

**CONTRACT DOCUMENTS**  
**FOR THE CONSTRUCTION OF THE**  
**DEKOVEN TANKS REPLACEMENT**



**SAN MATEO COUNTY, CALIFORNIA**

**MAY 2021**



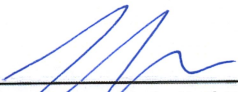
Pakpour Consulting Group, Inc.




**Acknowledgment**

**MID-PENINSULA WATER DISTRICT  
DEKOVEN TANKS REPLACEMENT**

These specifications and plans have been prepared by or under the direction of the following design professionals, licensed by the State of California, for each of the various disciplines involved:

  
\_\_\_\_\_  
Joubin Pakpour, P.E. Civil Engineer  
Reg. No. 59155



  
\_\_\_\_\_  
Subhashchandra Patel, S.E. Structural Engineer  
Reg. No. 4233



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**MID-PENINSULA WATER DISTRICT  
DEKOVEN TANKS REPLACEMENT  
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## ADVERTISEMENT FOR PROPOSALS

**Mid-Peninsula Water District  
3 Dairy Lane  
Belmont, CA 94002**

Sealed PROPOSALS for the **Dekoven Tanks Replacement** whether mailed or personally delivered, must be received by the Mid-Peninsula Water District (District) staff by **2:00 P.M., Thursday, July 8, 2021**, at District's office located at 4 Dairy Lane, Belmont, CA 94002. PROPOSALS will then be publicly opened and read aloud at the administrative offices.

PROPOSALS received after 2:00 P.M. will not be accepted. PROPOSALS will not be accepted if they are delivered by fax, telephone or other electronic means. Bidders dropping a PROPOSAL in the District's mail slot are advised to confirm receipt by District staff via e-mail. BIDDER can contact Victor Fung at (925) 224-7717 with any questions.

The project consists of replacing two existing steel tanks of 1.0 and 0.76 MG capacity and replacing with two seismically reinforced 0.98 and 0.82 MG welded steel tanks with appurtenances. The project also consists of concrete foundations, installation of 8" and 12" isolation valves, 12" ductile iron pipe (DIP) water main improvements, chemical feed system and building shed, pneumatic tank seismic upgrades, two seismic inlet/outlet tank assemblies, two interior mixing units, tank level copper transducer lines, digital tank level, cathodic protection, and site improvements consisting of a fire hydrant retaining wall, concrete and asphalt vertical curb, minor concrete (curb and gutter, driveway approach), asphalt replacement, site grading, storm drain inlet structures and gate valve replacements.

The project is located in the City of Belmont, County of San Mateo, California between 2518 and 2424 Dekoven Avenue. The work will be done for the **Mid-Peