptably engaged.
- E. Do not use more than one gasket between contact faces in assembling a flanged joint.
- F. Place washers under all nuts and no more than one (1) washer be used per nut,. Place washers under bolt heads where the flanges have been fusion bonded epoxy coated. Do not damage coated surfaces during installation.
- G. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reset or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight. Replace galled, cracked, or distorted bolts and nuts.
- H. After testing, coat exposed surfaces of bolts, nuts, and washers to be buried with primer for wax tape coating per Standard Specification Section 09952.
- I. Wrap flanges which connect to buried valves or other buried equipment with wax tape per Standard Specification Section 09952. Extend the polyethylene material over the flanges and bolts, and secure it around the adjacent pipe circumference with plastic adhesive tape.

#### 3.4 INSTALLING BLIND FLANGES

- A. At outlets not indicated to be connected to valves or to other pipes and to complete the installed pipeline hydrostatic test, provide blind flanges with bolts, nuts, washers, and gaskets.
- B. Coat the inside face of blind flanges per Standard Specification Section 09900, System No. 5.

#### 3.5 INSTALLATION OF STAINLESS STEEL BOLTS AND NUTS

Prior to assembly, coat threaded portions of stainless steel bolts and nuts with chlorine free lubricant.

END OF SECTION

## SECTION 15080 - MISCELLANEOUS PIPING SPECIALTIES

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

This section includes miscellaneous valves, fittings, piping materials and installation. Testing shall be in accordance with associated facilities.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Standard Drawings.
- B. Record Drawings and Submittals: STD SPEC 01300.
- C. Cold Applied Wax Tape Coating and Polyethylene Sheet or Tube Encasement: STD SPEC 09952.
- D. Steel Transmission Pipe: STD SPEC 15061.
- E. Disinfection of Piping: STD SPEC 15141.
- F. Pressure Testing of Piping: STD SPEC 15144.

#### 1.3 SUBMITTALS

- A. Submit submittal packages in accordance with Standard Specification Section 01300.
- B. Submit manufacturer's catalog data, descriptive literature and assembly drawings. Show dimensions, materials of construction by specification reference and grade, linings and coatings.

### PART 2 - MATERIALS

#### 2.1 GENERAL

Valves and miscellaneous components are identified on the Standard Drawings by size and type.

#### 2.2 CORPORATION STOPS - BRONZE, 2 INCHES AND SMALLER

For working pressures from zero to 300 psi, use corporation stops per OMWD AML. Stops shall be bronze (ASTM B 62) with inlet male iron pipe threads and outlet with quick joint for copper water tube. Quick joint shall consist of a threaded nut, an external nut stop, stainless steel gripper ring, and gasket. Gripper rings can only be used once. If the threaded nut of the quick joint is loosened after assembly and the copper water tube removed from the corporation stop, a new gripper ring shall be used in the reinstallation of the copper water tube and the corporation stop. Compression or pack joints will not be allowed.



### 2.3 BALL VALVES - BRONZE, 2 INCHES AND SMALLER

- A. For 1-inch and 2-inch valves with working pressures from zero to 300 psi valves shall be bronze (ASTM B 62) with both ends female iron pipe threads and full port per OMWD AML.
- B. For 1/2-inch valves with working pressures from zero to 600 psi valves shall have threaded ends, two-piece bronze body, standard port, bronze trim, chrome plated ball, and blowout proof stem per OMWD AML. Use a lever handle for non-buried installations and a tee handle for buried installations.

### 2.4 ANGLE VALVES - BRONZE, 2 INCHES AND SMALLER

For working pressures from zero to 300 psi valves shall be bronze (ASTM B 62), union bonnet, angle design, 300 psi WOG rated with both ends female iron pipe threads per OMWD AML.

### 2.5 ANGLE VALVES - BRONZE HYDRANT HEAD

For working pressures from zero to 300 psi valves shall be bronze (ASTM B 62) with 4-inch inlet female iron pipe threads and 2-1/2-inch outlet male national standard hose threads with cap and chain per OMWD AML.

### 2.6 ISOLATION UNION

See Standard Specification Section 15080 and Standard Drawing G-15. Use isolation union on installations wherever dissimilar metals are connected. Use isolation union with service saddles on ductile iron pipe installations with working pressures of 200 psi or less. Use isolation union at steel weld on outlets with working pressure of 200 psi or less.

### 2.7 SERVICE SADDLES - BRONZE, 2 INCHES AND SMALLER

- A. Perform wet taps on existing asbestos cement pipe, ductile iron pipe, and PVC pressure pipe with working pressures 200 psi or less. Provide service saddles that have been specifically designed to fit the type, size, and class of pipe of the installation per OMWD AML.
- B. Provide service saddles with full width, cast bronze bodies conforming to ASTM B 62, O-ring gaskets, and iron pipe threads. Provide Type 304 stainless steel double band straps with four bolts or a single wide strap with four bolts. All stainless steel shall be fully passivated for enhanced corrosion resistance. Use tapping machines and cutting tools that have been specifically designed for the type of pipe to be drilled and are hand operated only no mechanized tools will be used.

## 2.8 TAPPING SLEEVES

- A. Perform wet taps on existing asbestos cement pipe, ductile iron pipe, and PVC pressure pipe with working pressures 150 psi or less. Provide tapping sleeves that have been specifically designed to fit the type, size and class of pipe of the installation per OMWD AML.
- B. Tapping sleeves shall be of Type 304 stainless steel construction with two half sleeves and flanged outlet per OMWD AML. Sleeve halves shall be bolted together with stainless steel bolts and nuts. Gaskets shall completely surround the pipe to be tapped and be the same length as the sleeves. Gaskets shall be SBR conforming to ASTM D 2000. Flanged outlet shall be flat faced conforming to ANSI B16.5, Class 150. Use tapping machines and cutting tools that have been specifically designed for the type of pipe to be tapped.

## 2.9 WELD-ON OUTLETS

- A. Perform dry taps on existing welded steel pipe unless the District cannot take the pipeline out of service. Prior to making the tap, submit to the District's Representative a letter outlining the procedures to be followed.
- B. Use a manufactured steel wrapper plate, outlet pipe, and flange. Cement mortar line the outlet pipe prior to the installation and cement mortar coat the wrapper and outlet pipe after welding to the existing steel pipe. Provide weld-on outlets that conform to the applicable requirements of Standard Specification Section 15061.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

Installation shall be in accordance with manufacturer's recommendations. Tightening of nuts, bolts, screws, flanges shall be accomplished so that zero leakage is obtained.

- A. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing screwed valves.
- B. Lubricate bolt threads with oil or graphite prior to installation.
- C. Tighten nuts uniformly and progressively.
- D. After testing, coat exposed surfaces of bolts and nuts to be buried with primer for wax tape coating per Standard Specification Section 09952.
- E. Wrap buried ferrous fittings and appurtenances with polyethylene material per Standard Specification Section 09954.

### 3.2 PRESSURE TESTING

Test miscellaneous piping specialties at the same time that the connecting pipelines are pressure tested. See Standard Specification Section 15144 for pressure testing requirements. Repair leaks in piping and retest.

### 3.3 DISINFECTION

See Standard Specification Section 15141 for chlorination requirements.

END OF SECTION

## SECTION 15122 - FLEXIBLE PIPE COUPLINGS

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

This section includes materials, installation, and testing of flexible pipe couplings for steel pipe, PVC pressure pipe, PVC distribution pipe, and ductile iron pipe.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Standard Drawings.
- B. Record Drawings and Submittals: STD SPEC 01300.
- C. Painting and Coating: STD SPEC 09900.
- D. Cold Applied Wax Tape Coating: STD SPEC 09952.
- E. Cold Applied Wax Tape Coating and Polyethylene Sheet or Tube Encasement: STD SPEC 09952.
- F. Fusion-Bonded Epoxy Lining and Coating: STD SPEC 09961.
- G. Corrosion Control for Buried Piping: STD SPEC 15310.
- H. General Piping Requirements: STD SPEC 15050.
- I. Disinfection of Piping: STD SPEC 15141.
- J. Pressure Testing of Piping: STD SPEC 15144.

#### 1.3 SUBMITTALS

- A. Submit submittal packages in accordance with Standard Specification Section 01300.
- B. Submit manufacturer's catalog data, descriptive literature, and assembly drawings. Show manufacturer's model or figure number for each type of coupling or joint for each type of pipe material for which couplings are used.
- C. Submit manufacturer's recommended torques to which the coupling bolts shall be tightened.
- D. Show dimensions, materials of construction by specification reference and grade, linings, and coatings.
- E. Show number, size and material of construction of the rods and lugs for each joint harness on the project.

## PART 2 - MATERIALS

### 2.1 COUPLING SYSTEM DESIGN AND COMPONENT UNIT RESPONSIBILITY

Gaskets, bolts, nuts, glands, end rings, and hardware for pipe couplings of all types shall be furnished by the manufacturer of the pipe coupling and shall be designed as an integral system by the pipe coupling manufacturer. Gaskets shall be designed for the coupling and appropriately sized to provide a watertight seal at the design pressure and temperature. Gaskets, bolts, nuts, glands, end rings, and hardware for pipe couplings shall be shipped with the pipe coupling and shall be clearly labeled indicating the origin of the material, including place and date of manufacture. Manufacturer's printed installation instructions shall be packaged with each pipe coupling.

### 2.2 STEEL FLEXIBLE PIPE COUPLINGS

- A. Steel couplings shall have center sleeves and end rings made of carbon steel conforming to AWWA C219, Section 4. Minimum center sleeve length shall be 5 inches for pipe sizes 3/4-inch through 4-1/2 inches; 7 inches for pipe sizes 5 inches through 24 inches; and 10 inches for pipe sizes larger than 24 inches.
- B. Sleeve bolts in exposed service or buried shall be Type 304 stainless steel per AWWA C219, Section 4.
- C. Steel end follower rings shall be cast, forged, or hot rolled in one piece. Do not use rings fabricated from two or more shapes.
- D. Wall thickness of sleeve shall be at least that specified for the size of pipe in which the coupling is to be used.
- E. Gaskets shall be Buna-N.

### 2.3 DUCTILE IRON FLEXIBLE PIPE COUPLINGS

- A. Couplings shall have center sleeves and end rings made of ductile iron conforming to AWWA C219, Section 4.
- B. Sleeve bolts in exposed service or buried shall be Type 304 stainless steel per AWWA C219, Section 4.
- C. Gaskets shall be Buna-N.

### 2.4 FLEXIBLE PIPE COUPLINGS FOR PLAIN END STEEL PIPE, PLAIN END DUCTILE IRON PIPE, PVC PRESSURE PIPE

Provide coupling per OMWD AML.

### 2.5 TRANSITION COUPLINGS

Couplings for connecting different pipes having different outside diameters shall be per OMWD AML. Couplings shall have an integral full circumference ring pipe stop at the

midpoint of the coupling. Inside diameter of coupling pipe stop shall equal inside diameter of smaller diameter pipe.

2.6 FLANGED COUPLING ADAPTERS FOR STEEL PIPE, ASBESTOS CEMENT PIPE, DUCTILE IRON PIPE OR PVC PRESSURE PIPE

Adapters shall be per OMD AML. Flange ends shall match the flange of the connecting pipe.

2.7 LINING AND COATING FOR COUPLINGS

Coat interior and exterior ferrous surfaces of flexible pipe couplings, transition couplings, and flanged coupling adapters with fusion-bonded epoxy per Standard Specification Section 09961. Coating shall be holiday free on interior surfaces.

2.8 JOINT HARNESSSES

- A. Provide joint harnesses for flexible pipe couplings located in vaults and structures where the piping is not restrained or anchored. Joint harnesses of this design shall be limited to a maximum pipe size of 8 inches and only applies to steel pipe.
- B. Steel ring plates shall conform to ASTM A 36; ASTM A 283, Grade B, C or D; or ASTM A 285, Grade C. Ring plates shall be as shown on the Drawings.
- C. Tie bolts or studs shall be as shown in the following table. Bolt or stud material shall be high-strength alloy steel conforming to ASTM A 193, Grade B7. Nuts shall conform to ASTM A 194, Grade 2H.

Nominal Pipe Size (inches)	Number of Bolts/Studs	Diameter (inches)
2	2	5/8
3	2	5/8
4	2	5/8
6	2	5/8
8	2	5/8

- D. Provide washers for each nut. Washers shall be of the same material as the nuts.

2.9 BOLTS, NUTS AND GASKETS FOR FLANGES

See Standard Specification Section 15050.

2.10 WAX TAPE COATING

See Standard Specification Section 09952.

2.11 WAX TAPE COATING AND POLYETHYLENE ENCASEMENT

See Standard Specification Section 09952.

## 2.12 CORROSION CONTROL COMPONENTS

See Standard Specification Section 15310.

## PART 3 - EXECUTION

### 3.1 INSTALLING COUPLINGS OR ADAPTERS

- A. Clean oil, grease, scale, and dirt from pipe ends. Repair any damage or holidays in the shop applied coating before installing couplings or adapters. Clean gaskets in flexible pipe couplings, transition couplings, and flanged coupling adapters before installing.
- B. Clean sleeve bolts and nuts by wire brushing before installing in end rings. Lubricate threads of bolts and nuts with oil or graphite prior to installation. Tighten nuts uniformly and in a progressive diametrically opposite sequence, and torque with a calibrated torque wrench.
- C. If couplings or adapters leak under pressure testing, loosen or remove the nuts and sleeve bolts, reset or replace the gaskets, reinstall or retighten the bolts and nuts, and retest the coupling or adapter. Couplings and adapters shall be watertight.
- D. After testing, wrap sleeve bolts and nuts of buried couplings or adapters with wax tape coating per Standard Specification Section 09952.
- E. Wrap buried couplings and adapters with polyethylene material per Standard Specification Section 09954.
- F. Where couplings or adapters are installed on buried metallic pipe, provide bond wires across the coupling and bond the follower ring to the pipe per Standard Specification Section 15310.

### 3.2 INSTALLING FLANGED JOINTS

See Standard Specification Section 15050 for installation instructions.

### 3.3 PAINTING AND COATING

Coat flexible pipe couplings, transition couplings, flanged coupling adapters and joint harnesses located aboveground, or in vaults and structures, the same as the adjacent pipes and per Standard Specification Section 09900. Do not apply flame spray coating to fusion-bonded epoxy coated couplings. Apply finish coats in the field. Color of finish coat shall match color of the adjacent piping.

### 3.4 PRESSURE TESTING

Test couplings and adapters at the same time that the connecting pipelines are pressure tested. See Standard Specification Section 15144 for pressure testing requirements. Repair leaks in piping and retest.

### 3.5 DISINFECTION

See Standard Specification Section 15141 for chlorination requirements.

END OF SECTION



## SECTION 15141 - DISINFECTION OF PIPING

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

This section includes materials and procedures for disinfection of water mains by the continuous feed method or by the slug method. Do not use the tablet method to disinfect pipelines. Disinfect in accordance with AWWA C651, except as modified below. Other methods of disinfection will only be allowed with the written permission of the District's Representative.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Standard Drawings.
- B. Pressure Testing of Piping: STD SPEC 15144.

#### 1.3 JOB CONDITIONS

- A. Discharge of chlorinated water into watercourses or surface waters is regulated by the National Pollutant Discharge Elimination System (NPDES). Apply to cognizant environmental regulation authority and obtain permit for permission to discharge. Disposal of the chlorinated disinfection water and the flushing water is the Contractor's responsibility.
- B. Schedule the rate of flow and locations of discharges in advance to permit review and coordination with District and cognizant regulatory authorities: San Diego County Health Department. If there is any question that the chlorinated discharge will cause damage to the environment, then a reducing agent shall be applied to the water to be wasted to neutralize thoroughly the chlorine residual remaining in the water. See AWWA C651, Appendix C for neutralizing chemicals.
- C. Use potable water for chlorination. Provide a reduced pressure backflow prevention assembly if source of potable water is from District waterlines.
- D. Submit request for use of water from waterlines of District 48 hours in advance.

### PART 2 - MATERIALS

#### 2.1 LIQUID CHLORINE

Inject with a solution feed chlorinator and a water booster pump into the pipeline at a metered rate for the continuous feed or slug method. Use an experienced operator and follow the instructions of the chlorinator manufacturer.

#### 2.2 CALCIUM HYPOCHLORITE (DRY)

Use tablets in wet trenches when connecting to existing waterlines to minimize contamination.

## 2.3 SODIUM HYPOCHLORITE (SOLUTION)

Further dilute in water to desired concentration and swab or spray the inside surfaces of all new piping at connection points to existing waterlines.

## 2.4 CHLORINE RESIDUAL TEST KIT

For measuring chlorine concentration, supply and use a medium range, drop count, titration kit or an orthotolidine indicator comparator with wide range color discs. Products: Hach Chemical or Hellige. Maintain kits in good working order available for immediate test of residuals at points of sampling.

# PART 3 - EXECUTION

## 3.1 CONTINUOUS FEED METHOD

Introduce potable water into the pipeline at a constant measured rate. Feed the chlorine solution into the same water at a measured rate. Proportion the two rates so that the chlorine concentration in the pipeline is maintained at a minimum concentration of 50 mg/l. Check the concentration at points downstream during the filling to ascertain that sufficient chlorine is being added.

## 3.2 SLUG METHOD

Introduce potable water into the pipeline at a constant measured rate. At the start of the test section, feed the chlorine solution into the same water pipeline at a measured rate so that the chlorine concentration created in the pipeline is 300 mg/l. Feed the chlorine for a sufficient period to develop a solid column or "slug" of chlorinated water that will, as it passes along the line, expose all interior surfaces to a concentration of at least 300 mg/l for at least three hours.

## 3.3 DISINFECTION OF VALVES AND APPURTENANCES

During the period that the chlorine solution or slug is in the section of pipeline, open and close valves to obtain a chlorine residual at hydrants and other pipeline appurtenances.

## 3.4 CONFIRMATION OF RESIDUAL

- A. After the chlorine solution applied by the continuous feed method has been retained in the pipeline for 24 hours, confirm that a chlorine residual of 25 mg/l minimum exists along the pipeline by sampling at air valves and other points of access.
- B. With slug method, confirm by sampling as the slug passes each access point and as it leaves the pipeline.

## 3.5 PIPELINE FLUSHING

After confirming the chlorine residual, flush the excess chlorine solution from the pipeline until the chlorine concentration in the water leaving the pipe is non-detectable. Use an Environmental Protection Agency approved reducing agent such as Vita-D-Chlor or District approved equal if discharge of chlorinated water would be damaging to the environment.

### 3.6 BACTERIOLOGIC QUALITY TESTS

- A. The Contractor shall provide the services of an acceptable state certified laboratory to take all samples, deliver to laboratory, and provide written test results to the District's Representative.
- B. Perform bacteriologic quality testing after disinfection, final flushing, and refilling of the pipeline. Collect two consecutive sets of acceptable samples taken at least 24 hours apart from the pipeline. Take samples from the pipeline at 1500-foot intervals and from each end. Repeat the process 24 hours later at the same sample points. The sample point spacing may be adjusted in the field by the District's Representative.
- C. Deliver samples to a certified laboratory within three hours after collecting and have a bacteriologic quality test performed. Test for coliform organisms and perform a heterotrophic plate count for each sample taken. Coordinate the collection of the samples with the laboratory's hours of operation and allow adequate time for the test results.
- D. All samples must show the absence of coliform organisms and all heterotrophic plate counts must be less than 500 colonie forming unit/ml.

### 3.7 REPETITION OF PROCEDURE

If the initial disinfection fails to produce required residuals and bacteriologic quality tests, conduct investigations into the cause of the contamination and correct the condition. Repeat the disinfection process and the testing until satisfactory results are obtained.

### 3.8 TEST FACILITY REMOVAL

After satisfactory disinfection, replace air valves, restore the pipe coating, and complete the pipeline where temporary distribution or test facilities were installed.

### 3.9 FINAL CONNECTIONS TO EXISTING WATERLINES

New waterlines and appurtenances shall be completely installed, disinfected, flushed, and satisfactory bacteriological sample results received prior to permanent connections being made to the active distribution system. Sanitary construction practices shall be followed during installation of the final connection, such that there is no contamination of the new or existing waterlines with foreign material or groundwater.

### 3.10 CUTTING INTO EXISTING WATERLINES

- A. When connecting to existing waterlines, use extreme caution to minimize contamination of the interior passageways of the existing pipe, valves, and fittings. If the trench is wet, apply liberal quantities of hypochlorite to open trench areas to lessen the danger of pollution. Use tablets in this situation for slow and continuous release of hypochlorite as water is pumped from the excavation. Prior to the installation of new piping, swab or spray the interior surfaces of all pipe, valves, and fittings with a 1-percent hypochlorite solution.

- B. Within 24 hours of making a connection to an existing waterline, a bacteriologic quality test shall be performed by a state certified laboratory. Collect a sample from the existing waterline at the nearest access point to the connection. The sample shall be collected, delivered, and tested as described in paragraph 3.06. If the sample fails the test, the District's Representative will direct the Contractor to perform corrective action and retest.

END OF SECTION

## SECTION 15144 - PRESSURE TESTING OF PIPING

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

This section includes pressure and leakage testing of pressure pipelines and appurtenances for transmission and distribution mains.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Standard Drawings.
- B. Record Drawings and Submittals: STD SPEC 01300.
- C. Disinfection of Piping: STD SPEC 15141.

#### 1.3 SUBMITTALS

- A. Submit submittal packages in accordance with Standard Specification Section 01300.
- B. Submit test bulkhead locations, pipe attachment details, methods to prevent excessive pipe wall stresses, blocking to overcome thrust conditions and design calculations.
- C. Submit request for use of water from waterlines of District 48 hours in advance.

### PART 2 - MATERIALS

#### 2.1 TEST BULKHEADS

Design and fabricate test bulkheads per Section VIII of the ASME Boiler and Pressure Vessel Code. Materials shall comply with Part UCS of said code. Design pressure shall be at least 2.0 times the specified test pressure for the section of pipe containing the bulkhead. Limit stresses to 70-percent of yield strength of the bulkhead material at the bulkhead design pressure. Include air-release and water drainage connections.

#### 2.2 TEST OUTLETS AND TEMPORARY VALVES

Provide additional outlets and temporary valves for releasing air or apply the test where automatic air valves or other outlets are available in the pipeline. Construct the outlets in the same manner as for a permanent outlet and after use, seal with a blind flange, pipe cap, or plug and coat equal to the adjacent pipe.

## 2.3 TEST FLUID AND TEMPORARY PIPING

Use only potable water for the hydrostatic pressure test. Provide a reduced pressure backflow prevention assembly if source of potable water is from District waterlines. Provide temporary piping to convey and dispose of the test fluid used in the pipeline. Disconnect and remove temporary piping after complying with the allowable leakage.

## 2.4 TEST EQUIPMENT

Provide calibrated pressure gauges, calibrated recorder, pipes, pumps, meters, and other equipment necessary to perform the hydrostatic test.

# PART 3 - EXECUTION

## 3.1 TESTING PREPARATION

- A. Subject the pipeline and appurtenances to a hydrostatic pressure test after the pipe has been laid and backfilled for required restraint. Allow concrete pipe anchors, collars, encasements and thrust blocks to cure for at least 7 days prior to pressure testing. Allow concrete structures to attain the specified 28-day compressive strength prior to testing. Existing facilities will be operated by or under direction of the District's Representative only.
- B. Provide any temporary piping needed to carry the test fluid to the piping that is to be tested. After the test has been completed and demonstrated to comply with the specifications, disconnect and remove temporary piping. Do not remove exposed vent and drain valves at the high and low points in the tested piping; remove any temporary buried valves and cap the associated outlets. Plug taps or connections to the existing piping from which the test fluid was obtained.
- C. Provide temporary drain lines needed to carry testing fluid away from the pipe being tested. Remove such temporary drain lines after completing the pressure testing.

## 3.2 CLEANING

Before conducting hydrostatic pressure tests, flush pipes with water to remove dirt and debris. Maintain a flushing velocity of at least 3 fps for water testing. Flush pipes for time period as given by the formula:

$$T = \frac{2L}{3}$$

in which:

T = flushing time (seconds)

L = pipe length (feet).

### 3.3 TESTING AND DISINFECTION SEQUENCE

- A. Perform required disinfection after pressure testing, except when pipeline being tested is connected to a potable water pipeline.
- B. Locate and install test bulkheads, temporary valves and connections to existing pipelines, and other appurtenances in a manner to provide air gap separation between existing potable water pipelines and pipeline being tested. Disinfect water and pipeline being tested before pressure testing when connected to a potable water pipeline.
- C. See Standard Specification Section 15141 for chlorination requirements.

### 3.4 LENGTH OF TEST SECTION

Test the pipeline in sections. In any one test, do not exceed more than 2,500 feet, the distance between closed valves, or as directed by the District's Representative.

### 3.5 INITIAL PIPELINE FILLING

Maximum rate of filling with test fluid shall not cause water velocity in pipeline to exceed one foot per second. Expel air from the pipeline while filling and prior to testing. Provide necessary outlets to fill and test pipeline. Allow 72 hours for the water filled pipeline to soak and release entrapped air prior to testing.

### 3.6 TESTING NEW PIPE WHICH CONNECTS TO EXISTING PIPE

Prior to hydrostatic pressure testing new pipelines which are to be connected to existing pipelines, isolate the new pipeline from the existing pipeline by means of test bulkheads, spectacle flanges, or blind flanges. After the new pipeline has been successfully pressure tested, see Standard Specification Section 15141 for instructions to continue with the disinfection and connection work.

### 3.7 PRESSURE AND DURATION OF TEST

- A. Contractor shall perform and pass a pre-test prior to the District being requested for witnessing the pressure testing of the pipe.
- B. Base pipeline test pressures on the test hydraulic gradient elevation (HGL) as shown on the Drawings. Test pressure shall be the difference between the test HGL elevation and the invert elevation of the pipeline at the low point in the test section multiplied by 0.433 (psi). If no test HGL is shown, subject the pipeline at the low point in the test section to a hydrostatic test pressure which is 200 psi for DR-18 and 250 psi for DR-14
- C. Maintain the pipeline test pressure for the following duration and restore the test pressure whenever it drops 5 psi. Use a calibrated recorder during the test and provide a record of the test to the District.

Nominal Pipe Size (inches)	Duration of Test (hours)
18 and less	2

### 3.8 ALLOWABLE LEAKAGE

- A. Apply the test pressure with a positive displacement pump. Provide a snubber or dampener between the pump and the pipeline to reduce instantaneous pressure pulses to 10-percent of the test pressure. Draw test fluid from containers in which the volume of water can be readily measured or through a positive displacement meter.
- B. Leakage shall be considered as the total amount of water pumped into the pipeline during the test period. The allowable leakage for aboveground and buried piping having threaded, soldered, welded, flanged, push-on joint, mechanical joint, and rubber gasket joint shall be zero (0).

### 3.9 REPETITION OF TEST

If the actual leakage exceeds the allowable, locate and correct the faulty work and repeat the test until the leakage does not exceed the allowable. Restore the work and all damage resulting from the leak and its repair. All visible leakage shall be eliminated.

### 3.10 BULKHEAD AND TEST FACILITY REMOVAL

After a satisfactory pressure test and disinfection, drain the water; remove test bulkheads, temporary valves and piping, and other test facilities; connect to existing facilities; and restore the pipe coatings.

END OF SECTION



## SECTION 15220 - COPPER PIPE AND TUBE

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

This section includes materials, installation, and testing of copper pipe, tube, and fittings that conform to all State, Local and Federal low lead requirements.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Standard Drawings.
- B. Record Drawings and Submittals: STD SPEC 01300.
- C. Trenching, Backfilling, and Compacting: STD SPEC 02223.
- D. General Piping Requirements: STD SPEC 15050.
- E. Disinfection of Piping: STD SPEC 15141.
- F. Pressure Testing of Piping: STD SPEC 15144.

#### 1.3 SUBMITTALS

- A. Submit submittal packages in accordance with Standard Specification Section 01300.
- B. Submit manufacturer's catalog data and descriptive literature for copper pipe, tube, fittings, miscellaneous piping materials, and solder. Show dimensions and materials of construction by specification reference and grade.

### PART 2 - MATERIALS

#### 2.1 COPPER WATER TUBE

Copper water tube shall conform to ASTM B 88. Tubing located above ground, in vaults and structures shall be Type K, drawn temper (hard). Buried tubing shall be Type K, annealed temper (soft), except 3-inch tube shall be Type K, drawn temper (hard).

#### 2.2 PIPE AND NIPPLES

Pipe and short threaded nipples shall be brass conforming to ASTM B 43 or copper conforming to ASTM B 42, regular wall thickness, except that pipe and nipples of sizes 1-inch and smaller shall be extra strong. Threads shall conform to ASME B1.20.1, NPT.

## 2.3 SOLDER JOINT FITTINGS

- A. Wrought copper solder joint seamless fittings shall be designed for use with copper water tube and conform to ASTM B 75 and ASME B16.22. Material shall be UNS C10200, C12000, or C12200.
- B. Cast copper solder joint pressure fitting shall be designed for use with copper water tube and conform to ASME B16.18.
- C. Use solder joint fittings for working pressures of 300 psi or less.

## 2.4 THREADED FITTINGS

Cast bronze threaded fittings shall be designed for use with brass or copper pipe and nipples and conform to ASME B16.15, Class 125 and 250. Use Class 125 fittings for working pressures of 200 psi or less. Use Class 250 fittings for working pressures greater than 200 psi, but less than 400 psi.

## 2.5 FLANGES AND FLANGED FITTINGS

Cast bronze pipe flanges and flanged fittings shall conform to ASME B16.24, Class 150 or Class 300. Use Class 150 flanged fittings for working pressures of 225 psi or less. Use Class 300 flanged fittings for working pressures greater than 225 psi; but less than 500 psi. Provide flat faced flanges. Use solder joint or threaded end companion flanges. Companion flanges with solder joint or threaded end shall be limited to the pressure rating of the pipe connection and not the flanged joint.

## 2.6 SOLDER

Solder shall be 95-5 (95-percent tin and 5-percent antimony) conforming to ASTM B 32, Alloy Grade Sb5 or silver solder conforming to AMS 4773C. Do not use lead or cored solder.

## 2.7 SOLDERING FLUX

Soldering flux shall comply with ASTM B 813.

## 2.8 BOLTS, NUTS AND GASKETS FOR FLANGES

See Standard Specification Section 15050.

# PART 3 - EXECUTION

## 3.1 GENERAL

- A. Install pipe and tube without springing, forcing, or stressing the pipe, tube, or any connecting valves.
- B. Provide pipe hangers and supports for pipe and tube where installed above ground, in vaults and structures.

- C. Use soldered joints and fittings with copper water tube in buried and exposed service.
- D. Use threaded joints and fittings with brass or copper piping in buried and exposed service.

### 3.2 INSTALLATION

- A. Tube cutters shall always be sharp. Do not take too deep a cut with each turn of the cutter or back and forth motion of a saw blade.
- B. Cut tubing square and remove burrs. Use a sizing ring on the ends of soft copper tubing, and bring to true dimension and roundness. Clean the surfaces to be soldered with fine emery cloth, cleaning pads, or special wire brushes. Rub hard enough to remove the surface film of oil, grease, heavy oxide, and soil, but not hard enough to remove metal. Coat clean surfaces with a thin film of non-toxic and non-corrosive flux, assemble joint full depth, and remove excess flux before soldering.
- C. Make soldered joints in accordance with ASTM B 828. Solder shall penetrate to the full depth of the cup in joints and fittings. Solderers shall comply with ASME B31.3, paragraph 333. Using full oxygen and acetylene equipment only.
- D. Bends in soft copper tubing shall be long sweep. Shape bends with shaping tools. Form bends without flattening, buckling, or thinning the tubing wall at any point.
- E. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to male pipe threads before mating threaded joint. Joints shall be watertight.
- F. Install flanged joints per the installation instructions in Standard Specification Section 15050.

### 3.3 INSTALLING BURIED TUBING

- A. See Standard Specification Section 02223 for earthwork requirements.
- B. Remove foreign matter and dirt from inside of tubing and keep clean during and after laying.
- C. Handle tubing in a manner to avoid any damage to the tubing.
- D. Grade the bottom of the trench to the line and grade to which the tubing is to be laid. Remove hard spots that would prevent a uniform thickness of pipe base material (imported sand). Before laying the tubing, check the grade and correct any irregularities found.

### 3.4 PRESSURE TESTING

Test copper pipe, tube, and fittings at the same time that the connecting pipelines are pressure tested. See Standard Specification Section 15144 for pressure testing requirements. Repair leaks in piping and retest.

### 3.5 DISINFECTION

See Standard Specification Section 15141 for chlorination requirements.

END OF SECTION

## SECTION 15290 - POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

This section includes materials and installation of polyvinyl chloride (PVC) pipe and fittings with iron pipe size outside diameters for miscellaneous applications. Size range is 1/2- to 3-inch nominal size.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Standard Drawings.
- B. Record Drawings and Submittals: STD SPEC 01300.

#### 1.3 SUBMITTALS

- A. Submit submittal packages in accordance with Standard Specification Section 01300.
- B. Submit manufacturer's catalog data and descriptive literature for PVC, pipe, fittings, solvent, and miscellaneous materials. Show dimensions and materials of construction by specification reference and grade.

### PART 2 - MATERIALS

#### 2.1 PVC PIPE

PVC pipe shall be Schedule 80, Type I, Grade I (Class 12454-B), conforming to ASTM D 1784 and D 1785. Provide PVC pipe with the schedule as shown on the Drawings.

#### 2.2 NIPPLES

Short nipples shall be the same as the PVC pipe.

#### 2.3 FITTINGS

Provide fittings that have the same schedule as the PVC pipe.

- A. Fittings shall be Schedule 80 conforming to ASTM D 2464 for threaded type and ASTM D 2467 for socket type.

## 2.4 JOINTS

- A. Pipe and fitting joints shall be solvent welded except where threaded joints are required.
- B. Solvent cement for socket joints shall comply with ASTM D 2564 and F 656.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Do not install PVC pipe when the temperature is below 40 degrees F or above 90 degrees F.
- B. Store fittings indoors in their original cartons.
- C. Store solvent cement indoors or, if outdoors, shade from direct sunlight exposure. Do not use solvent cements which have exceeded the shelf life marked on the storage container.
- D. Before installation, check pipe and fittings for cuts, scratches, gouges, buckling, kinking, or splitting on pipe ends. Remove any pipe section containing defects by cutting out the damaged section as a complete cylinder.

### 3.2 INSTALLATION

Do not drag PVC pipe over the ground, drop it into the ground, or drop objects on it. Cut pipe ends square and remove all burrs, chips, and filings before joining pipe or fittings. Bevel solvent welded pipe ends as recommended by the pipe manufacturer.

### 3.3 SOLVENT WELDED JOINTS

- A. Prior to solvent welding, remove fittings and couplings from their cartons and expose them to the air for at least one hour to the same temperature conditions as the pipe.
- B. Wipe away loose dirt and moisture from the ID and OD of the pipe end and the ID of the fitting before applying solvent cement. Do not apply solvent cement to wet surfaces.
- C. Make up solvent welded joints per ASTM D 2855.
- D. Allow at least 8 hours of drying time before moving solvent welded joints or subjecting the joints to any internal or external loads or pressures.

END OF SECTION

## SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. The Contractor shall provide electrical and appurtenant Work necessary for a complete and operable electrical system, in accordance with the Contract Documents.
- B. The Contractor shall make all field connections and terminations to all motors, switchgear, panels, control equipment and devices, instruments, and to all vendor-furnished packaged equipment. The requirements of this Section shall apply to all electrical items indicated in Division 16 unless otherwise indicated.
- C. The Contractor shall provide all materials and incidentals required to complete the electrical work. Typical materials which may be incidentals are terminal lugs not furnished with vendor-supplied equipment, compression connectors for cables, splices, junction and terminal boxes, and all control wires required by vendor-furnished equipment to interconnect with other equipment all specifically indicated on the Contract Documents.

#### 1.02 RELATED SECTIONS

- A. The Work of the following Sections applies to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.
  - 1. Section 17010 - Instrumentation and Controls General Requirements
  - 2. Section 16080 – Acceptance Testing

#### 1.03 REFERENCE SPECIFICATIONS, CODE AND STANDARDS

- A. Codes and Standards:
  - 1. NEC - National Electrical Code, latest edition
- B. Government Standards:
  - 1. FS WW-C-581D, E - Conduit, Metal, Rigid, And Intermediate; And Coupling, Elbow, and Nipple, Electrical Conduit: Steel, Zinc Coated
- C. Commercial Standards:
  - 1. ANSI C80.1 - Zinc Coated, Rigid Steel Conduit, Specification for
  - 2. ANSI C80.4 - Fittings for Rigid Metal Conduit and Electrical Metallic Tubing, Specifications for
  - 3. ANSI/UL 467 - Grounding and Bonding Equipment, Safety Standard for

4. ASTM B3 - Soft or Annealed Copper Wire
  5. ASTM B8 - Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, and Soft
  6. ASTM B33 - Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes
  7. ICEA S-61-402 - Thermoplastic - Insulated Wire and Cable
  8. ICEA S-66-524, NEMA WC7 - Cross-Linked, Thermosetting, Polyethylene Wire and Cable
  9. ICEA S-68-516, NEMA WC8 - Ethylene Propylene Rubber Insulated Wire and Cable
  10. UL 6 - Rigid Metal Electrical Conduit
  11. UL 44 - Rubber - Insulated Wire and Cable.
  12. UL 514 - Electrical Outlet Boxes and Fittings
  13. UL 886 - Electrical Outlet Boxes and Fittings for Use in Hazardous Locations
- D. All equipment furnished by the Contractor shall be listed by and shall bear the label of Underwriters' Laboratories, Incorporated (UL), or of an independent testing laboratory acceptable to the local code-enforcement agency having jurisdiction.
- E. The construction and installation of all electrical equipment and materials shall comply with all applicable provisions of the OSHA Safety and Health Standards (29CFR1910 and 29CFR1926, as applicable), State Building Standards, and applicable local codes and regulations.

#### 1.04 SUBMITTALS

- A. Shop Drawings and Catalog Data: The Contractor shall submit shop drawings and catalog data submittals in accordance with Division 1 - Submittals.
- B. Material Lists: The Contractor shall submit complete material lists for the Work of this Section. Such lists shall state the manufacturer and brand name of each item or class of material. The Contractor shall submit shop drawings for all grounding work not specifically indicated.
- C. Shop Drawing Content: Shop drawings are required for materials and equipment listed in other Sections. Shop drawings shall provide sufficient information to evaluate the suitability of the proposed material or equipment for the intended use, and for compliance with these Specifications. The following shall be included:



1. Front, side, rear elevations and top views with dimensional data.
  2. Location of conduit entrances and access plates.
  3. Component data.
  4. Connection diagrams, terminal numbers, wire numbers, internal wiring diagrams, conductor size, and cable numbers.
  5. Method of anchoring, seismic requirement; weight.
  6. Types of materials and finish.
  7. Nameplates.
  8. Temperature limitations, as applicable.
  9. Voltage requirement, as applicable.
  10. Front and rear access requirements.
- D. Catalog Data: Catalog data shall be submitted to supplement all shop drawings. Catalog cuts, bulletins, brochures, or the like or photocopies of applicable pages thereof shall be submitted for mass produced, non-custom manufactured material. These catalog data sheets shall be stamped to indicate the project name, applicable Specification section and paragraph, model number, and options. This information shall be marked in spaces designated for such data in the stamp.
- E. Materials and Equipment Schedules: The Contractor shall furnish within 30 days, a complete list of all materials, equipment, apparatus, and fixtures proposed for use. The list shall include type, sizes, names of manufacturers, catalog numbers, and such other information required to identify the items.
- F. Manuals: The Contractor shall furnish manuals as part of the shop drawing submittals under Section 1 specifications.
- G. Record Drawings: In addition to the record drawings as a part of the record drawing requirements specified in Section 1 specifications, the Contractor shall show depths and routing of all duct bank concealed below grade electrical installations.

#### 1.05 QUALITY ASSURANCE

- A. Field Control of Location and Arrangement: The Drawings diagrammatically indicate the desired location and arrangement of outlets, conduit runs, equipment, and other items. The Contractor shall determine the exact locations in the field based on the physical size and arrangement of equipment, finished elevations, and other obstructions. Locations shown on the Drawings, however, shall be adhered to as closely as possible.

- B. Equipment Locations: All conduit and equipment shall be installed in a manner to avoid all obstructions and to preserve head room and keep openings and passageways clear. Lighting fixtures, switches, convenience outlets, and similar items shall be located within finished rooms, as shown. Where the Drawings do not indicate exact locations, such locations shall be obtained from the Engineer. Where equipment is installed without instruction and must be moved, it shall be moved without additional cost to the OWNER.
- C. Workmanship: All materials and equipment shall be installed in accordance with printed recommendations of the manufacturer which have been reviewed by the Engineer. The installation shall be accomplished by workmen skilled in this type of work and installation shall be coordinated in the field with other trades so that interferences are avoided.
- D. Quality of Work: All Work, including installation, connection, calibration, testing, adjustment, and paint touchup, shall be accomplished by qualified, experienced personnel working under continuous, competent supervision. The completed installation shall display competent work, reflecting adherence to prevailing industrial standards and methods.
- E. Protection of Equipment and Materials: The Contractor shall furnish adequate means for and shall fully protect all finished parts of the materials and equipment against damage from any cause during the progress of the Work and until acceptable by the Engineer.
- F. Protection: All materials and equipment, both in storage and during construction, shall be covered in such a manner that no finished surfaces will be damaged, marred, or splattered with water, foam, plaster, or paint. All moving parts shall be kept clean and dry.
- G. Damaged Materials and Equipment: The Contractor shall replace or have refinished by the manufacturer, all damaged materials or equipment, including face plates of panels and switchboard sections, at no expense to the OWNER.
- H. Tests: The Contractor shall perform all tests required by the Engineer or other authorities having jurisdictions. All such tests shall be performed in the presence of the Engineer. The Contractor shall furnish all necessary testing equipment and pay all costs of tests, including all replacement parts and labor necessary due to damage resulting from damaged equipment or from test and correction of faulty installation. The following testing shall be accomplished:
  - 1. Testing for the ground resistance value under "Grounding," below.
  - 2. Insulation resistance tests under "Wire and Cable," below.
  - 3. Operational testing of all equipment furnished and/or connected in other Sections of Division 16, including furnishing of support labor for testing.
- I. Standard test reports for mass-produced equipment shall be submitted along with the shop drawing for such equipment. Test reports on testing specifically required for individual pieces of equipment shall be submitted for review prior to final acceptance of the project.

- J. Any test failure shall be corrected in accordance with the industry practices and in a manner satisfactory to the Engineer.

#### 1.06 PERMITS AND INSPECTION

- A. The Contractor shall obtain permits and pay for inspection fees as indicated in the Contract Documents.
- B. The Contractor shall pay for any service charges required by the utility company for connection and activation.

#### 1.07 AREA DESIGNATIONS

- A. General: For purposes of delineating electrical enclosure and electrical installation requirements of this project, certain areas have been classified in the Contract Documents as defined below. Electrical installations within these areas shall conform to the referenced code requirements for the area involved.
- B. Not used.
- C. All exposed Locations: Raceway shall be galvanized rigid PVC (polyvinyl chloride)-coated conduit; entrances shall be threaded; and fittings shall have gasketed covers. Provisions shall be made to drain the fitting or conduit system. Threaded fastening hardware shall be 316 stainless steel. Raceway supports such as hanger rods, clamps, and brackets shall be 316 stainless steel. Attachments or welded assemblies shall be galvanized after fabrication. Instruments and control cabinets, and panel enclosures shall be NEMA Type 4X enclosure. Enclosures shall be mounted 1 inch from walls to provide an air space.

#### 1.08 CLEANUP

- A. Cleaning of Materials and Equipment: All materials and equipment shall be thoroughly cleaned. Exposed parts shall be thoroughly clean of cement, plaster, and other materials. All oil and grease spots shall be removed with a nonflammable cleaning solvent. Such surfaces shall be carefully wiped and all cracks and corners scraped out. Paint touchup shall be applied to all scratches on panels and cabinets. Electrical cabinets or enclosures shall be vacuum cleaned before final acceptance.
- B. Cleaning of the Site: During the progress of the Work, the Contractor shall clean the premises and leave the premises and all portions of the site free of debris.

#### 1.09 DEMOLITION AND RELATED WORK

- A. Demolition Work: The Contractor shall perform all electrical demolition work as indicated.
  - 1. Electrical equipment and components, terminal and relay cabinets, MCCs, shall be returned to the OWNER in an orderly fashion to a designated location on the site.

2. Wire, conduit, junction boxes, fittings, supports and miscellaneous hardware removed as part of the demolition work shall not be reused and shall be returned to the OWNER.
3. Wires and/or conduits that need to be extended shall be terminated in a new terminal box with terminal strips. Terminal box shall be properly sized by the Contractor. In outdoor installation, the terminal box shall be NEMA 4X 316 stainless steel. Wires and terminals shall be properly identified before disconnection and after reconnection.
4. Wiring in conduits located in or under slabs shall be removed. The conduit shall be plugged level with the floor where practical. In other cases, the conduit shall be cut three inches below the finished floor and the area shall be resurfaced.
5. Openings in walls and platforms created by the removal of conduit or electrical equipment shall be patched with materials similar to those in surrounding work areas or as required to provide proper sealed conditions as reviewed and accepted by the Engineer.
6. Electrical demolition shall be as shown on the Drawings or as required by the Specifications.
7. The Contractor shall exercise due care in the removal of the equipment made surplus by this project so as not to impair its resale value or reuse. The OWNER has the right to salvage any wire or other electrical equipment removed from the project.

B. Installation of New Equipment in Existing Structures:

1. Installation of certain new equipment and devices is required in existing structures. For this phase of the Work, the Contractor shall remove existing equipment or devices, install new equipment as indicated, remove existing conductors from existing raceways, and pull new conductors in existing raceways, reconnect existing conductors or furnish and install new conduit and wires.
2. The Contractor shall visit the site before bidding and carefully examine existing installation so that its proposal will reflect all the Work necessary to provide a complete installation so that the resulting installation will function as required. Include in the bid price all costs of labor and materials necessary to complete installations.

C. Installation of Temporary Equipment:

1. To facilitate continuous operation of existing equipment, temporary equipment shall be provided where indicated. The Contractor shall submit installation and connection details for review and acceptance. Temporary installations shall be provided at no additional cost to the OWNER.

2. All cables, conduits, and fittings used in temporary connections shall not be reused to install permanent connections. Salvaged items shall be returned to the OWNER.

D. Plant Monitoring Power and Control Shutdowns:

1. Existing plant operation shall be continued during this demolition process. The Contractor shall carefully examine all Work to be done in, on, or adjacent to existing equipment. Work shall be scheduled, subject to the OWNER's approval, to minimize required plant shutdown time. The Contractor shall submit a written request, including sequence and duration of activities to be performed during plant shutdown.
2. The Contractor shall perform all switching and safety tagging required for plant shutdown or to isolate existing equipment. In no case shall the Contractor begin any Work in, on, or adjacent to existing equipment without written authorization of the Engineer.

E. Modifications to Existing Electrical Facilities:

1. The Contractor shall provide all modifications or alterations to existing electrical facilities required to successfully install and integrate the new electrical equipment. All modifications to existing equipment, panels, or cabinets shall be made in a professional manner with all coatings repaired to match existing. Modifications to existing electrical facilities required for a complete and operating system shall be made at no additional cost to the OWNER. Extreme caution shall be exercised in digging trenches in order not to damage existing underground utilities. Cost of repairs of damages caused during construction shall be the Contractor's responsibility.
2. The Contractor shall verify all available existing circuit breakers in lighting panels for their intended use as required by the Drawings. At no additional cost to the OWNER, the Contractor shall verify the available space in substation switchboards to integrate new power circuit breakers.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. All equipment and materials shall be new, shall be listed by UL, and shall bear the UL label where UL requirements apply. All equipment and materials shall be the products of experienced and reputable manufacturers in the industry. Similar items in the project shall be products of the same manufacturer. All equipment and materials shall be of industrial grade and standard of construction; shall be of sturdy design and manufacture; and shall be capable of reliable, trouble-free service.

### 2.02 GROUNDING

- A. General: All components of the grounding electrode system shall be manufactured in accordance with UL 467 and shall conform to the applicable requirements of NEC Article 250.
- B. Grounding Cable: Grounding cable shall be copper. Bare copper wire shall be annealed, No. 8 AWG minimum, if not called out in the Drawings.
- C. Ground Rods: Ground rods shall conform to ANSI/UL 467 and shall be 3/4-inch diameter copper-clad steel, sectional type, joined by threaded copper alloy couplings.
  - 1. Grounding connectors shall be high-strength copper alloy suitable for direct burial.
  - 2. Wire connections shall be exothermic weld by Cadweld or Erico Products for underground installation, or Burndy Hyground System using irreversible compression-type connectors for exposed aboveground installation.
  - 3. Manufacturers of grounding materials shall be Copperweld, Blackburn, Burndy, or equal.

## 2.03 UNDERGROUND DUCTS AND MANHOLES

- A. General: Where an underground distribution system is required, it shall be comprised of multiple runs of single bore metallic and nonmetallic ducts and pullboxes. When nonmetallic ducts are required, they shall be rigid Schedule 80 PVC for direct burial.
  - 1. Pullboxes shall be of precast concrete. Concrete construction shall be designed for traffic loading.
    - a. Covers shall be traffic type, except as shown otherwise. Pullbox covers designated as "Electrical". All covers shall be watertight after installation.
  - 2. Pullboxes shall be Brooks, Quikset, U.S. Precast, or equal. Cast-iron covers shall be by U.S. Foundry, or equal.

## 2.04 RACEWAYS

- A. PVC-Coated Raceway: PVC-coated raceway system shall conform to Federal Specification WW-C-581E, ANSI C80.1, and to UL specifications.
  - 1. The zinc surfaces of the conduits and fittings shall remain intact and undisturbed on both the inside and the outside of the conduit through the preparation and application processing.
  - 2. A PVC coating shall be bonded to the galvanized outer surface of the conduit. The bond between the PVC coating and the conduit surface shall be greater than the tensile strength of the plastic.
  - 3. The thickness of the PVC coating shall be a minimum of 40 mils.

4. A PVC jacketed coupling shall be furnished with each length of conduit. A PVC sleeve equal to the OD of the conduit shall extend 1-1/2 inches from each end of coupling.
5. PVC-coated conduits shall be as manufactured by Robroy, Occidental (OCCAL), or equal.

## 2.05 WIRE AND CABLE

- A. General: All conductors, including ground conductors, shall be copper. Insulation shall bear UL label and the manufacturer's trademark, type, voltage and temperature rating, and conductor size. Wire and cable shall be products of American, Rome Cable, Okonite, Houston, or equal.
- B. Control Cables: All control cables shall be rated for 600 V and shall meet the following requirements:
  1. Control wires shall consist of No. 14 gage stranded copper conductors and shall be XHHW rated for 90 degrees C at dry locations and 75 degrees C at wet locations.
  2. Control wires at panels and cabinets shall be machine tool grade type MTW, UL approved, rated for 90 degrees C at dry locations.
  3. Multiconductor control cable shall be rated at 600 V and shall consist of No. 14 gage stranded copper conductors, individually insulated with a minimum of 20 mils of polyethylene, 10 mils full color coded PVC jacket over each insulated conductor, a polyester tape over assembly, and an overall PVC jacket. Multiconductor cable shall be identified by either ICEA color coding or ink imprinting. Multiconductor cables may be used in conduits or cable trays as required by the Drawings. Multipull taped control conductor assemblies may be used in conduits as approved by the Engineer.
  4. Multiconductor tray cable shall be rated 600 V, listed by UL as Type TC cable per Article 340 of the NEC. The individual conductors shall be UL listed as Type XHHW, with a sunlight-resistant overall jacket. The cables shall pass UL and IEEE-383 ribbon burner flame tests.
- C. Instrumentation Cables: Shielded instrumentation cables shall be rated at 300 V and shall comply with the following requirements:
  1. Individual shielded cable shall consist of twisted 2 or 3 No. 18 gauge, stranded, color coded, tinned-coated copper in accordance with ASTM B 33 - Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes and B 8 - Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, and Soft. Color coding shall be black-clear, or black-red-clear.
  2. Insulation thickness shall be 32 mils of polyethylene, insulated with 2.3 mils 100% aluminum foil/polyester shield and No. 18 stranded tinned copper drain wire, all

under a 32 mil PVC jacket. The shield shall be continuous and shall be grounded only at the receiving end, or as indicated.

3. Multi-individual shielded pair or triad instrumentation cable shall consist of individual shielded and twisted pair copper conductors with an ethylene-propylene insulation, and No. 18 AWG tinned stranded copper drain wire, an overall aluminum mylar shield and an overall chloro-sulfonated polyethylene compound jacket. The cables shall be suitable for cable tray installation and shall be flame retardant.

D. Building Wire and Cable: Building wires and cables shall be rated at 600 V and shall meet the following requirements:

1. Building wire shall be single conductor copper cable listed by UL as Type XHHW rated 75 degrees C in wet locations and 90 degrees C in dry locations.
2. Building wire No. 8 AWG and larger shall be stranded; size No. 10 AWG and smaller shall be solid or stranded.
3. No wire smaller than No. 12 AWG shall be used unless specifically indicated.

E. Cable Terminations: Cable terminations shall be in accordance with the following:

1. Compression connectors shall be Burndy "Hi Lug", Thomas & Betts "Shure Stake", or equal. Threaded connectors shall be split bolt type of high strength copper alloy.
2. Spring connectors (wire nuts) shall be 3M "Scotch Lok," "Ideal Wing Nuts", or equal.
3. Preinsulated fork tongue lugs shall be "Thomas & Betts" RC Series, Burndy, or equal.
4. General purpose insulating tape shall be Scotch No. 33, Plymouth "Slip-knot", or equal. High temperature tape shall be polyvinyl by Plymouth, 3M, or equal.
5. Splices in underground pullboxes shall be submersible type by Burndy or equal.

## 2.06 PULL AND JUNCTION BOXES

- A. Surface Mounted Boxes: Outlet, switch, pull and junction boxes where surface mounted in exposed locations shall be PVC coated or 316 SST.

## 2.07 CONDUIT FITTINGS

- A. General: Fittings shall comply with the same requirements as the raceway with which they will be used. Fittings having a volume less than 100 cubic inches for use with rigid steel conduit, shall be cast or malleable nonferrous metal. Such fittings larger than one inch shall be "mogul size." Fittings shall be of the gland ring compression type. Covers of



fittings, unless in "dry" locations, shall be closed with gaskets. Surface-mounted cast fittings, housing wiring devices in outdoor and damp locations, shall have mounting lugs.

- B. Insulated Bushings: Insulated bushings shall be molded plastic or malleable iron with insulating ring, similar to O-Z Type A and B, equivalent types by Thomas & Betts, Steel City, Appleton, O-Z/Gedney, or equal.
- C. Insulated Grounding Bushings: Insulated grounding bushings shall be malleable iron with insulating ring and with ground lug, such as O-Z Type BL, equivalent types by T & B, Steel City, O-Z/Gedney, or equal.
- D. Erickson Couplings: Erickson couplings shall be used at all points of union between ends of rigid steel conduits which cannot be coupled. Running threads and threadless couplings shall not be used. Couplings shall be 3-piece type such as Appleton Type EC, equivalent types such as manufactured by T & B, Steel City, O-Z/Gedney, or equal.
- E. Liquid-Tight Fittings: Liquid-tight fittings shall be similar to Appleton Type ST, equivalent types such as manufactured by Crouse-Hinds, T & B, O-Z/Gedney, or equal. Fittings shall be PVC coated when used with PVC coated conduits.
- F. Hubs: Hubs for threaded attachment of steel conduit to sheet metal enclosures, where required, shall be similar to Appleton Type HUB, equivalent types such as manufactured by T & B, Myers Scrutite, or equal. Hubs located outdoors shall be 316 stainless steel or PVC coated.
- G. Transition Fittings: Transition fittings to mate steel to PVC conduit, and PVC access fitting, shall be as furnished or recommended by the manufacturer of the PVC conduit.

## 2.08 ELECTRICAL IDENTIFICATION

- A. Nameplates: Nameplates shall be fabricated from white-letter, black-face laminated plastic engraving stock, Formica type ES-1, or equal. Each shall be fastened securely, using fasteners of brass, cadmium plated steel, or stainless steel, screwed into inserts or tapped holes, as required. Engraved characters shall be block style of adequate size to be read easily at a distance of 6 feet with no characters smaller than 1/8-inch high.
- B. Conductor and Equipment Identification: Conductor and equipment identification devices shall be either imprinted plastic-coated cloth marking devices such as manufactured by Brady, Thomas & Betts, or equal, or shall be heat-shrink plastic tubing, imprinted split-sleeve markers cemented in place, or equal.
- C. Identification Tape: Identification tape for protection of buried electrical installation shall be a 6-inch wide red polyethylene tape imprinted "CAUTION - ELECTRIC UTILITIES BELOW."

## PART 3 - EXECUTION

### 3.01 GROUNDING

OMWD  
DCMWTP pH CONTROL SYSTEM  
BASIC ELECTRICAL MATERIALS AND METHODS

- A. General: Grounding cable shall be sized in accordance with NEC Article 250 requirements when sizes are not indicated on the Drawings. The location of ground rods shall be as indicated. The length of rods forming an individual ground array shall be equal in length and shall be of the quantity required to obtain a ground resistance of no more than 5 ohms.
- B. Equipment Ground: Ground continuity throughout the facility shall be maintained by installing an electrically-continuous metallic raceway system, or a non-metallic raceway with a grounding conductor when non-metallic raceway is permitted in the Contract Documents.
  - 1. Metallic raceway shall be installed with double lock nuts or hubs at enclosures. Nonmetallic raceway containing dc conductors operating at more than 50 V to ground, or any AC conductors, shall contain a copper grounding conductor either bare, or green if insulated. Such conductor shall be bonded to terminal and intermediate metallic enclosures.
  - 2. Metal equipment platforms which support any electrical equipment shall be bonded to the nearest ground bus or to the nearest switchgear ground bus. This grounding requirement is in addition to the raceway grounding required in the preceding paragraph herein.
- C. Grounding Electrode System: Install the grounding electrode system with all required components in accordance with NEC Article 250.
  - 1. Connection to ground electrodes and ground conductors shall be exothermic welded where concealed and shall be bolted pressure type where exposed. Bolted connectors shall be assembled wrench-tight.
  - 2. Insulated grounding bushings shall be employed for all grounding connections to steel conduits in switchboards, in motor control centers, in pullboxes, and elsewhere where conduits do not terminate at a hub or a sheet metal enclosure. Where insulated bushings are required, they shall be installed in addition to double lock-nuts.
  - 3. Copper bonding jumpers shall be used to obtain a continuous metallic ground.
- D. Shield Grounding:
  - 1. Shielded power cable shall have its shield grounded at each termination in a manner recommended by the cable manufacturer.
  - 2. Shielded instrumentation cable shall be grounded at one end only; this shall be at the Main Control Panel or otherwise at the "receiving" end of the signal carried by the cable, unless shop drawings indicate that the shield shall be grounded at both ends.
  - 3. Termination of each shield drain wire shall be on its own terminal screw. All of these terminal screws in one rack shall be jumpered with No. 16 solid tinned bare

copper wire; connection to ground shall be accomplished with a No. 12 green insulated conductor to the main ground bus.

### 3.02 NOT USED

### 3.03 RACEWAYS

- A. General: Raceways shall be installed as indicated, however, conduit routings shown are diagrammatic. Raceway systems shall be electrically and mechanically complete before conductors are installed. Bends and offsets shall be smooth and symmetrical, and shall be accomplished with tools designed for the purpose intended. Factory elbows shall be used for all 3/4-inch conduit. Bends in larger sizes of metallic conduit shall be accomplished by field bending or by the use of factory elbows. All installations shall be in accordance with the latest edition of the NEC.
- B. Installation: Raceways shall be installed in accordance with the following schedule:
  - 1. Exposed Raceways:
    - a. Conduits shall be rigidly supported with clamps, hangers, and Unistrut channels.
    - b. Intervals between supports shall be in accordance with the National Electric Code.
- C. Conduit Terminations: Empty conduit terminations not in manholes or pullboxes shall be plugged. Exposed raceway shall be installed perpendicular or parallel to buildings except where otherwise indicated. Conduit shall be terminated with flush couplings at exposed concrete surfaces. Conduit stubbed up for floor-standing equipment shall be placed in accordance with approved shop drawings. Metallic raceways installed below-grade or in outdoor locations and in concrete shall be made up with a conductive waterproof compound applied to threaded joints. Compound shall be Zinc Clads Primer Coatings No. B69A45, HTL-4 by Crouse-Hinds, Kopr Shield by Thomas & Betts, or equal.
- D. Conduit Installations:
  - 1. Conduit may be cast integral with horizontal and vertical concrete slabs, providing one-inch clearance is maintained between conduit surface and concrete surface. If said clearance cannot be maintained, the conduit shall be installed exposed below elevated slabs; provided, that in the case of slabs on grade, conduit shall be installed below the slab. Maximum size of conduit that can be cast in slab shall be 1-1/2 inches.
  - 2. Nonmetallic conduit may be cast integral with horizontal slabs with placement criteria stated above. Non-metallic conduit may be run beneath structures or slabs on grade, without concrete encasement. In these instances, conduit shall be placed at least 12 inches below the bottom of the structure or slab. Nonmetallic conduit may be buried 24 inches minimum below grade, with a 3-

inch concrete cover, in open areas or where otherwise not protected by concrete slab or structures. Top of concrete cover shall be colored red. Nonmetallic conduit shall be permitted only as required by the Specifications and in concealed locations as described above.

3. Where a run of concealed PVC conduit becomes exposed, a transition to rigid steel conduit is required. Such transition shall be accomplished by means of a factory elbow or a minimum 3-foot length of rigid steel conduit, either terminating at the exposed concrete surface with a flush coupling. Piercing of concrete walls by nonmetallic runs shall be accomplished by means of a short steel nipple terminating with flush couplings.
4. Flexible conduit shall be used at dry locations for the connection of equipment such as motors, transformers, instruments, valves, or pressure switches subject to vibration or movement during normal operation or servicing. Flexible conduit may be used in lengths required for the connection of recessed lighting fixtures; otherwise the maximum length of flexible conduit shall be 18 inches.
5. In other than dry locations, connections shall be made using flexible liquid-tight conduit. Equipment subject to vibration or movement which is normally provided with wiring leads, such as solenoid valves, shall be installed with a cast junction box for the make-up of connections. Flexible conduits shall be as manufactured by American Brass, Cablec, Electroflex, or equal.
6. Conduit penetrations on walls and concrete structures shall be performed in accordance with the following:
  - a. Seal all raceways entering structures at the first box or outlet with oakum or suitable plastic expandable compound to prevent the entrance into the structure of gases, liquids, or rodents.
  - b. Dry pack with nonshrink grout around raceways that penetrate concrete walls, floors, or ceilings aboveground, or use one of the methods indicated for underground penetrations.
  - c. Where an underground conduit enters a structure through a concrete roof or a membrane waterproofed wall or floor, provide an acceptable, malleable iron, watertight, entrance sealing device. When there is no raceway concrete encasement, provide such device having a gland type sealing assembly at each end with pressure bushings which may be tightened at any time. When there is raceway concrete encasement indicated, provide such a device with a gland type sealing assembly on the accessible side. Securely anchor all such devices into the masonry construction with one or more integral flanges. Secure membrane waterproofing to such devices in a permanently watertight manner.
  - d. Where an underground raceway without concrete encasement enters a structure through a non-waterproofed wall or floor, install a sleeve made of Schedule 40 galvanized pipe. Fill the space between the conduit and sleeve with a suitable plastic expandable compound, or an oakum and lead joint, on each side of the wall or floor in such a manner as to prevent

entrance of moisture. A watertight entrance sealing device may be used in lieu of the sleeve.

### 3.04 WIRES AND CABLES

#### A. General: Conductors shall not be pulled into raceway until:

1. Raceway system has been inspected and accepted by the Engineer.
2. Plastering and concrete have been completed in affected areas.
3. Raceway system has been freed of moisture and debris.

#### B. Wire and Cables:

1. Conductors of No. 1 size and smaller shall be hand pulled. Larger conductors may be installed using power winches. Pulling tensions on the cables shall be within the limits recommended by the cable manufacturer. Wire pulling lubricant, where needed, shall be UL approved.
2. Wire in panels, cabinets, and gutters shall be neatly grouped using nylon tie straps, and shall be fanned out to terminals.

#### C. Splices and Terminations:

1. The Contractor shall provide, install, and terminate the conductors required for power and controls to electrical equipment and to interconnect incoming annunciator, instrumentation terminal cabinets, and control and instrumentation equipment except where indicated elsewhere. There shall be no cable splices in underground manhole or pullboxes unless otherwise indicated.
2. All 120/208-V and 480-V branch circuit conductors may be spliced in suitable fittings at locations determined by the Contractor.
3. Solid conductors shall be terminated at equipment terminal screws with proper care that conductor is tightly wound around screw and does not protrude beyond screw head. Stranded conductors shall be terminated directly on equipment box lugs making sure that all conductor strands are confined within lug. Use forked-tongue lugs where equipment box lugs have not been provided.
4. Splices in 600-V wire which are not pre-insulated shall be insulated with three layers of tape each half lapped except that splices in below grade pull boxes or in any box subject to flooding shall be made watertight using an epoxy resin splicing kit or other approved means.
5. Splices to motor leads in motor terminal boxes shall be wrapped with mastic material to form a mold and then shall be taped with a minimum of two layers of varnished cambric tape overlapped with a minimum of two layers of high temperature tape.

6. Control devices, such as solenoid operated valves, that are normally supplied with conductor pigtails, shall be terminated per manufacturer recommendation.
- D. Cable Assembly and Testing: Cable assembly and testing shall comply with applicable requirements ICEA Publication No. S-68-516 and other relevant ICEA publications. Factory test results shall be submitted in accordance with Section 01300 - Submittals, prior to shipment of cable. The following tests shall be the minimum requirements:
1. High potential DC test shall be performed on all cables operating at more than 2000 V to ground.
  2. Insulation resistance shall be obtained and shall not be less than the value recommended by ICEA.
  3. All cables rated at 600 V shall be tested for insulation resistance between phases and from each Phase to a ground using a megohmmeter.
  4. All field testing mentioned above shall be done after cables are installed in the raceways.
  5. Field tests shall be performed by certified test organization acceptable to the cable manufacturer. Test results shall be submitted for review and acceptance.
  6. Cables failing in the said tests shall be replaced with a new cable or repaired. Such kind of repair methods shall be as recommended by the cable manufacturer and shall be performed by persons certified by the industry.
- E. Continuity Test: All control and instrumentation cables shall be tested for continuity, polarity, undesirable ground, and origination. Such tests shall be performed prior to placing all cables in service.

### 3.05 PULL AND JUNCTION BOXES

- A. Sizing: Pull and junction boxes shall be sized in accordance with the requirements of the NEC.
- B. Outlet Boxes: Outlet boxes shall be used as junction boxes wherever possible. Where separate pullboxes are required, they shall have screw covers.
- C. Requirements: Pullboxes shall be installed when conduit run contains more than three 90-degree bends and runs exceed 200 feet.

### 3.06 CABLE AND EQUIPMENT IDENTIFICATION

- A. General: The completed electrical installation shall be provided with adequate identification to facilitate proper control of circuits and equipment and to reduce maintenance effort.

- B. Cable: Assign each control and instrumentation wire and cable a unique identification number. Said numbers shall be assigned to all conductors having common terminals and shall be shown on all shop drawings. Identification numbers shall appear within 3 inches of conductor terminals. "Control" shall be defined as any conductor used for alarm, annunciator, or signal purposes:
1. Multiconductor cable shall be assigned a number which shall be attached to the cable at intermediate pull boxes and at stub-up locations beneath free-standing equipment. It is expected that the cable number shall form a part of the individual wire number. All individual control conductors and instrumentation cable shall be identified at pull points as described above. The instrumentation cable numbers shall incorporate the loop numbers indicated on the Drawings.
  2. All 120/208-V system feeder cables and branch circuit conductors shall be color coded as follows: Phase A-black, Phase B-red, Phase C-blue, and Neutral-white. The 480/277-V system conductors shall be color coded as follows: Phase A-brown, Phase B-orange, Phase C-yellow, and Neutral-gray. Color coding tape shall be used where colored insulation is not available. Branch circuit switch shall be yellow. Insulated ground wire shall be green, and neutral shall be gray. Color coding and phasing shall be consistent throughout the site, but bars at panelboards, switchboards, and motor control centers shall be connected Phase A-B-C, top to bottom, or left to right, facing connecting lugs.
  3. PLC ac control cables shall be blue.
  4. All spare cables shall be terminated on terminal screws and shall be identified with a unique number as well as with destination.
  5. Terminal strips shall be identified by imprinted, varnished, marker strips attached under the terminal strip.
- C. Equipment: Equipment and devices shall be identified as follows:
1. Nameplates shall be provided for all panelboards, panels, starters, switches, and pushbutton stations. In addition to the name plates shown, control devices shall be equipped with standard collar-type legend plates.
  2. Control devices within enclosures shall be identified similar to the paragraph above.
  3. Three-phase receptacles shall be consistent with respect to phase connection of receptacle terminals. Errors in phasing shall be corrected at the bus, not at the receptacle.
  4. Toggle switches which control loads out of sight of switch, and all multiswitch locations of more than two switches, shall have suitable inscribed finish plates.

5. Empty conduits shall be tagged at both ends to indicate the destination at the far end. Where it is not possible to tag the conduit, destination shall be identified by marking an adjacent surface.
6. Provide typewritten circuit directories for panelboards; circuit directory shall accurately reflect the outlets connected to each circuit.
7. Install identification tape directly above buried unprotected raceway; install tape 8 inches below grade and parallel with raceway to be protected. Identification tape is required for all buried raceway not under buildings or equipment pads except identification tape is not required for protection of street lighting raceway.

END OF SECTION



## SECTION 16080 - ACCEPTANCE TESTING

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Includes:
  - 1. Basic requirements for acceptance testing.
- B. Related Sections include but are not necessarily limited to:
  - 1. Division 1 - General Requirements.
  - 2. Section 16050 – Basic Electrical Materials and Methods.

#### 1.02 QUALITY ASSURANCE

- A. Referenced Standards:
  - 1. International Electrical Testing Association (NETA):
    - a. ATS, Acceptance Testing Specifications for Electric Power Distribution Equipment and Systems.
  - 2. National Institute for Certification in Engineering Technologies (NICET).
  - 3. National Institute of Standards and Technology (NIST).
  - 4. Nationally Recognized Testing Laboratory (NRTL).

#### 1.03 SYSTEM DESCRIPTION

- A. The purpose of field acceptance testing is to verify equipment and system integrity and operation after manufacture, shipping and installation.
  - 1. All equipment included in Division 16 shall receive all routine factory tests required by the applicable industry standards or Nationally Recognized Testing Laboratory (NRTL) and certification of these tests shall be submitted concurrent with shipment to the job site.
  - 2. However, factory testing will not be accepted in lieu of the field acceptance testing requirements specified in this Section.
- B. Test the following:
  - 1. Test all electrical equipment on the project.
  - 2. The following identifies the specific equipment to be tested:
    - a. Step down dry type transformers.
    - b. Low voltage cable:
      - (1) All feeders.
    - c. Grounding and ground fault protection.

- d. Motors and motor controls.
  - e. Functional tests.
- C. Tests and inspections not specifically listed, but required to insure that the equipment is safe to energize and ready for commercial operation, shall be performed.

#### 1.04 SUBMITTALS

- A. See Division 1 for requirements for the mechanics and administration of the submittal process.
- B. Submit prior to energizing equipment:
  - 1. Photocopies of field test reports for all applicable pre-energization tests including over-potential, insulation resistance, contact resistance, ratio and excitation, protective device and continuity tests.
- C. Submit within two (2) weeks of the completion of acceptance testing:
  - 1. Final test report signed by the engineering technician including the following information:
    - a. Summary of Project.
    - b. Description of equipment/components tested.
      - (1) Identify equipment by tag numbers and circuit numbers shown on the Drawings.
      - (2) Individual units of switchgear and switchboards shall be identified by manufacturer's section number as shown on Shop Drawings.
    - c. Date and time of each test.
    - d. Visual inspection report.
    - e. Description of tests.
    - f. Test results recorded legibly or typewritten on appropriate test forms.
      - (1) Include acceptance criteria, acceptable range of values or other basis for pass/fail decision.
      - (2) Include "as found" and "as left" results and identify all adjustments or corrections made during testing.
    - g. Conclusions and recommendations.

#### PART 2 - PRODUCTS - (NOT APPLICABLE)

## PART 3 - EXECUTION

### 3.01 GENERAL REQUIREMENTS

#### A. Scope:

1. Complete visual inspection, mechanical and electrical operational tests and electrical acceptance tests shall be performed in accordance with NETA ATS.
2. The following paragraphs identify the scope of testing for each item to be tested.
  - a. All required tests per NETA shall be performed.
  - b. Tests identified by NETA ATS as optional shall be performed when listed below.
  - c. Additional tests not required by NETA ATS are also listed when required.
3. Perform and report all tests recommended or required by the equipment manufacturer's installation, operation and maintenance instructions, even if not included in NETA ATS or listed below.
4. Repairs shall be made when test values do not meet known acceptable values.
  - a. Test report shall clearly indicate "as found" and "as left" values, the cause of the unacceptable values, and the details of the corrective action taken to obtain acceptable results.

#### B. Sequencing and Scheduling:

1. Testing shall be performed only after completion of installation of systems and equipment unless the nature of the test requires an exception.
  - a. Do not test partial systems unless specified.
2. Schedule all tests intended to determine fitness for energizing to occur immediately prior to first energizing of equipment.
3. Equipment and systems shall not be energized or placed into service until testing is complete and all unacceptable results have been resolved.
  - a. Except tests that, by their nature, require the equipment in an energized or operational state, such as synchronism-check.

#### C. Testing personnel shall have the following system and equipment reference data on site during all testing:

1. Approved Shop Drawings for the Project to include at a minimum:
  - a. Single line diagrams.
  - b. Three-line diagrams.
  - c. Cable schedules.
2. Manufacturers approved Shop Drawings for motor control centers and other major equipment items.
3. Manufacturer's instruction manuals for all equipment.
4. A copy of this Specification Section.

5. Manufacturer's instruction manuals for all test instruments.
6. NETA ATS.

### 3.02 ACCEPTANCE TESTING

#### A. Grounding:

1. Perform inspections and tests per NETA ATS 7.13.
2. Components: Test all components per applicable paragraphs of this Specification and NETA ATS.

#### B. Motors:

1. Perform inspections and tests per NETA ATS 7.15.1.
2. Components: Test all components per applicable paragraphs of this Specification and NETA ATS.

#### C. Motor Controllers:

1. Perform inspections and tests per NETA ATS 7.16.
2. Components: Test all components per applicable paragraphs of this Specification and NETA ATS.

#### D. Control System Functional Test:

1. Perform test upon completion of equipment acceptance tests.
2. The test is to prove the correct interaction of all sensing, processing and action devices.
3. Develop a test plan and parameters for the purpose of evaluating the performance of the system.
4. Perform the following tests:
  - a. Verify the correct operation of all interlock safety devices for fail-safe functions in addition to design function.
  - b. Verify the correct operation of all sensing devices, alarms and indicating devices.
5. Systems to be tested: PLC I/O and local control system panels.

END OF SECTION

## SECTION 17010 - INSTRUMENTATION AND CONTROLS – GENERAL REQUIREMENTS

### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

##### A. Work Included:

1. Provide all tools, equipment, materials, and supplies and be responsible for all labor required to complete the installation, startup and operational testing of a complete and operable Instrumentation and Control (I&C) System as indicated on the Drawings and as specified herein.
2. PLC programming and central SCADA programming will be done by the Owner (District).
3. Contractor is to coordinate with District when programs are required for testing. District needs a minimum of five weeks' notice prior to test date. Contractor will be held responsible for any delay in project timeline due to failure to properly coordinate with District. When field testing and troubleshooting during startup Contractor is to have Instrument Tech dedicated to support District Programmer at all times the District Programmer is onsite related to the work.
3. Provide all the necessary equipment components and interconnections along with the services of manufacturers' engineering representatives necessary to ensure that the Owner receives a completely integrated and operational I&C system as herein specified.
4. Provide all terminations for wiring at field mounted instruments, equipment enclosures, alarm, and status contacts.
5. Provide all Instrumentation and Control wire required for a fully functioning Instrumentation and Controls System as shown on the Drawings except for wire specifically specified in Division 16.

##### B. Work Specified in Other Divisions:

1. Instruments and controls which are not directly used for process control, i.e., those provided as part of a package system, such as the pumping skids, etc. as specified in Divisions 11, 13, 14, 15, or 16.
2. Division 16 work, including all instrumentation and controls conduit, and only that wire specified in Division 16. Refer to Division 16 Specifications for specific requirements for wire, conduit, grounding, and other electrical equipment.

#### 1.02 REFERENCE STANDARDS

##### A. American National Standard Institute (ANSI) Publications:

1. Y14.15a Drafting Practice
2. C62.1 Surge Arrestors

##### B. Instrumentation Society of America (ISA) Publications:

1. S5.4 Instrument Loop Diagrams

2. S20 Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves

### 1.03 RESPONSIBILITIES

- A. The CONTRACTOR through the use of an Instrumentation Supplier shall be responsible to the OWNER for the implementation of the Control System, with other required electrical, instrumentation, and control devices.
- B. Due to the complexities associated with the interfacing of numerous control system devices, it is the intent of these specifications that the Instrumentation Supplier be responsible to the CONTRACTOR for the integration of the SCADA system with devices provided under other sections with the objective of providing a completely integrated control system free of signal incompatibilities.
- C. Provide all engineering, documentation, labor, and materials required to resolve signal, power, or functional incompatibilities between the control and instrumentation system and interfacing devices. This includes all interfaces to existing instruments and equipment.
- D. As a minimum, the Instrumentation Supplier shall perform the following work:
  1. Prepare analog and digital hardware submittals
  2. Procure hardware
  3. Perform bench calibration and verify calibration after installation
  4. Oversee and certify installation
  5. Conduct the performance test
  6. Prepare record drawings
- E. Integration of the SCADA system with instrumentation and control devices being provided under other sections:
  1. Resolve signal, power, or functional incompatibilities between the SCADA system and interfacing devices.
- F. Any Instrumentation Supplier responsibilities in addition to the list above are at the discretion of the CONTRACTOR and the Instrumentation Supplier. Additional requirements in this Section and throughout Division 17 that are stated to be the CONTRACTOR'S responsibility may be performed by a qualified Instrumentation Supplier if the CONTRACTOR and Instrumentation Supplier so agree.

### 1.04 NOT USED

### 1.05 NOT USED

### 1.06 QUALITY ASSURANCE

- A. Standard of Quality: The Contractor shall provide equipment of the types and sizes specified which has been demonstrated to operate successfully. Provide equipment which is new and of recent proven design.

## 1.07 DRAWINGS

- A. Drawings: The Instrumentation Drawings are diagrammatic; exact locations of instrumentation products shall be determined in the field. Except where special details are used to illustrate the method of installation of a particular piece or type of equipment or material, the requirements or descriptions in this Specification shall take precedence in the event of conflict.
1. Locations of equipment, inserts, anchors, motors, panels, pull boxes, manholes, conduits, stub-ups, fittings, power and convenience outlets, and ground wells are approximate unless dimensioned; verify locations prior to installation. Field verify scaled dimensions on Drawings.
  2. Review the Drawings and Specification Divisions of other trades and perform the instrumentation work that will be required for the installations.
  3. Should there be a need to deviate from the Instrumentation Drawings and Specifications, submit written details and reasons for all changes to the Engineer for favorable review.

## 1.08 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Box, crate, or otherwise enclose and protect instruments and equipment during shipment, handling, and storage. Keep all equipment dry and covered from exposure to weather, moisture, corrosive liquids and gases or any element that could degrade the equipment. Protect painted surfaces against impact, abrasion, discoloration, and other damage. Notify the Engineer in writing in the event that any equipment or material is damaged. Obtain prior favorable review by the Engineer before making repairs to damaged products.

## 1.09 TESTING

- A. Thirty-Day Acceptance Test: After the Field Functional Test has been completed, the Control System shall undergo a 30-day acceptance test. The acceptance test will begin and end in different months. The System shall run continuously for 30 consecutive days. During this period, all Control System functions shall be exercised. Any System interruption and accompanying component, or subsystem failure shall be logged for the cause, time of occurrence and duration of each failure. A failure shall cause termination of the 30-day acceptance test. When the cause of a failure has been corrected, a new 30-day acceptance test shall be started.
- B. Each time the CONTRACTOR's technician is required to respond to a Control System malfunction, a report shall be prepared which includes details on the nature of the complaint or malfunction and the resulting repair action required and taken.

## 1.10 WARRANTY REQUIREMENTS

- A. Correction of Defects: The CONTRACTOR shall correct all defects in the Control System upon notification from the Owner for a period of one year from the date of Acceptance Test Completion. Mechanical corrections shall be completed within 5 days of notification.

## PART 2 – PRODUCTS

### 2.01 MATERIALS AND STANDARD SPECIFICATIONS

- A. Provide instruments, equipment and materials suitable for service conditions and meeting standard specifications such as ANSI, ASTM, ISA, and SAMA. The intent of this Specification is to insure instruments and equipment are of a uniform quality and manufacture throughout the plant. All instruments in the plant of the same type shall be made by the same manufacturer.

### 2.02 NAMEPLATES

- A. For each piece of equipment, provide a manufacturer's nameplate showing their name, location, the pertinent ratings and the model designation.
- B. Identify each piece of equipment and related controls with a rigid laminated engraved phenolic nameplate. Engrave nameplates with the inscriptions indicated on the Drawings and, if not so indicated, with the equipment name. Securely fasten nameplates in place using two stainless steel screws or, where favorably reviewed by the Engineer, with epoxy cement. Where no inscription is indicated on the Drawings, furnish nameplates with an appropriate inscription furnished by the Engineer upon prior request by the Contractor.
- C. Each control device, including pushbuttons, control switches, and indicating lights, shall have an integral legend plate or nameplate indicating the device function. These shall be inscribed as indicated on the Drawings or as favorably reviewed by the Engineer.
- D. Provide CAUTION or SAFETY nameplates to alert operators of special conditions that may result in faulty equipment operations. Devices containing batteries that must be replaced periodically must be clearly identified. Nameplates are not required if the device senses and displays a low battery warning.

### 2.03 NAME TAGS

- A. All instrumentation and equipment items or systems shall be identified by name tags. Field equipment shall be tagged with the assigned instrumentation tag number listed in the Instrument Schedule.
- B. Name tags shall be stainless steel with engraved or stamped black characters of 3/16-inch minimum height. Tags shall be attached to equipment with a tag holder and stainless steel band with a worm screw clamping device. Use 20-gauge stainless steel wire where banding is impractical. For field panels or large equipment cases use stainless steel screws; however, such permanent attachment shall not be on an ordinarily replaceable part.

### 2.04 FIELD-MOUNTED EQUIPMENT

- A. All instrument and control equipment mounted outside of protective structures shall be equipped with suitable surge arresting devices to protect the equipment from damage due to electrical transients induced in the interconnecting lines from lightning discharges or nearby electrical devices. Protective devices used on 120 VAC inputs to field



mounted equipment shall be secondary valve surge protectors conforming to the requirements of ANSI C62.1.

## 2.05 EQUIPMENT OPERATING CONDITIONS

- A. All equipment shall be rated for normal operating performance with varying operating conditions over the following minimum ranges:
  - 1. Electrical Power: 120 VAC  $\pm$ 10%, 60 Hz, unregulated, except where specifically stated otherwise on the Drawings or in the Specifications, or when two-wire, loop-powered devices are specified.
  - 2. Field Instruments:
    - a. Outdoor Areas:  
Ambient Temperature: +15°F to +120°F  
Ambient Relative Humidity: 5% to 100%  
Weather: Rain, and ice
    - b. Indoor Unheated Areas:  
Ambient Temperature: +40°F to +120°F  
Ambient Relative Humidity: 5% to 95%, non-condensing
    - c. Indoor Environmentally Controlled Areas:  
Ambient Temperature: +60°F to +104°F  
Ambient Relative Humidity: 10% to 90%, non-condensing

## 2.06 EQUIPMENT LOCATIONS

- A. Provide equipment and materials suitable for the types of locations in which they are located as defined under Division 16. All equipment specified for field mounting shall be weatherproof and splash proof as a minimum. If electrical or electronic components are contained within the equipment, they shall be housed in NEMA 4X gasketed cases unless noted otherwise on the Drawings.

## 2.07 CURRENT TECHNOLOGY

- A. All meters, instruments, and other components shall be the most recent field-proven models marketed by their manufacturers at the time of submittal of the shop drawings unless otherwise required to match existing equipment.

## 2.08 LOOP ACCURACY

- A. The accuracy of each instrumentation system or loop shall be determined as a probable maximum error; this shall be the square-root of the sum of the squares of certified "accuracies" of the designated components in each system, expressed as a percentage of the actual span or value of the measured variable. Each individual instrument shall have a minimum accuracy of plus and minus 0.5 percent of full scale and a minimum repeatability of plus and minus 0.25 percent of full scale unless otherwise indicated. Instruments which do not conform to or improve upon these criteria are not acceptable.

## 2.09 SIGNAL ISOLATORS, CONVERTORS, AND CONDITIONERS

- A. Ensure that input-out signals of all instruments and control devices are compatible. Provide signal isolators and converters as necessary to obtain the required system performance. Mount the devices in the field at point of application. Provide items as manufactured by AGM Electronics, Action Instruments, or equal.

## 2.10 ANALOG SIGNAL INDICATED UNITS

- A. For all instruments with local or remote indicators, provide indicators scaled in actual engineering units, i.e., gallons per minute, feet, psi, etc., rather than 0 to 100%, unless noted otherwise on the Drawings or Instrument Schedule.

## 2.11 SIGNAL TRANSMISSION

- A. Analog:
  - 1. Signal transmission between electric or electronic instruments shall be 4-20 mA and shall operate at 24 VDC. Signal output from all transmitters and controllers shall be current regulated and shall not be affected by changes in load resistance within the unit's rating.
  - 2. Nonstandard transmission systems such as impulse duration, pulse rate, and voltage regulated will not be permitted except where specifically noted in the Instrument Schedule or shown on the Drawings. When transmitters with nonstandard outputs do occur, their output shall be converted to 4-20 mA prior to transmission.
- B. Discrete: All alarm and status signals shall be 120 VAC unless specified otherwise on the Instrument Schedule.

## 2.12 NOT USED

## 2.13 FASTENERS

- A. Fasteners for securing equipment to walls, floors and the like shall be 316 stainless steel. When fastening to existing walls, floors, and the like, provide capsule anchors, not expansion shields. Size capsule anchors to meet load requirements. Minimum size capsule anchor bolt is 3/8-inch.

## 2.14 INSTRUMENT CALIBRATION

- A. Submit a written report to the Engineer on each instrument. This report shall include a laboratory calibration sheet or the manufacturer's standards calibration sheet on each instrument and calibration reading as finally adjusted within tolerances.
- B. The Contractor may, at his option, choose to perform calibration on an instrument by acquiring the services of an independent test lab, or by obtaining the required test instruments and performing the calibration.

# PART 3 - EXECUTION

## 3.01 MOUNTINGS

- A. Mount and install equipment as indicated. Mount field instruments on pipe mounts or other similar means in accordance with suppliers' recommendation. Where mounted in control panels, mount according to requirements of that section.
- B. Equipment specified for field mounting shall be suitable for direct pipe mounting or surface mounting, surface-mounted indicators and equipment with calibration adjustments or requiring periodic inspection shall be mounted not lower than 3 feet-6 inches nor higher than 6 feet above walkways, platforms, catwalks, and the like.
- C. Note that applicable specifications require detail drawings showing seismic sway bracing design and anchorage requirements for their equipment. Seismic zone requirements are specified in Division 1.
- D. All devices shall be accessible to operators for servicing, operating, reading, etc. Provide permanent platforms to assure devices are continuously accessible.

### 3.02 SIGNAL GROUNDING

- A. Proper grounding of equipment and systems in this Division is critical, since computer and associated networks and peripherals are involved. The Drawings and Division 16, Section 16050, specify safety grounding for all equipment in this Division.
- B. A single-point grounding system for instrument signals is required for all instrument panels. This instrument single point grounding system does not use building steel or conduit systems for its ground path.
  - 1. Ground all signal shields, signal grounds, and power supplies at an isolated signal bus within each instrument panel, rack, or enclosure. The shields at the far ends of these signal cables must be disconnected (floated) from any ground to prevent ground loops.
  - 2. Do not connect the rack or enclosure frames to the signal grounding buses.
  - 3. Connect each isolated signal ground bus within each panel using a stranded, insulated copper wire of size 6 AWG or larger directly to a system ground rod installed per the Drawings.

### 3.03 CALIBRATION

- A. General: All devices provided under Division 17 shall be calibrated according to the manufacturer's recommended procedures to verify operational readiness and ability to meet the indicated functional and tolerance requirements.
- B. Bench Calibration: Instruments which have been bench-calibrated shall be examined in the field to determine whether any of the calibrations are in need of adjustment. Such adjustments, if required, shall be made only after consultation with the ENGINEER.
- C. Field Calibration: Instruments which were not bench-calibrated shall be calibrated in the field to insure proper operation in accordance with the instrument loop diagrams or specification data sheets.

- D. Calibration Sheets: Each instrument calibration sheet shall provide the following information and a space for sign-off on individual items and on the completed unit:
1. Project name
  2. Loop number
  3. Tag number
  4. Manufacturer
  5. Model number
  6. Serial number
  7. Calibration range
  8. Calibration data: Input, output, and error at 10 percent, 50 percent, and 90 percent of span
  9. Switch setting, contact action, and deadband for discrete elements
  10. Space for comments
  11. Space for sign-off by Instrumentation Supplier and date
  12. Test equipment used and associated serial numbers

#### 3.04 LOOP TESTING

- A. Instrument and Instrument Component Validation: Each instrument shall be field tested, inspected, and adjusted to its indicated performance requirement in accordance to its Manufacturer's specifications and instructions. Any instrument which fails to meet any Contract requirement, or, in the absence of a Contract requirement, any published manufacturer performance specification for functional and operational parameters, shall be repaired or replaced.
- B. Loop Validation: Controllers and electronic function modules shall be field tested and exercised to demonstrate correct operation. All control loops shall be checked under simulated operating conditions by impressing input signals at the primary control elements and observing appropriate responses of the respective control and monitoring elements, final control elements, and the graphic displays associated with the PLC. Actual signals shall be used whenever available.
- C. Loop Certification: When installation tests have been successfully completed for all individual instruments and all separate analog control networks, a certified copy of all test forms shall be retained by the CONTRACTOR.

#### 3.05 FIELD FUNCTIONAL TESTING

- A. General: Field functional testing shall commence after acceptance of all wire test, calibration tests and loop tests, and all inspections have demonstrated that the instrumentation and control system complies with all Contract requirements. Field functional testing shall demonstrate proper operation of all systems with process equipment operating over full operation ranges under conditions as closely resembling actual operation conditions as possible.
- B. Operational Validation: Where feasible, system field functional testing activities shall include the use of water to establish service conditions that simulate, to the greatest extent possible, normal final control element operation conditions in terms of applied process loads, operation ranges, and environmental conditions. Final control elements, control panels, and ancillary equipment shall be tested under start-up and steady-state

operation conditions to verify that proper and stable control is achieved using motor control center and local field mounted control circuits. All hardwired and software control circuit interlocks and alarms shall be operational. The control of final control element and ancillary equipment shall be tested using both manual and automatic (where provided) control circuits. The stable steady-state operation of final control elements running under the control of field mounted controllers as required eliminating oscillatory final control element operation. The transient stability of final control elements operation under the control of field mounted, and software based automatic analog controllers shall be verified by applying control signal disturbances, monitoring the amplitude and decay rate of control parameter oscillations (if any) and making necessary controller adjustments as required to eliminate excessive oscillatory amplitudes and decay rates.

- C. Loop Tuning: All electronic control stations incorporating proportional, integral or differential control circuits shall be optimally tuned, experimentally, by applying control signal disturbances and adjusting the gain, reset, or rate settings as required to achieve a proper response. Measured final control element variable position/speed setpoint settings shall be compared to measured final control element position/speed values at 0, 25, 50, 75, and 100 % of span and the results checked against indicated accuracy tolerances.
- D. Field Functional Test Validation Sheets: Field functional testing shall be documented on one of two types of test forms as follows:
  - 1. For functions which can be demonstrated on a loop-by-loop basis, the form shall include:
    - a. Project name
    - b. Loop number
    - c. Loop description
    - d. Tag number, description, manufacturer and data sheet number for each component.
    - e. Space for sign-off and date by both the Instrumentation Supplier and ENGINEER.
  - 2. For functions which cannot be demonstrated on a loop-by-loop basis, the test form be a listing of the specific tests to be conducted. With each test description the following information shall be included:
    - a. Specification page and paragraph of function demonstrated
    - b. Description of function
    - c. Space for sign-off and date by both the Instrumentation Supplier and ENGINEER.
- F. Field Functional Test Certification: The CONTRACTOR shall submit instrumentation and control system field functional test completion report which shall state that all Contract requirements have been met and shall include a listing of all instrumentation and control system maintenance and repair activities conducted during the field functional testing. Acceptance of the instrumentation and control system field functional testing must be provided in writing by the ENGINEER before the acceptance testing may begin. Final acceptance of the control system shall be based upon plant completion as stated in the General Conditions.

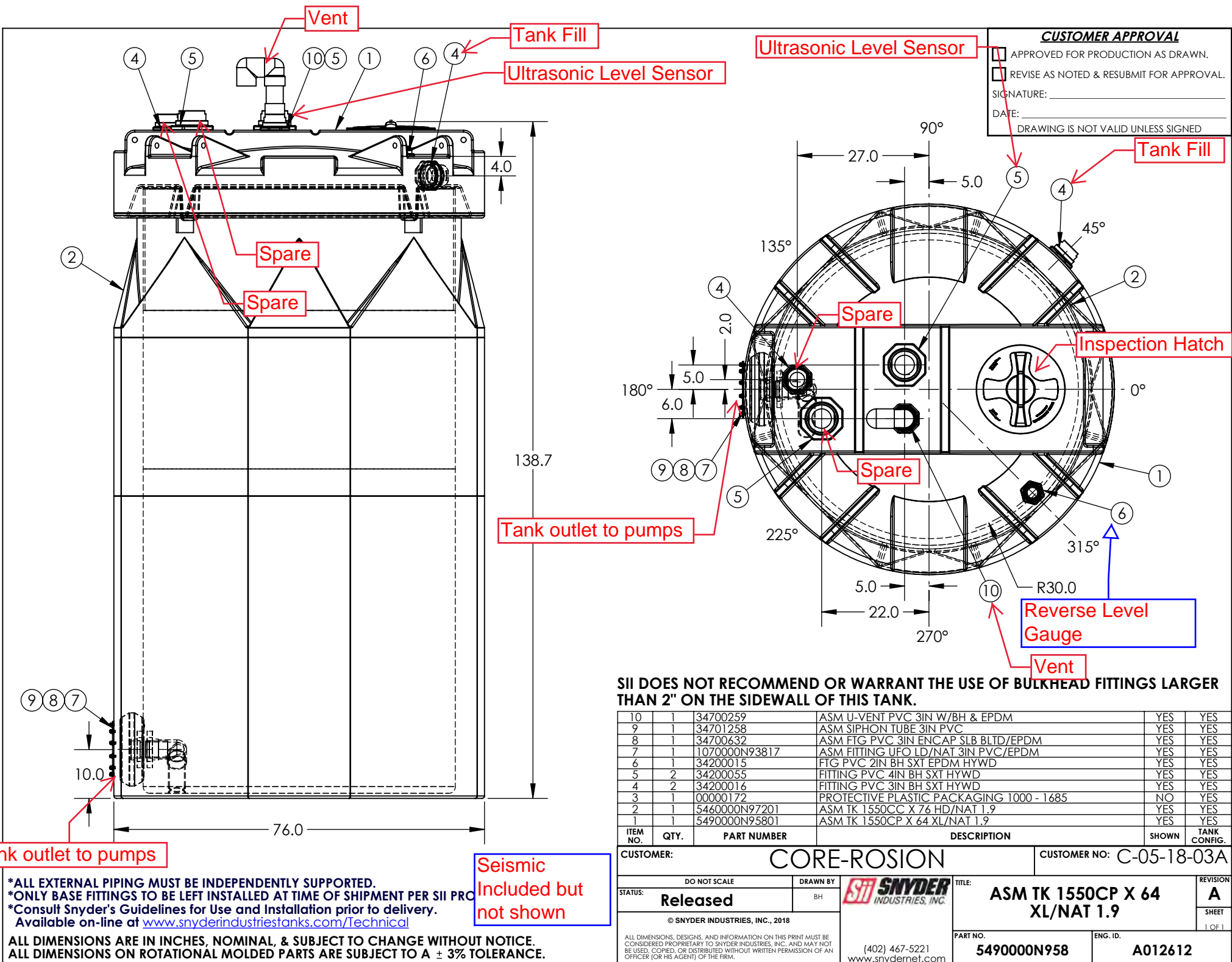
END OF SECTION

# Appendix A

The following information is provided solely for the convenience of the bidder/Contractor. The bidder/Contractor shall procure and conform to the requirements of the latest standards, drawings, permits, or data from the governing jurisdictional agency that are relevant to the Work specified in the Contract Documents.

(BLANK)





# Appendix B

The following information is provided solely for the convenience of the bidder/Contractor. The bidder/Contractor shall procure and conform to the requirements of the latest standards, drawings, permits, or data from the governing jurisdictional agency that are relevant to the Work specified in the Contract Documents.

(BLANK)

**B.A. SIMS ENGINEERING, INC.**  
5150 E. PACIFIC COAST HWY  
SUITE 200  
LONG BEACH, CA 90804  
(562) 735-4955  
www.basims.com

STRUCTURAL CALCULATIONS  
FOR TANK ANCHORAGE  
PROJECT: Olivenhain Municipal Water  
District  
19090 Via Ambiente Road  
Encinitas, CA 92029  
CLIENT: Core-Rosion

18226.xmcd  
5/9/2018

#### TERMS AND CONDITIONS / LIMITATION OF LIABILITY:

B.A. Sims Engineering, Inc., was engaged to provide structural calculations for the above project.

By making use of this document and the associated plans, the CLIENT (CORE-ROSION) hereby acknowledges and agrees to the following terms and conditions:

- 1) CLIENT binds himself, his partners, his agents, and his contractors to this agreement in respect to all of the terms and conditions herein.
- 2) ENGINEER has no authority insofar as the CLIENT's or OWNER's personnel are concerned. OWNER and CLIENT are admonished to observe all applicable safety regulations for the protection of personnel.
- 3) OWNER and CLIENT shall defend, indemnify and hold harmless ENGINEER from all costs of litigation that may arise out of alleged damages or injuries associated with the execution of the work defined by this agreement, including attorney's fees and judgments, unless it is proven in a court of law that said injuries or damages resulted directly from negligent errors or omissions in the work prepared by the ENGINEER.
- 4) The ENGINEER does not issue any warranties or guarantees and is not responsible for the completion or quality of performance of the contracts by any CLIENT, contractor, the OWNER, or other 3rd parties.

End of Terms and Conditions.

#### Design criteria:

- 1) 2016 California Building Code / ASCE 7-10.
- 2) AISC Manual of Steel Construction.
- 3) ACI 318-14: Building Code Requirements for Structural Concrete.

#### Definition of Units:

$$k := 1000 \cdot lb \quad ksi := \frac{k}{in^2} \quad pcf := \frac{lb}{ft^3} \quad psf := \frac{lb}{ft^2} \quad plf := \frac{lb}{ft} \quad psi := \frac{lb}{in^2} \quad sf := ft^2 \quad ftk := ft \cdot k \quad ksf := \frac{k}{ft^2} \quad ea := l$$

The following tank anchorage design is valid only for the client and project listed.

Calculations are on the following pages. Tank design by others.

Foundation design by others.

**Tank Anchorage Summary:** (1) 1550 Gallon Tank, Snyder ASM TK 1550CP X 64

#### **Restraint clips:**

- (3) L6x4x1/2 x 0'-6" stainless steel angle clips per tank (L6-6 clips or similar).

#### **Anchors:**

- (2) 5/8" dia. Hilti HAS-R 316 SS anchor rods with Hilti HIT-RE 500 V3 epoxy adhesive per restraint clip (6 anchors per tank).
- Anchors shall be 316 stainless steel.
- Anchors shall have 7" min. embedment and 3.5" c.c. spacing per clip.
- Anchors shall have 12" min. edge distance to edge of concrete.
- Concrete shall be 12" thk. min. and have compressive strength of 3000 psi min.
- Install anchors per ICC report ESR-3814. Deputy inspection required.

#### **Cables:**

- (1) 1/4" dia. 7x19 stainless steel cable per restraint clip, attached to one eye nut/anchor at each restraint clip (3 cables per tank).
- Provide thimble and (2) cable clips per cable.

#### **Eye nuts:**

- (1) stainless steel eye nut (for 5/8" dia. anchor) per restraint clip. One eye nut attached to one anchor at each restraint clip (3 eye nuts per tank).
- Eye nut shall have min. 3500 lb rating.



5/9/18



**B.A. SIMS ENGINEERING, INC.**  
5150 E. PACIFIC COAST HWY  
SUITE 200  
LONG BEACH, CA 90804  
(562) 735-4955  
www.basims.com

STRUCTURAL CALCULATIONS  
FOR TANK ANCHORAGE  
PROJECT: Olivenhain Municipal Water  
District  
19090 Via Ambiente Road  
Encinitas, CA 92029  
CLIENT: Core-Rosion

18226.xmcd  
5/9/2018

### Seismic Parameters:

Risk category III, per IBC Table 1604.5  
Site Class D

$S_s := 0.969$        $S_{DS} := 0.719$       per USGS Design Maps  
 $S_1 := 0.379$        $S_{D1} := 0.415$       Summary Report attached

Seismic Design Category D      per ASCE 7-10 Tables 11.6-1 and 11.6-2

Redundancy factor:  $\rho := 1$       per ASCE 7-10 12.3.4.1 and 15.6

Seismic Importance factor:  $I_e := 1.25$       per ASCE 7-10 Table 1.5-2 and 15.4.1.1

Tank: Snyder ASM TK 1550CP X 64

### Product Specifications:

- HDPE tank
- Refer to drawing A003550

### Dimensions and Weight:

Tank dimensions:  $H := 137 \cdot \text{in} = 11.42 \cdot \text{ft}$  (height)  
 $D := 76 \cdot \text{in} = 6.33 \cdot \text{ft}$  (diameter)

Weight: Empty tank:  $W_E := 2000 \cdot \text{lb} = 2 \cdot \text{k}$

Full tank:  $W_F := 1550 \cdot \text{gal} \cdot 1.24 \cdot 62.4 \cdot \text{pcf} + W_E = 18.03 \cdot \text{k}$  (contents + tank) (SG=1.24)

Seismic load: Per ASCE 7-10 15.7.6.

Seismic coefficients:  $R := 1.5$        $\Omega_0 := 1.5$       per ASCE 7-10 Table 15.4-2

$T_L := 4$       per ASCE 7-10 15.7.6.1 Note (d)

$T_S := \frac{S_{D1}}{S_{DS}} = 0.58$       per ASCE 7-10 11.4.5

### Full tank:

Fundamental period of tank:  $T_i := 0$  (for HDPE tank)

Base shear due to impulsive component:

$T_i = 0 < T_S = 0.58$ , therefore:  $S_{ai} := S_{DS} = 0.72$  {ASCE 7-10 Eq. 15.7-7}

$$\frac{D}{H} = 0.55 < 1.333, \text{ therefore: } W_i := \left(1.0 - 0.218 \cdot \frac{D}{H}\right) \cdot W_F = 15851.91 \text{ lb} \quad \{\text{API 650 Eq. E.6.1.1-2}\}$$

$$V_i := \frac{S_{ai} \cdot W_i}{\left(\frac{R}{I_e}\right)} = 9497.94 \text{ lb} \quad \{\text{ASCE 7-10 Eq. 15.7-5}\}$$

Natural period of the first (convective) mode of sloshing:

$$T_c := 2 \cdot \pi \cdot \sqrt{\frac{D}{3.68 \cdot g \cdot \tanh\left(\frac{3.68 \cdot H}{D}\right)}} \cdot \frac{1}{s} = 1.45 \quad \{\text{ASCE 7-10 Eq. 15.7-12}\}$$

Base shear due to convective component: Per ASCE 7-10 15.7.7 & API 650:

$$T_c = 1.45 \leq T_L = 4, \text{ therefore: } S_{ac} := \frac{1.5 \cdot S_{D1}}{T_c} = 0.43 < S_{DS} = 0.72 \quad \{\text{ASCE 7-10 Eq. 15.7-10}\}$$

$$W_c := 0.230 \cdot \frac{D}{H} \cdot \tanh\left(\frac{3.67 \cdot H}{D}\right) \cdot W_F = 2300.8 \text{ lb} \quad \{\text{API 650 Eq. E.6.1.1-3}\}$$

$$V_c := \frac{S_{ac} \cdot I_e}{1.5} \cdot W_c = 821.33 \text{ lb} \quad \{\text{ASCE 7-10 Eq. 15.7-6}\}$$

$$\text{Seismic base shear: } V_F := \sqrt{V_i^2 + V_c^2} = 9533.38 \text{ lb}$$

Empty tank:

$$C_s := \frac{S_{DS}}{\left(\frac{R}{I_e}\right)} = 0.6 \quad \text{Governs.} \quad \{\text{ASCE 7-10 Eq. 12.8-2}\}$$

$$C_{smin} := 0.044 \cdot S_{DS} \cdot I_e = 0.04 \quad \{\text{ASCE 7-10 Eq. 15.4-1}\}$$

$$\text{Seismic base shear: } V_E := C_s \cdot W_E = 1198.33 \text{ lb} \quad \{\text{ASCE 7-10 Eq. 12.8-1}\}$$

Seismic overturning moment:

Determine full tank overturning moment per Housner equations:

Housner, G.W., "The Dynamic Behavior of Water Tanks," Bull. Seism. Soc. Am., Vol. 53, 1963.

$$R := \frac{D}{2} = 3.17 \text{ ft (radius)} \quad M := W_F - W_E = 16.03 \cdot k \text{ (tank contents)} \quad h := 116.0 \cdot \text{in} = 9.67 \text{ ft (water depth)}$$

$$\text{Mass of impulsive component of tank contents: } M_0 := M \cdot \frac{\tanh\left(1.7 \cdot \frac{R}{h}\right)}{1.7 \cdot \frac{R}{h}} = 14.56 \cdot k$$

Mass of convective component of tank contents:  $M_i := M \cdot (0.6) \cdot \frac{\tanh\left(1.8 \cdot \frac{h}{R}\right)}{1.8 \cdot \frac{h}{R}} = 1.75 \cdot k$

Impulsive force centroid height:  $h_i := \frac{3}{8} \cdot h \cdot \left[ 1 + 1.33 \cdot \left( \frac{M}{M_i} \right) \cdot \left( \frac{R}{h} \right)^2 - 1 \right] = 4.74 \text{ ft}$

Convective force centroid height:  $h_c := h \cdot \left[ 1 - 0.185 \cdot \frac{M}{M_i} \cdot \left( \frac{R}{h} \right)^2 - 0.56 \cdot (2.0) \cdot \frac{R}{h} \cdot \sqrt{\left( \frac{M \cdot R}{3 \cdot M_i \cdot h} \right)^2 - 1} \right] = 7.88 \text{ ft}$

Impulsive moment:  $M_i := V_i \cdot h_i = 45 \cdot \text{ftk}$

Convective moment:  $M_c := V_c \cdot h_c = 6.47 \cdot \text{ftk}$

Tank dead load moment:  $M_E := V_E \cdot \frac{h}{2} = 5.79 \cdot \text{ftk} \quad (\text{empty tank})$

Moment: Full tank:  $M_F := \sqrt{M_i^2 + M_c^2 + M_E^2} = 45.83 \cdot \text{ftk}$

Empty tank:  $M_E = 5.79 \cdot \text{ftk}$

Wind analysis: Wind speed 115 mph, Exposure C. See **Mecawind** sheets attached.

Shear:  $V_W := 0.9 \cdot k$

Moment:  $M_W := 4.9 \cdot \text{ftk}$

Sliding resistance: Assume coefficient of friction of 0.24 for HDPE.

Full tank, seismic: Tank shall be anchored with cables to prevent overturning, therefore assume at least half of the weight of the tank contents will be used as sliding resistance.

$F_F := 0.24 \cdot (W_E + 0.5 \cdot M) \quad F_F = 2.4 \cdot k$

$\text{if}(V_F < F_F, \text{"OK"}, \text{"NO GOOD"}) = \text{"NO GOOD"}$

**Sliding resistance between full tank and concrete is inadequate. Anchorage is required for sliding resistance, see calcs below.**

Empty tank, seismic:  $F_E := 0.24 \cdot W_E \quad F_E = 0.48 \cdot k$

$\text{if}(V_E < F_E, \text{"OK"}, \text{"NO GOOD"}) = \text{"NO GOOD"}$

**Sliding resistance between empty tank and concrete is inadequate. Anchorage is required for sliding resistance, see calcs below.**

Empty tank, wind:  $F_E := 0.24 \cdot W_E \quad F_E = 0.48 \cdot k$

$\text{if}(V_W < F_E, \text{"OK"}, \text{"NO GOOD"}) = \text{"NO GOOD"}$

**Sliding resistance between empty tank and concrete is inadequate. Anchorage is required for sliding resistance, see calcs below.**



Overturning moment:

Full tank, seismic: LRFD BLC 7 governs, per ASCE 7-10 12.4.2.3:  $(0.9 - 0.2 \cdot S_{DS}) \cdot D + \rho \cdot Q_E$

Tank shall be anchored with cables to prevent overturning, therefore assume at least half of the weight of the tank contents will be used as overturning moment resistance.

$$OTM := \rho \cdot M_F - (0.9 - 0.2 \cdot S_{DS}) \cdot (W_E + 0.5 \cdot M) \cdot \frac{D}{2} \quad OTM = 21.85 \cdot \text{ftk}$$

if(OTM < 0, "OK", "NO GOOD !") = "NO GOOD !"

**Overturning moment resistance for full tank is inadequate. Anchorage is required for moment resistance, see calcs below.**

Empty tank, seismic: LRFD BLC 7 governs, per ASCE 7-10 12.4.2.3:  $(0.9 - 0.2 \cdot S_{DS}) \cdot D + \rho \cdot Q_E$

$$OTM := \rho \cdot M_E - (0.9 - 0.2 \cdot S_{DS}) \cdot W_E \cdot \frac{D}{2} \quad OTM = 1 \cdot \text{ftk}$$

if(OTM < 0, "OK", "NO GOOD !") = "NO GOOD !"

**Overturning moment resistance for empty tank is inadequate. Anchorage is required for moment resistance, see calcs below.**

Empty tank, wind: LRFD BLC 6 governs, per ASCE 7-10 2.3.2:  $0.9 \cdot D + 1.0 \cdot W$

$$OTM := 1.0 \cdot M_W - 0.9 \cdot W_E \cdot \frac{D}{2} \quad OTM = -0.8 \cdot \text{ftk}$$

if(OTM < 0, "OK", "NO GOOD !") = "OK"

**Overturning moment resistance for empty tank is adequate. Anchorage is NOT required for moment resistance.**

Anchorage: 3 restraint clips per tank, 2 anchors per clip.

Full tank, seismic: LRFD BLC 6 governs, per ASCE 7-10 12.4.3.2:  $(0.9 - 0.2 \cdot S_{DS}) \cdot D + \Omega_0 \cdot Q_E$

$$\text{Moment: } M_{\text{anchorage}} := \Omega_0 \cdot M_F - (0.9 - 0.2 \cdot S_{DS}) \cdot (W_E + 0.5 \cdot M) \cdot \frac{D}{2} \quad M_{\text{anchorage}} = 44.77 \cdot \text{ft} \cdot \text{k}$$

$$\text{Tension: } T_{\text{anchorage}} := \frac{M_{\text{anchorage}}}{D \cdot 1 \cdot \text{ea}} \quad T_{\text{anchorage}} = 7068.33 \text{ lb} \quad \text{per clip, with 1 clip resisting total overturning moment}$$

$$\text{Shear: } V_{\text{anchorage}} := \frac{\Omega_0 \cdot V_F - F_F}{1 \cdot \text{ea}} \quad V_{\text{anchorage}} = 11896.15 \text{ lb} \quad \text{per clip, with 1 clip resisting total shear}$$

Empty tank, seismic: LRFD BLC 6 governs, per ASCE 7-10 12.4.3.2:  $(0.9 - 0.2 \cdot S_{DS}) \cdot D + \Omega_0 \cdot Q_E$

$$\text{Moment: } M_{\text{anchorage}} := \Omega_0 \cdot M_E - (0.9 - 0.2 \cdot S_{DS}) \cdot W_E \cdot \frac{D}{2} \quad M_{\text{anchorage}} = 3.9 \cdot \text{ft} \cdot \text{k}$$

$$\text{Tension: } T_{\text{anchorage}} := \frac{M_{\text{anchorage}}}{D \cdot 1 \cdot \text{ea}} \quad T_{\text{anchorage}} = 615.58 \text{ lb} \quad \text{per clip, with 1 clip resisting total overturning moment}$$

$$\text{Shear: } V_{\text{anchorage}} := \frac{\Omega_0 \cdot V_E - F_E}{1 \cdot \text{ea}} \quad V_{\text{anchorage}} = 1317.5 \text{ lb} \quad \text{per clip, with 1 clip resisting total shear}$$



Empty tank, wind: LRFD BLC 6 governs, per ASCE 7-10 2.3.2:  $0.9 \cdot D + 1.0 \cdot W$

$$\text{Moment: } M_{\text{anchorage}} := 1.0 \cdot M_W - 0.9 \cdot W_E \cdot \frac{D}{2} \quad M_{\text{anchorage}} = -0.8 \cdot \text{ft} \cdot \text{k}$$

$$\text{Tension: } T_{\text{anchorage}} := \frac{M_{\text{anchorage}}}{D \cdot l \cdot ea} \quad T_{\text{anchorage}} = -126.32 \text{ lb} \quad \text{per clip, with 1 clip resisting total overturning moment}$$

$$\text{Shear: } V_{\text{anchorage}} := \frac{1.0 \cdot V_W - F_E}{l \cdot ea} \quad V_{\text{anchorage}} = 420 \text{ lb} \quad \text{per clip, with 1 clip resisting total shear}$$

Full tank (seismic) case governs. See HILTI design report attached for calcs.

Provide 3 restraint clips with (2) 5/8" dia. Hilti HAS-R 316 SS anchors per clip, with Hilti HIT-RE 500 V3 epoxy adhesive (6 anchors total per tank). Anchors to be 316 stainless steel, with 7" min. embed. and 12" min. edge distance. Concrete shall be 12" thick min. and have compressive strength of 3000 psi min.

Restraint clip: (3) L6-6 restraint clips per tank: L6x4x1/2 x 0'-6" angle.

Full tank, seismic: LRFD BLC 7 governs, per ASCE 7-10 12.4.2.3:  $(0.9 - 0.2 \cdot S_{DS}) \cdot D + \rho \cdot Q_E$

$$\text{Shear: } V_{\text{clip}} := \frac{\rho \cdot V_F - F_F}{l \cdot ea} \quad V_{\text{clip}} = 7129.46 \text{ lb} \quad \text{per clip, with 1 clip resisting total shear}$$

$$\text{Moment: } M_{\text{clip}} := V_{\text{clip}} \cdot l \cdot \text{in} \quad M_{\text{clip}} = 0.59 \cdot \text{ft} \cdot \text{k} \quad \text{per clip}$$

$$\begin{array}{llllll} \text{316 stainless steel:} & F_y := 42.1 \cdot \text{ksi} & Z := \frac{6 \cdot \text{in} \cdot (0.5 \cdot \text{in})^2}{4} & Z = 0.38 \cdot \text{in}^3 & S := \frac{6 \cdot \text{in} \cdot (0.5 \cdot \text{in})^2}{6} & S = 0.25 \cdot \text{in}^3 \end{array}$$

$$\begin{array}{llllll} \text{304 stainless steel:} & F_y := 31.2 \cdot \text{ksi} & M_p := F_y \cdot Z & M_p = 0.98 \cdot \text{ft} \cdot \text{k} & M_y := F_y \cdot S & M_y = 0.65 \cdot \text{ft} \cdot \text{k} \end{array}$$

$$M_p = 0.98 \cdot \text{ft} \cdot \text{k} < 1.6 \cdot M_y = 1.04 \cdot \text{ft} \cdot \text{k}, \text{ therefore: } M_n := M_p \quad M_n = 0.98 \cdot \text{ft} \cdot \text{k} \quad \{\text{AISC 360-10 Eq. F11-1}\}$$

$$M_{\text{ALLOW}} := 0.90 \cdot M_n \quad M_{\text{ALLOW}} = 0.88 \cdot \text{ft} \cdot \text{k} \quad (\text{LRFD})$$

$$\text{if}(M_{\text{ALLOW}} > M_{\text{clip}}, "OK", "NO GOOD") = "OK"$$

(3) L6x4x1/2 x 0'-6" stainless steel clips OK.

Cable: (3) 1/4" dia. 7x19 stainless steel cables per tank, 1 cable per restraint clip.

Full tank, seismic: LRFD BLC 7 governs, per ASCE 7-10 12.4.2.3:  $(0.9 - 0.2 \cdot S_{DS}) \cdot D + \rho \cdot Q_E$

$$\text{Tension: } T_{\text{clip}} := \frac{\rho \cdot M_F - (0.9 - 0.2 \cdot S_{DS}) \cdot (W_E + 0.5 \cdot M) \cdot \frac{D}{2}}{D \cdot l \cdot ea} \quad T_{\text{clip}} = 3449.83 \text{ lb} \quad \text{per clip, with 1 clip resisting total overturning moment}$$

$$T := \frac{T_{\text{clip}}}{l \cdot ea} \quad T = 3449.83 \text{ lb} \quad \text{tension per cable}$$

$$T_{\text{ALLOW}} := 5800 \cdot \text{lb} \quad \text{allowable tension per cable (see cable sheet attached)}$$

if( $T_{\text{ALLOW}} > T$ , "OK", "NO GOOD") = "OK" **(1) 1/4" dia. 7x19 stainless steel cable per restraint clip OK. Provide thimble and (2) cable clips per cable.**

Eye nut: (3) stainless steel eye nuts for 5/8" dia. anchors per tank, 1 eye nut per restraint clip.

Full tank, seismic: LRFD BLC 7 governs, per ASCE 7-10 12.4.2.3:  $(0.9 - 0.2 \cdot S_{DS}) \cdot D + \rho \cdot Q_E$

$$\text{Tension: } T_{\text{clip}} := \frac{\rho \cdot M_F - (0.9 - 0.2 \cdot S_{DS}) \cdot (W_E + 0.5 \cdot M) \cdot \frac{D}{2}}{D \cdot l \cdot ea} \quad T_{\text{clip}} = 3449.83 \text{ lb} \quad \text{per clip, with 1 clip resisting total overturning moment}$$

$$T := \frac{T_{\text{clip}}}{l \cdot ea} \quad T = 3449.83 \text{ lb} \quad \text{tension per eye nut}$$

$$T_{\text{ALLOW}} := 5000 \cdot \text{lb} \quad \text{allowable force per eye nut (see eye nut load sheet attached)}$$

if( $T_{\text{ALLOW}} > T$ , "OK", "NO GOOD") = "OK" **(1) stainless steel eye nut (for 5/8" dia. anchor) per restraint clip OK.**

<<<end of calculations>>>

# **Design Maps Summary Report**

## User-Specified Input

**Report Title** 18226

Tue May 8, 2018 15:41:39 UTC

**Building Code Reference Document** ASCE 7-10 Standard

(which utilizes USGS hazard data available in 2008)

**Site Coordinates** 33.06542°N, 117.14604°W

**Site Soil Classification** Site Class D – “Stiff Soil”

**Risk Category** I/II/III



## USGS-Provided Output

$S_s = 0.969 \text{ g}$

$S_{MS} = 1.078 \text{ g}$

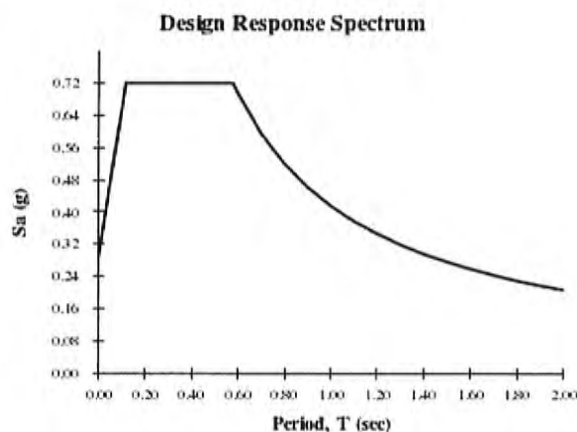
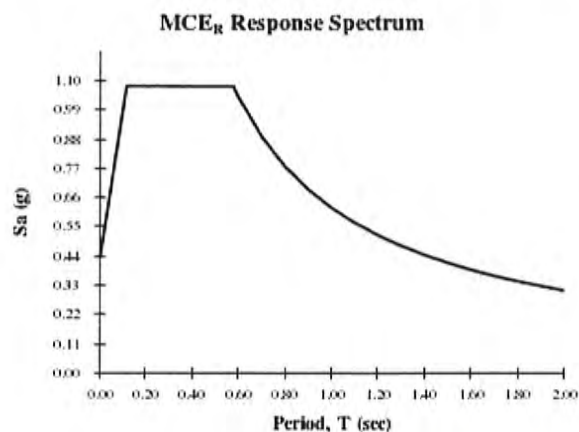
$S_{DS} = 0.719 \text{ g}$

$S_1 = 0.379 \text{ g}$

$S_{M1} = 0.622 \text{ g}$

$S_{D1} = 0.415 \text{ g}$

For information on how the  $S_s$  and  $S_1$  values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the “2009 NEHRP” building code reference document.



For  $PGA_M$ ,  $T_L$ ,  $C_{RS}$ , and  $C_{R1}$  values, please [view the detailed report](#).

Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.



# MecaWind Pro v2.2.7.5 per ASCE 7-10

Developed by MECA Enterprises, Inc. Copyright [www.mecaenterprises.com](http://www.mecaenterprises.com)

```

Date       : 5/8/2018
Company Name : B.A. Sims Engineering, Inc.
Address    : 5150 E. PCH, Suite 200
City       : Long Beach
State      : CA
File Location: C:\Users\User\Documents\Project Files\18226-Core-Rosion-Escondido part 2\18226.wnd

Project No. : 18226
Designed By : SM
Description  : Tank
Customer Name : Core-Rosion
Proj Location : Escondido, CA
  
```

## Input Parameters: Other Structures & Building Appurtances MWFRS (Ch 29)

```

Basic Wind Speed(V) = 115.00 mph
Structural Category = III
Natural Frequency = N/A
Importance Factor = 1.00
Damping Ratio (beta) = 0.01
Alpha = 9.50
At = 0.11
Am = 0.15
Cc = 0.20
Epsilon = 0.20

Exposure Category = C
Flexible Structure = No
Kd Directional Factor = See Below

Zg = 900.00 ft
Bt = 1.00
Bm = 0.65
l = 500.00 ft
Zmin = 15.00 ft
  
```

## Gust Factor Calculations

```

Gust Factor Category I Rigid Structures - Simplified Method
Gust1: For Rigid Structures (Nat. Freq.>1 Hz) use 0.85 = 0.85
  
```

```

Gust Factor Category II Rigid Structures - Complete Analysis
Zm: 0.6*Ht = 15.00 ft
lzm: Cc*(33/Zm)^0.167 = 0.23
Lzm: 1*(Zm/33)^Epsilon = 427.06 ft
Q: (1/(1+0.63*((B+Ht)/Lzm)^0.63))^0.5 = 0.84
Gust2: 0.925*((1+1.7*lzm*3.4*Q)/(1+1.7*3.4*lzm)) = 0.84
  
```

```

Gust Factor Summary
Not a Flexible Structure use the Lessor of Gust1 or Gust2 = 0.84
  
```

Design Wind Pressure - Other Structures

## Wind On Chimneys, Tanks, Rooftop Equip. & Similar Structures per Figure 29.5-2:

Elev ft	Kz	Kzt	Kd	qz psf	Pres psf
11.42	0.85	1.00	0.95	27.303	22.998

Top El ft	Btm El ft	Width ft	Type	Cf psf	Addl ft	Tot Wid ft	Shear Kip	Moment K-ft
11.42	.00	6.334		0.513	.000	3.250	0.9	4.9

### Notes:

```

Top El = Top elevation of element under consideration relative to grade.
Btm El = Top elevation of element under consideration relative to grade.
Width = Dia of circular cross-section & least horizontal dim of square,
        hexagonal or octagonal cross section.
Type = (1)Square-Wind on Face, (2)Square-Wind Along Diagonal, (3)Hexag. or Octag.
        (4)Round-Moderately Smooth, (5)Round-Rough, (6)Round-Very Rough
Cf = Shape factor per Figure 6-21 based upon H/D ratio and Type selected.
Addl = Additional Area (Piping, Ladders, platforms, etc.), Cf=1.0 is assumed.
Tot Wid = Total Wind Width: Cf * Width + Addl
Shear = Shear @ Btm: Press * Tot Wid + Shear(top)
Moment = Mom @ Btm: Mom(Top)+Shear(Top)*(Top El-Btm El)+Shear(Btm)*(Top El-Btm El)/2
  
```

Company: B.A. Sims Engineering, Inc.  
 Specifier: SM  
 Address: 5150 E. Pacific Coast Hwy, Ste. 200  
 Phone | Fax: (562) 735-4955 |  
 E-Mail:

Page: 1  
 Project: 17060  
 Sub-Project | Pos. No.:  
 Date: 5/8/2018

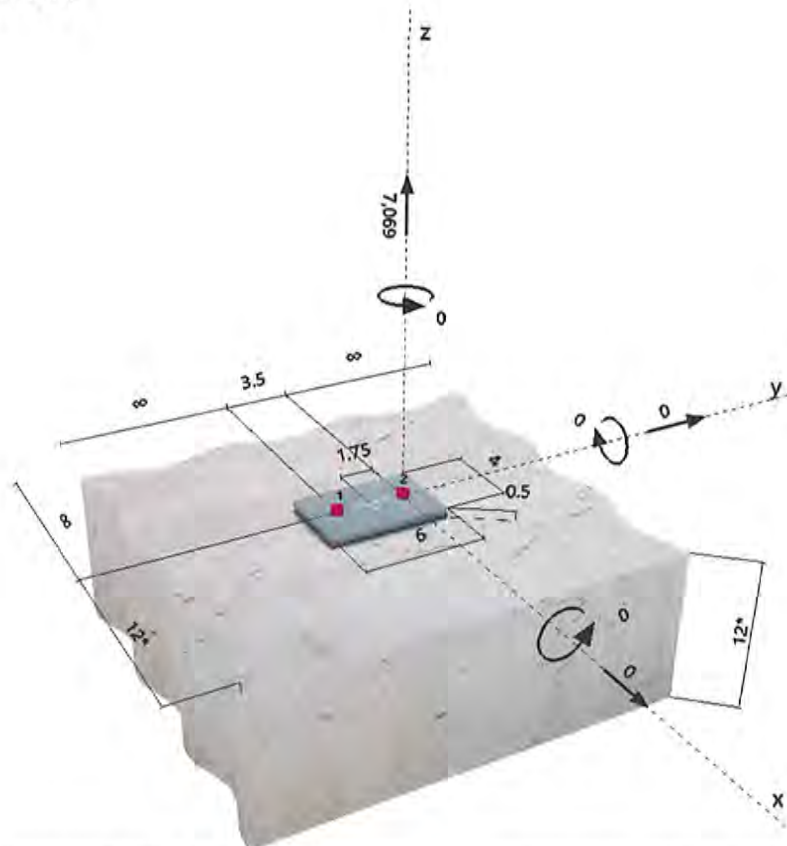
**Specifier's comments:** Tension

## 1 Input data

<b>Anchor type and diameter:</b>	HIT-RE 500 V3 + HAS-R 316 SS 5/8
<b>Effective embedment depth:</b>	$h_{ef,act} = 7.000$ in. ( $h_{ef,limit} = -$ in.)
<b>Material:</b>	ASTM F 593
<b>Evaluation Service Report:</b>	ESR-3814
<b>Issued   Valid:</b>	1/1/2017   1/1/2019
<b>Proof:</b>	Design method ACI 318-14 / Chem
<b>Stand-off installation:</b>	$e_b = 0.000$ in. (no stand-off); $t = 0.500$ in.
<b>Anchor plate:</b>	$l_x \times l_y \times t = 4.000$ in. $\times$ $6.000$ in. $\times$ $0.500$ in.; (Recommended plate thickness: not calculated)
<b>Profile:</b>	no profile
<b>Base material:</b>	cracked concrete, 3000, $f_c' = 3,000$ psi; $h = 12.000$ in., Temp. short/long: 32/32 °F
<b>Installation:</b>	<b>hammer drilled hole, Installation condition: Dry</b>
<b>Reinforcement:</b>	tension: condition B, shear: condition B; no supplemental splitting reinforcement present
	edge reinforcement: none or $<$ No. 4 bar
<b>Seismic loads (cat. C, D, E, or F)</b>	Tension load: yes (17.2.3.4.3 (d))
	Shear load: yes (17.2.3.5.3 (c))



### Geometry [in.] & Loading [lb, in.lb]



Company: B.A. Sims Engineering, Inc.  
 Specifier: SM  
 Address: 5150 E. Pacific Coast Hwy, Ste. 200  
 Phone / Fax: (562) 735-4955 |  
 E-Mail:

Page: 2  
 Project: 17060  
 Sub-Project / Pos. No.:  
 Date: 5/8/2018

## 2 Load case/Resulting anchor forces

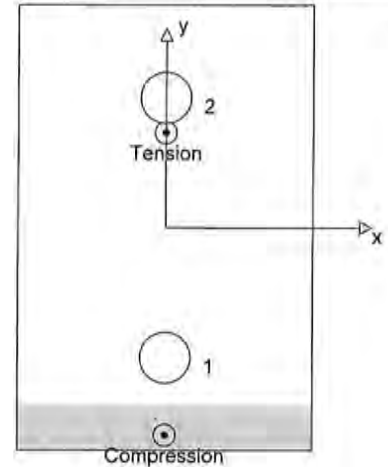
Load case: Design loads

### Anchor reactions [lb]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	1,056	0	0	0
2	6,826	0	0	0

max. concrete compressive strain: 0.15 [‰]  
 max. concrete compressive stress: 667 [psi]  
 resulting tension force in (x/y)=(0.000/1.281): 7,882 [lb]  
 resulting compression force in (x/y)=(0.000/-2.797): 813 [lb]



## 3 Tension load

	Load $N_{ua}$ [lb]	Capacity $\phi N_n$ [lb]	Utilization $\beta_N = N_{ua} / \phi N_n$	Status
Steel Strength*	6,826	14,690	47	OK
Bond Strength**	7,882	8,618	92	OK
Sustained Tension Load Bond Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Strength**	7,882	8,741	91	OK

\* anchor having the highest loading \*\*anchor group (anchors in tension)

### 3.1 Steel Strength

$N_{sa}$  = ESR value refer to ICC-ES ESR-3814  
 $\phi N_{sa} \geq N_{ua}$  ACI 318-14 Table 17.3.1.1

#### Variables

$A_{se,N}$ [in. <sup>2</sup> ]	$f_{uta}$ [psi]
0.23	100,000

#### Calculations

$N_{sa}$ [lb]
22,600

#### Results

$N_{sa}$ [lb]	$\phi_{steel}$	$\phi_{nonductile}$	$\phi N_{sa}$ [lb]	$N_{ua}$ [lb]
22,600	0.650	1.000	14,690	6,826



[www.hilti.us](http://www.hilti.us)

Company: B.A. Sims Engineering, Inc.  
 Specifier: SM  
 Address: 5150 E. Pacific Coast Hwy, Ste. 200  
 Phone | Fax: (562) 735-4955 |  
 E-Mail:

Page: 3  
 Project: 17060  
 Sub-Project | Pos. No.:  
 Date: 5/8/2018

### 3.2 Bond Strength

$$N_{ag} = \left( \frac{A_{Na}}{A_{Na0}} \right)^{\psi_{ec1,Na} \psi_{ec2,Na} \psi_{ed,Na} \psi_{cp,Na}} N_{ba} \quad \text{ACI 318-14 Eq. (17.4.5.1.b)}$$

$$\phi N_{ag} \geq N_{ua} \quad \text{ACI 318-14 Table 17.3.1.1}$$

$$A_{Na} = \text{see ACI 318-14, Section 17.4.5.1, Fig. R 17.4.5.1(b)}$$

$$A_{Na0} = (2 c_{Na})^2 \quad \text{ACI 318-14 Eq. (17.4.5.1c)}$$

$$c_{Na} = 10 d_b \sqrt{\frac{\tau_{uncr}}{1100}} \quad \text{ACI 318-14 Eq. (17.4.5.1d)}$$

$$\psi_{ec,Na} = \left( \frac{1}{1 + \frac{e_N}{c_{Na}}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.5.3)}$$

$$\psi_{ed,Na} = 0.7 + 0.3 \left( \frac{c_{a,min}}{c_{Na}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.5.4b)}$$

$$\psi_{cp,Na} = \text{MAX} \left( \frac{c_{a,min}}{c_{ac}}, \frac{c_{Na}}{c_{ac}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.5.5b)}$$

$$N_{ba} = \lambda_a \cdot \tau_{k,c} \cdot \alpha_{N,seis} \cdot \pi \cdot d_b \cdot h_{ef} \quad \text{ACI 318-14 Eq. (17.4.5.2)}$$

#### Variables

$\tau_{k,c,uncr}$ [psi]	$d_b$ [in.]	$h_{ef}$ [in.]	$c_{a,min}$ [in.]	$\tau_{k,c}$ [psi]
2,313	0.625	7.000	12.000	1,295
$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{ac}$ [in.]	$\lambda_a$	$\alpha_{N,seis}$
0.000	1.281	15.754	1.000	0.950

#### Calculations

$c_{Na}$ [in.]	$A_{Na}$ [in. <sup>2</sup> ]	$A_{Na0}$ [in. <sup>2</sup> ]	$\psi_{ed,Na}$
9.022	388.76	325.60	1.000
$\psi_{ec1,Na}$	$\psi_{ec2,Na}$	$\psi_{cp,Na}$	$N_{ba}$ [lb]
1.000	0.876	1.000	16,908

#### Results

$N_{ag}$ [lb]	$\phi_{bond}$	$\phi_{seismic}$	$\phi_{nonductile}$	$\phi N_{ag}$ [lb]	$N_{ua}$ [lb]
17,678	0.650	0.750	1.000	8,618	7,882

[www.hilti.us](http://www.hilti.us)

Company: B.A. Sims Engineering, Inc.  
 Specifier: SM  
 Address: 5150 E. Pacific Coast Hwy, Ste. 200  
 Phone / Fax: (562) 735-4955 |  
 E-Mail:

Page: 4  
 Project: 17060  
 Sub-Project / Pos. No.:  
 Date: 5/8/2018

### 3.3 Concrete Breakout Strength

$$N_{cbg} = \left( \frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ec,N} \psi_{ed,N} \psi_{s,N} \psi_{cp,N} N_b \quad \text{ACI 318-14 Eq. (17.4.2.1b)}$$

$$\phi N_{cbg} \geq N_{ua} \quad \text{ACI 318-14 Table 17.3.1.1}$$

$$A_{Nc} \text{ see ACI 318-14, Section 17.4.2.1, Fig. R 17.4.2.1(b)}$$

$$A_{Nc0} = 9 h_{ef}^2 \quad \text{ACI 318-14 Eq. (17.4.2.1c)}$$

$$\psi_{ec,N} = \left( \frac{1}{1 + \frac{2 e_N}{3 h_{ef}}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.2.4)}$$

$$\psi_{ed,N} = 0.7 + 0.3 \left( \frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.2.5b)}$$

$$\psi_{cp,N} = \text{MAX} \left( \frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.2.7b)}$$

$$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} \quad \text{ACI 318-14 Eq. (17.4.2.2a)}$$

#### Variables

$h_{ef}$ [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
7.000	0.000	1.281	12.000	1.000
$c_{ac}$ [in.]	$k_c$	$\lambda_a$	$f'_c$ [psi]	
15.754	17	1.000	3,000	

#### Calculations

$A_{Nc}$ [in. <sup>2</sup> ]	$A_{Nc0}$ [in. <sup>2</sup> ]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	$N_b$ [lb]
514.50	441.00	1.000	0.891	1.000	1.000	17,245

#### Results

$N_{cbg}$ [lb]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	$\phi N_{cbg}$ [lb]	$N_{ua}$ [lb]
17,931	0.650	0.750	1.000	8,741	7,882



Company: B.A. Sims Engineering, Inc.  
 Specifier: SM  
 Address: 5150 E. Pacific Coast Hwy, Ste. 200  
 Phone / Fax: (562) 735-4955 |  
 E-Mail:

Page: 5  
 Project: 17060  
 Sub-Project / Pos. No.:  
 Date: 5/8/2018

## 4 Shear load

	Load $V_{ua}$ [lb]	Capacity $\phi V_n$ [lb]	Utilization $\beta_v = V_{ua} / \phi V_n$	Status
Steel Strength*	N/A	N/A	N/A	N/A
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength (Bond Strength controls)*	N/A	N/A	N/A	N/A
Concrete edge failure in direction **	N/A	N/A	N/A	N/A

\* anchor having the highest loading    \*\*anchor group (relevant anchors)

## 5 Warnings

- The anchor design methods in PROFIS Anchor require rigid anchor plates per current regulations (ETAG 001/Annex C, EOTA TR029, etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Anchor calculates the minimum required anchor plate thickness with FEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid base plate assumption is valid is not carried out by PROFIS Anchor. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Condition A applies when supplementary reinforcement is used. The  $\Phi$  factor is increased for non-steel Design Strengths except Pullout Strength and Pryout strength. Condition B applies when supplementary reinforcement is not used and for Pullout Strength and Pryout Strength. Refer to your local standard.
- Design Strengths of adhesive anchor systems are influenced by the cleaning method. Refer to the INSTRUCTIONS FOR USE given in the Evaluation Service Report for cleaning and installation instructions
- Checking the transfer of loads into the base material and the shear resistance are required in accordance with ACI 318 or the relevant standard!
- An anchor design approach for structures assigned to Seismic Design Category C, D, E or F is given in ACI 318-14, Chapter 17, Section 17.2.3.4.3 (a) that requires the governing design strength of an anchor or group of anchors be limited by ductile steel failure. If this is NOT the case, the connection design (tension) shall satisfy the provisions of Section 17.2.3.4.3 (b), Section 17.2.3.4.3 (c), or Section 17.2.3.4.3 (d). The connection design (shear) shall satisfy the provisions of Section 17.2.3.5.3 (a), Section 17.2.3.5.3 (b), or Section 17.2.3.5.3 (c).
- Section 17.2.3.4.3 (b) / Section 17.2.3.5.3 (a) require the attachment the anchors are connecting to the structure be designed to undergo ductile yielding at a load level corresponding to anchor forces no greater than the controlling design strength. Section 17.2.3.4.3 (c) / Section 17.2.3.5.3 (b) waive the ductility requirements and require the anchors to be designed for the maximum tension / shear that can be transmitted to the anchors by a non-yielding attachment. Section 17.2.3.4.3 (d) / Section 17.2.3.5.3 (c) waive the ductility requirements and require the design strength of the anchors to equal or exceed the maximum tension / shear obtained from design load combinations that include E, with E increased by  $\omega_0$ .
- Installation of Hilti adhesive anchor systems shall be performed by personnel trained to install Hilti adhesive anchors. Reference ACI 318-14, Section 17.8.1.

**Fastening meets the design criteria!**

Company: B.A. Sims Engineering, Inc.  
 Specifier: SM  
 Address: 5150 E. Pacific Coast Hwy, Ste. 200  
 Phone | Fax: (562) 735-4955 |  
 E-Mail:

Page: 6  
 Project: 17060  
 Sub-Project | Pos. No.:  
 Date: 5/8/2018

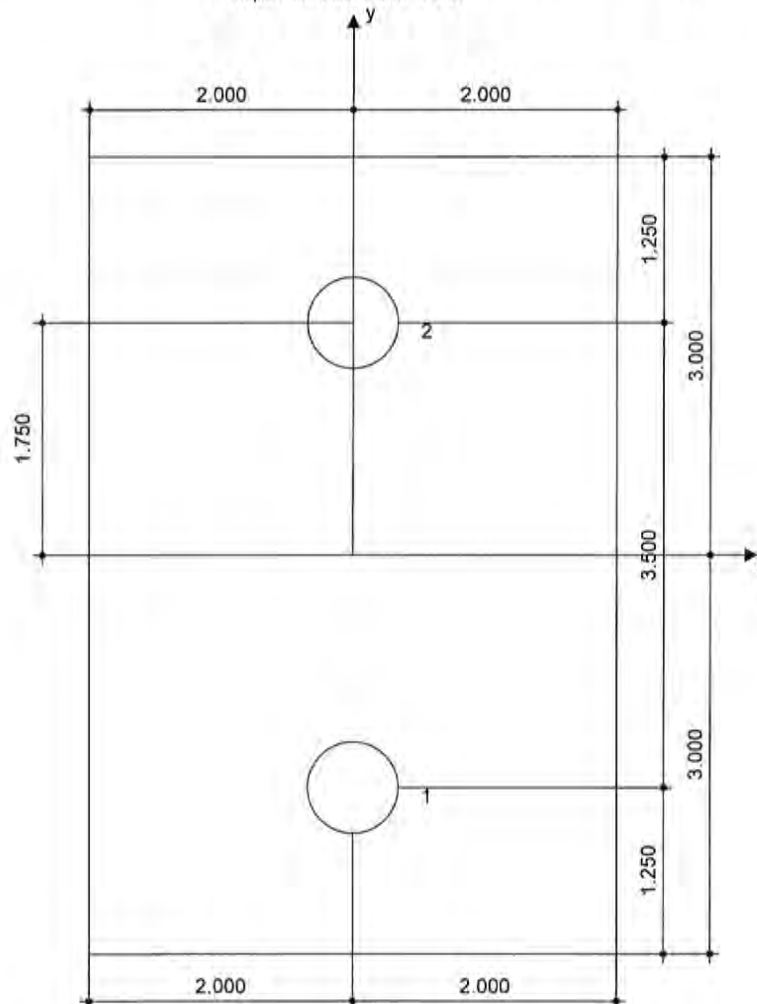
## 6 Installation data

Anchor plate, steel: -  
 Profile: no profile  
 Hole diameter in the fixture;  $d_f = 0.688$  in.  
 Plate thickness (input): 0.500 in.  
 Recommended plate thickness: not calculated  
 Drilling method: Hammer drilled  
 Cleaning: Compressed air cleaning of the drilled hole according to instructions for use is required

Anchor type and diameter: HIT-RE 500 V3 + HAS-R 316 SS 5/8  
 Installation torque: 720.000 in.lb  
 Hole diameter in the base material: 0.750 in.  
 Hole depth in the base material: 7.000 in.  
 Minimum thickness of the base material: 8.500 in.

### 6.1 Recommended accessories

Drilling	Cleaning	Setting
<ul style="list-style-type: none"> <li>Suitable Rotary Hammer</li> <li>Properly sized drill bit</li> </ul>	<ul style="list-style-type: none"> <li>Compressed air with required accessories to blow from the bottom of the hole</li> <li>Proper diameter wire brush</li> </ul>	<ul style="list-style-type: none"> <li>Dispenser including cassette and mixer</li> <li>Torque wrench</li> </ul>



Coordinates Anchor in.

Anchor	x	y	C <sub>-x</sub>	C <sub>+x</sub>	C <sub>-y</sub>	C <sub>+y</sub>
1	0.000	-1.750	-	12.000	-	-
2	0.000	1.750	-	12.000	-	-

[www.hilti.us](http://www.hilti.us)

Company: B.A. Sims Engineering, Inc.  
Specifier: SM  
Address: 5150 E. Pacific Coast Hwy, Ste. 200  
Phone | Fax: (562) 735-4955 |  
E-Mail:

Page: 7  
Project: 17060  
Sub-Project | Pos. No.:  
Date: 5/8/2018

## 7 Remarks; Your Cooperation Duties

- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.



Company: B.A. Sims Engineering, Inc.  
 Specifier: SM  
 Address: 5150 E. Pacific Coast Hwy, Ste. 200  
 Phone | Fax: (562) 735-4955 |  
 E-Mail:

Page: 1  
 Project: 17060  
 Sub-Project | Pos. No.:  
 Date: 5/8/2018

**Specifier's comments:** Shear

## 1 Input data

**Anchor type and diameter:** HIT-RE 500 V3 + HAS-R 316 SS 5/8

**Effective embedment depth:**  $h_{ef,act} = 7.000$  in. ( $h_{ef,limit} = -$  in.)

**Material:** ASTM F 593

**Evaluation Service Report:** ESR-3814

**Issued | Valid:** 1/1/2017 | 1/1/2019

**Proof:** Design method ACI 318-14 / Chem

**Stand-off installation:**  $e_b = 0.000$  in. (no stand-off);  $t = 0.500$  in.

**Anchor plate:**  $l_x \times l_y \times t = 4.000$  in.  $\times$   $6.000$  in.  $\times$   $0.500$  in.; (Recommended plate thickness: not calculated)

**Profile:** no profile

**Base material:** cracked concrete, 3000,  $f'_c = 3,000$  psi;  $h = 12.000$  in., Temp. short/long: 32/32 °F

**Installation:** **hammer drilled hole, Installation condition: Dry**

**Reinforcement:** tension: condition B, shear: condition B; no supplemental splitting reinforcement present

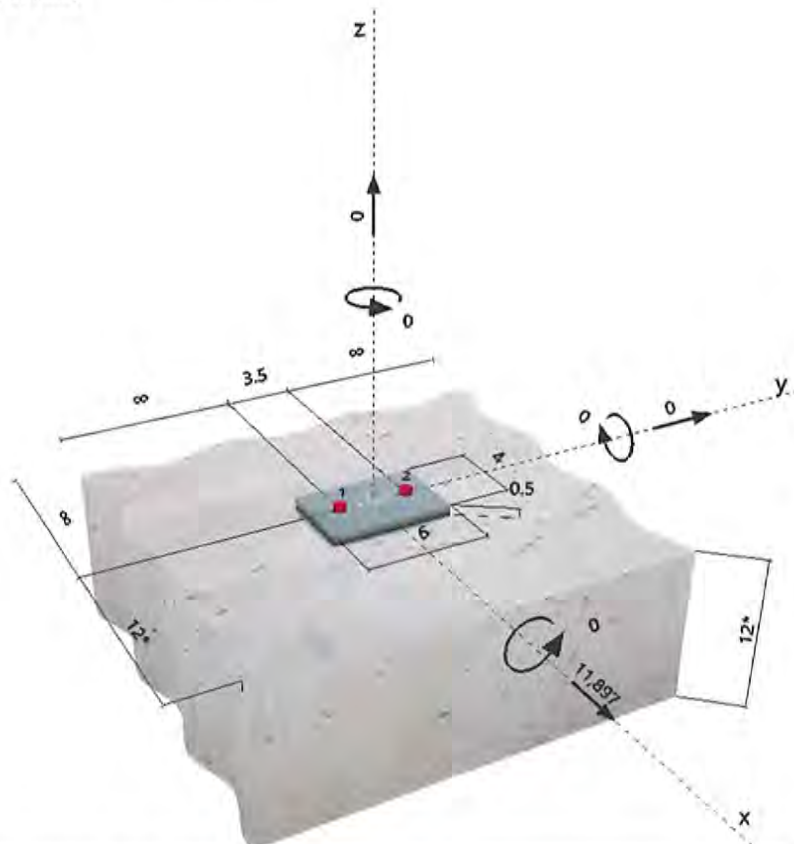
edge reinforcement: none or  $\leq$  No. 4 bar

Seismic loads (cat. C, D, E, or F) Tension load: yes (17.2.3.4.3 (d))

Shear load: yes (17.2.3.5.3 (c))



## Geometry [in.] & Loading [lb, in.lb]



## 2 Load case/Resulting anchor forces

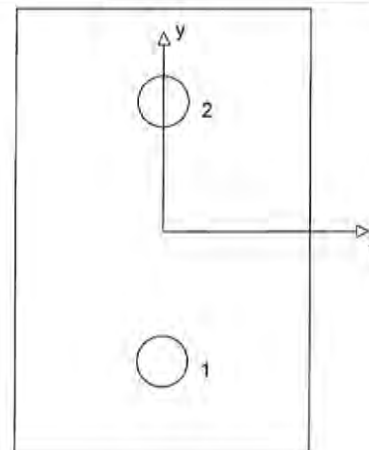
Load case: Design loads

### Anchor reactions [lb]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	0	5,948	5,948	0
2	0	5,948	5,948	0

max. concrete compressive strain: - [%]  
 max. concrete compressive stress: - [psi]  
 resulting tension force in (x/y)=(0.000/0.000): 0 [lb]  
 resulting compression force in (x/y)=(0.000/0.000): 0 [lb]



## 3 Tension load

	Load $N_{ua}$ [lb]	Capacity $\phi N_n$ [lb]	Utilization $\beta_N = N_{ua}/\phi N_n$	Status
Steel Strength*	N/A	N/A	N/A	N/A
Bond Strength**	N/A	N/A	N/A	N/A
Sustained Tension Load Bond Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Strength**	N/A	N/A	N/A	N/A

\* anchor having the highest loading    \*\*anchor group (anchors in tension)

## 4 Shear load

	Load $V_{ua}$ [lb]	Capacity $\phi V_n$ [lb]	Utilization $\beta_V = V_{ua}/\phi V_n$	Status
Steel Strength*	5,948	6,509	92	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength (Concrete Breakout Strength controls)**	11,897	28,166	43	OK
Concrete edge failure in direction x+**	11,897	11,977	100	OK

\* anchor having the highest loading \*\*anchor group (relevant anchors)

### 4.1 Steel Strength

$V_{sa,eq}$  = ESR value refer to ICC-ES ESR-3814  
 $\phi V_{steel} \geq V_{ua}$  ACI 318-14 Table 17.3.1.1

#### Variables

$A_{se,V}$ [in. <sup>2</sup> ]	$f_{uta}$ [psi]
0.23	100,000

#### Calculations

$V_{sa,eq}$ [lb]
10,848

#### Results

$V_{sa,eq}$ [lb]	$\phi_{steel}$	$\phi_{nonductile}$	$\phi V_{sa}$ [lb]	$V_{ua}$ [lb]
10,848	0.600	1.000	6,509	5,948

### 4.2 Pryout Strength (Concrete Breakout Strength controls)

$$V_{cpq} = k_{cp} \left[ \left( \frac{A_{Nc}}{A_{Ncd}} \right)^{1/3} \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \right] \quad \text{ACI 318-14 Eq. (17.5.3.1b)}$$

$$\phi V_{cpq} \geq V_{ua} \quad \text{ACI 318-14 Table 17.3.1.1}$$

$$A_{Nc} \text{ see ACI 318-14, Section 17.4.2.1, Fig. R 17.4.2.1(b)}$$

$$A_{Ncd} = 9 h_{ef}^2 \quad \text{ACI 318-14 Eq. (17.4.2.1c)}$$

$$\psi_{ec,N} = \left( \frac{1}{1 + \frac{2 e_{c,N}}{3 h_{ef}}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.2.4)}$$

$$\psi_{ed,N} = 0.7 + 0.3 \left( \frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.2.5b)}$$

$$\psi_{cp,N} = \text{MAX} \left( \frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.2.7b)}$$

$$N_b = k_c \lambda_a \sqrt{f_c} h_{ef}^{1.5} \quad \text{ACI 318-14 Eq. (17.4.2.2a)}$$

#### Variables

$k_{cp}$	$h_{ef}$ [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]
2	7.000	0.000	0.000	12.000

$\psi_{c,N}$	$c_{ac}$ [in.]	$k_c$	$\lambda_a$	$f_c$ [psi]
1.000	15.754	17	1.000	3,000

#### Calculations

$A_{Nc}$ [in. <sup>2</sup> ]	$A_{Ncd}$ [in. <sup>2</sup> ]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	$N_b$ [lb]
514.50	441.00	1.000	1.000	1.000	1.000	17,245

#### Results

$V_{cpq}$ [lb]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	$\phi V_{cpq}$ [lb]	$V_{ua}$ [lb]
40,238	0.700	1.000	1.000	28,166	11,897



Company: B.A. Sims Engineering, Inc.  
 Specifier: SM  
 Address: 5150 E. Pacific Coast Hwy, Ste. 200  
 Phone / Fax: (562) 735-4955 |  
 E-Mail:

Page: 4  
 Project: 17060  
 Sub-Project / Pos. No.:  
 Date: 5/8/2018

### 4.3 Concrete edge failure in direction x+

$$V_{cbg} = \left( \frac{A_{vc}}{A_{vc0}} \right) \psi_{ec,V} \psi_{ed,V} \psi_{c,V} \psi_{h,V} \psi_{parallel,V} V_b \quad \text{ACI 318-14 Eq. (17.5.2.1b)}$$

$$\phi V_{cbg} \geq V_{ua} \quad \text{ACI 318-14 Table 17.3.1.1}$$

$$A_{vc} \text{ see ACI 318-14, Section 17.5.2.1, Fig. R 17.5.2.1(b)}$$

$$A_{vc0} = 4.5 c_{a1}^2 \quad \text{ACI 318-14 Eq. (17.5.2.1c)}$$

$$\psi_{ec,V} = \left( \frac{1}{1 + \frac{2e_v}{3c_{a1}}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.5.2.5)}$$

$$\psi_{ed,V} = 0.7 + 0.3 \left( \frac{c_{a2}}{1.5c_{a1}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.5.2.6b)}$$

$$\psi_{h,V} = \sqrt{\frac{1.5c_{a1}}{h_a}} \geq 1.0 \quad \text{ACI 318-14 Eq. (17.5.2.8)}$$

$$V_b = \left( 7 \left( \frac{l_e}{d_a} \right)^{0.2} \sqrt{d_a} \right) \lambda_a \sqrt{f'_c} c_{a1}^{1.5} \quad \text{ACI 318-14 Eq. (17.5.2.2a)}$$

### Variables

$c_{a1}$ [in.]	$c_{a2}$ [in.]	$e_{cV}$ [in.]	$\psi_{c,V}$	$h_a$ [in.]
12.000	-	0.000	1.000	12.000
$l_e$ [in.]	$\lambda_a$	$d_a$ [in.]	$f'_c$ [psi]	$\psi_{parallel,V}$
5.000	1.000	0.625	3,000	1.000

### Calculations

$A_{vc}$ [in. <sup>2</sup> ]	$A_{vc0}$ [in. <sup>2</sup> ]	$\psi_{ec,V}$	$\psi_{ed,V}$	$\psi_{h,V}$	$V_b$ [lb]
474.00	648.00	1.000	1.000	1.225	19,098

### Results

$V_{cbg}$ [lb]	$\phi$ concrete	$\phi$ seismic	$\phi$ nonductile	$\phi V_{cbg}$ [lb]	$V_{ua}$ [lb]
17,110	0.700	1.000	1.000	11,977	11,897

## 5 Warnings

- The anchor design methods in PROFIS Anchor require rigid anchor plates per current regulations (ETAG 001/Annex C, EOTA TR029, etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Anchor calculates the minimum required anchor plate thickness with FEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid base plate assumption is valid is not carried out by PROFIS Anchor. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Condition A applies when supplementary reinforcement is used. The  $\Phi$  factor is increased for non-steel Design Strengths except Pullout Strength and Pryout strength. Condition B applies when supplementary reinforcement is not used and for Pullout Strength and Pryout Strength. Refer to your local standard.
- Design Strengths of adhesive anchor systems are influenced by the cleaning method. Refer to the INSTRUCTIONS FOR USE given in the Evaluation Service Report for cleaning and installation instructions
- Checking the transfer of loads into the base material and the shear resistance are required in accordance with ACI 318 or the relevant standard!
- An anchor design approach for structures assigned to Seismic Design Category C, D, E or F is given in ACI 318-14, Chapter 17, Section 17.2.3.4.3 (a) that requires the governing design strength of an anchor or group of anchors be limited by ductile steel failure. If this is NOT the case, the connection design (tension) shall satisfy the provisions of Section 17.2.3.4.3 (b), Section 17.2.3.4.3 (c), or Section 17.2.3.4.3 (d). The connection design (shear) shall satisfy the provisions of Section 17.2.3.5.3 (a), Section 17.2.3.5.3 (b), or Section 17.2.3.5.3 (c).
- Section 17.2.3.4.3 (b) / Section 17.2.3.5.3 (a) require the attachment the anchors are connecting to the structure be designed to undergo ductile yielding at a load level corresponding to anchor forces no greater than the controlling design strength. Section 17.2.3.4.3 (c) / Section 17.2.3.5.3 (b) waive the ductility requirements and require the anchors to be designed for the maximum tension / shear that can be transmitted to the anchors by a non-yielding attachment. Section 17.2.3.4.3 (d) / Section 17.2.3.5.3 (c) waive the ductility requirements and require the design strength of the anchors to equal or exceed the maximum tension / shear obtained from design load combinations that include E, with E increased by  $\omega_0$ .
- Installation of Hilti adhesive anchor systems shall be performed by personnel trained to install Hilti adhesive anchors. Reference ACI 318-14, Section 17.8.1.



[www.hilti.us](http://www.hilti.us)

**Profis Anchor 2.7.6**

Company: B.A. Sims Engineering, Inc.  
Specifier: SM  
Address: 5150 E. Pacific Coast Hwy, Ste. 200  
Phone | Fax: (562) 735-4955 |  
E-Mail:

Page: 5  
Project: 17060  
Sub-Project | Pos. No.:  
Date: 5/8/2018

**Fastening meets the design criteria!**



Company: B.A. Sims Engineering, Inc.  
 Specifier: SM  
 Address: 5150 E. Pacific Coast Hwy, Ste. 200  
 Phone / Fax: (562) 735-4955 |  
 E-Mail:

Page: 6  
 Project: 17060  
 Sub-Project / Pos. No.:  
 Date: 5/8/2018

## 6 Installation data

Anchor plate, steel: -  
 Profile: no profile  
 Hole diameter in the fixture:  $d_f = 0.688$  in.  
 Plate thickness (input): 0.500 in.  
 Recommended plate thickness: not calculated  
 Drilling method: Hammer drilled  
 Cleaning: Compressed air cleaning of the drilled hole according to instructions for use is required

Anchor type and diameter: HIT-RE 500 V3 + HAS-R 316 SS 5/8  
 Installation torque: 720.000 in.lb  
 Hole diameter in the base material: 0.750 in.  
 Hole depth in the base material: 7.000 in.  
 Minimum thickness of the base material: 8.500 in.

### 6.1 Recommended accessories

#### Drilling

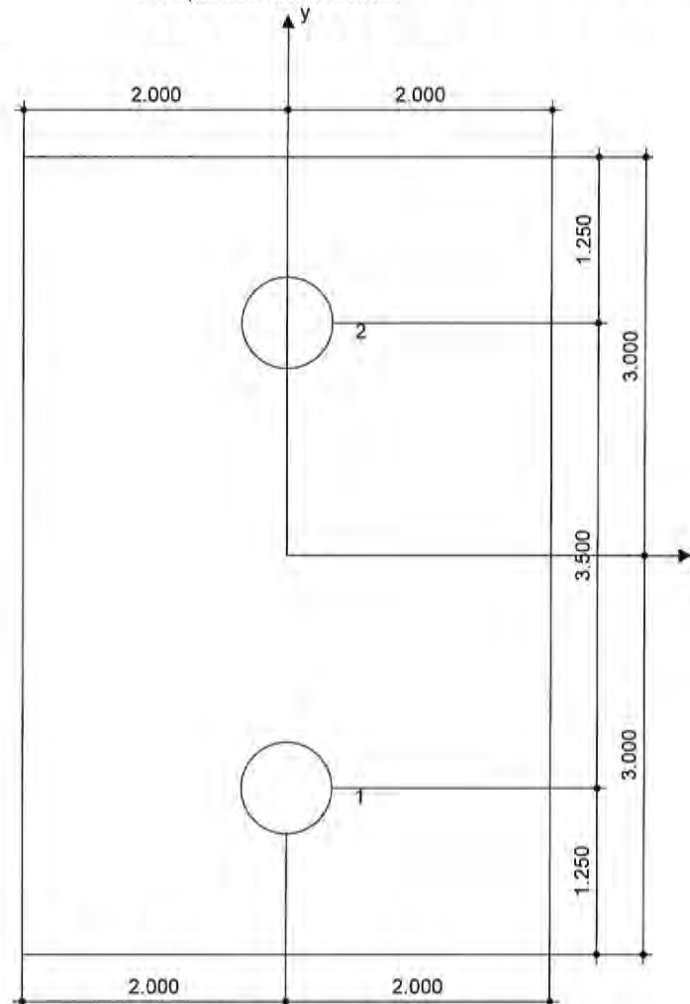
- Suitable Rotary Hammer
- Properly sized drill bit

#### Cleaning

- Compressed air with required accessories to blow from the bottom of the hole
- Proper diameter wire brush

#### Setting

- Dispenser including cassette and mixer
- Torque wrench



Coordinates Anchor in.

Anchor	x	y	c <sub>-x</sub>	c <sub>+x</sub>	c <sub>-y</sub>	c <sub>+y</sub>
1	0.000	-1.750	-	12.000	-	-
2	0.000	1.750	-	12.000	-	-

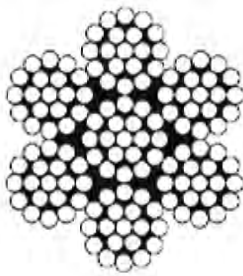
[www.hilti.us](http://www.hilti.us)

Company: B.A. Sims Engineering, Inc.  
Specifier: SM  
Address: 5150 E. Pacific Coast Hwy, Ste. 200  
Phone | Fax: (562) 735-4955 |  
E-Mail:

Page: 7  
Project: 17060  
Sub-Project | Pos. No.:  
Date: 5/8/2018

## 7 Remarks; Your Cooperation Duties

- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.



ITEM	SIZE	SPOOL	WLL (LB)	BL (MINIMUM LB)	WT (LB)
S0703-0002	3/32"	CUTS	160	800	2.00
S0703-0002-5	3/32"	5000 FT.	160	800	84.00
S0703-0003	1/8"	CUTS	320	1,600	3.00
S0703-0003-5	1/8"	5000 FT.	320	1,600	152.00
S0703-0004	5/32"	CUTS	460	2,300	5.00
S0703-0004-5	5/32"	5000 FT.	460	2,300	235.00
S0703-0005	3/16"	CUTS	680	3,400	7.00
S0703-0005-5	3/16"	5000 FT.	680	3,400	340.00
S0703-0006	7/32"	CUTS	900	4,500	9.00
S0703-0006-5	7/32"	5000 FT.	900	4,500	449.00
S0703-0007	1/4"	CUTS	1,160	5,800	11.00
S0703-0007-5	1/4"	5000 FT.	1,160	5,800	574.00
S0703-0008	9/32"	CUTS	1,360	6,800	14.00
S0703-0008-0	9/32"	500 FT.	1,360	6,800	73.00
S0703-0008-3	9/32"	2500 FT.	1,360	6,800	363.00
S0703-0009	5/16"	CUTS	1,580	7,900	17.00
S0703-0009-3	5/16"	2500 FT.	1,580	7,900	453.00
S0703-0010	3/8"	CUTS	2,200	11,000	24.00
S0703-0010-3	3/8"	2500 FT.	2,200	11,000	636.00
S0703-0013	1/2"	CUTS	3,800	19,000	44.00

# KEN FORGING

KEN FORGING, INC.

Call Toll Free **888-KEN-FORGING** (536-3674)

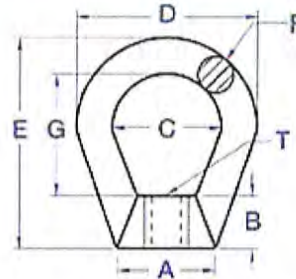
Locally: 440-993-8091

Fax: 440-992-0360

**MADE IN USA**[HISTORY](#)[PRODUCTS](#)[NEW PRODUCTS](#)[PRODUCT INFORMATION](#)[EVENTS](#)[CATALOGS](#)[QUOTES](#)[TERMS & CONDITIONS](#)[CONTACT US](#)[APPLICATION](#)[HOME](#)

## Eye Nuts - Style A 316 Stainless

Drop Forged Stainless Steel, Passivated  
& Electropolished  
ASTM A194-8M  
Tapped: UNC-2B



Stock No.	T Diameter & Thread UNC-2B	A Bell	B Thread Length	C Eye I.D.	D Eye O.D.	E Overall Length	F Bail Dia.	G Bail I.D.	Rated Capty. Lbs.	Weight
EN-3-316SS	3/8-16	7/8	5/8	1-1/4	2	2-1/2	3/8	1-1/2	2,700	.25
EN-5-316SS	1/2-13	7/8	5/8	1-1/4	2	2-1/2	3/8	1-1/2	2,700	.23
EN-7-316SS	5/8-11	1 3/8	3/4	1 1/2	2 1/2	3	1/2	1 3/4	5,000	0.56
EN-8-316SS	3/4-10	1 3/8	3/4	1 1/2	2 1/2	3	1/2	1 3/4	5,000	0.55

Blanks in stock. (Not passivated or electropolished) Inquire for price.

Enter your Dealer Code




Email PWS



*Our thoughts and  
prayers are with all  
of our Armed Forces  
and their families.*





# KEN FORGING

KEN FORGING, INC.

Call Toll Free **888-KEN-FORGING** (536-3674)

Locally: 440-993-8091

Fax: 440-992-0360

**MADE IN USA**

HISTORY

PRODUCTS

NEW PRODUCTS

PRODUCT INFORMATION

EVENTS

CATALOGS

QUOTES

TERMS &amp; CONDITIONS

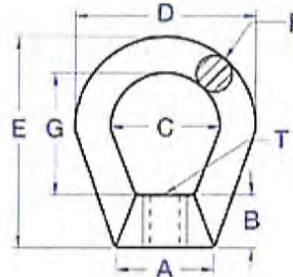
CONTACT US

APPLICATION

HOME

## Eye Nuts - Style A 304 Stainless

Drop Forged Stainless Steel, Passivated  
& Electropolished  
ASTM A194-8  
Tapped: UNC-2B



Stock No.	T Diameter & Thread UNC-2B	A Bell	B Thread Length	C Eye I.D.	D Eye O.D.	E Overall Length	F Bail Dia. Thick.	G I.D. Length	Rated Capty. Lbs.	Weight
EN-3-SS	3/8-16	7/8	5/8	1 1/4	2	2 1/2	3/8	1 1/2	2,700	0.25
EN-5-SS	1/2-13	7/8	5/8	1 1/4	2	2 1/2	3/8	1 1/2	2,700	0.23
EN-7-SS	5/8-11	1 3/8	3/4	1 1/2	2 1/2	3	1/2	1 3/4	5,000	0.56
EN-8-SS	3/4-10	1 3/8	3/4	1 1/2	2 1/2	3	1/2	1 3/4	5,000	0.55

Blanks in stock. (Not passivated or electropolished) Inquire for price.

Enter your Dealer Code

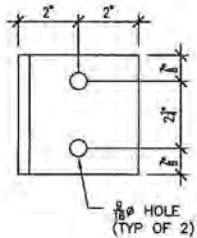



Email PWS

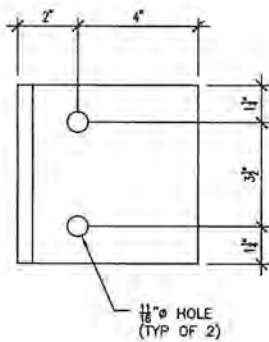


*Our thoughts and  
prayers are with all  
of our Armed Forces  
and their families.*

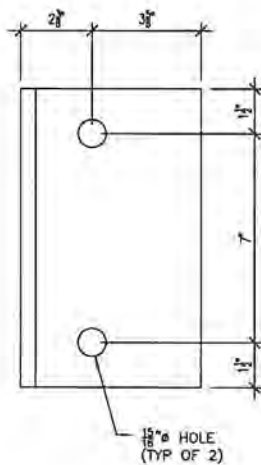
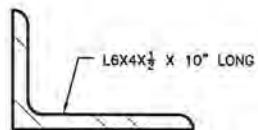




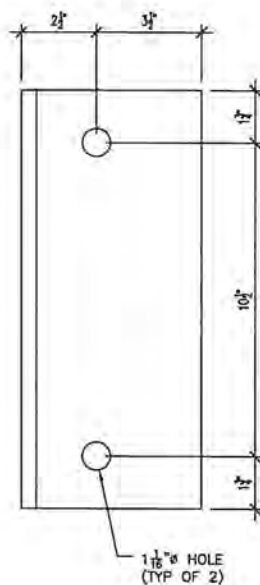
L4-4



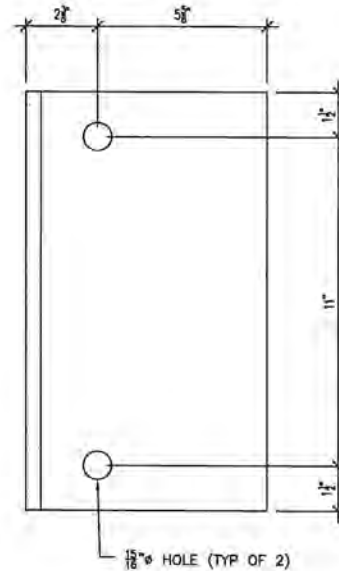
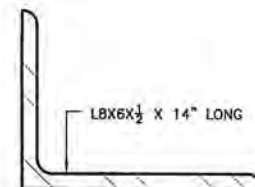
L6-6



L6-10



L6-14



L8-14

CONFIDENTIAL PROPERTY OF  
POLY PROCESSING CO.  
NOT FOR REPRINT OR USE WITHOUT  
PERMISSION OF POLY PROCESSING CO.

**LANE ENGINEERS INC.**  
CIVIL • STRUCTURAL • SURVEYING  
979 N. Blackstone Street  
Tulare, California 93274  
(659) 888-6283

REVISIONS

MANUFACTURER:  
POLY PROCESSING CO.  
WESTERN REGION  
8055 South Ash Street  
French Camp, CA 95231  
PH (209) 982-4904

2009 IBC  
RESTRAINT CLIPS

NAME J.A.  
DATE 07-21-2011  
SCALE NOTED  
CHECKED D.K.A.  
DRAWING NO. CLIP-01  
JOB NO.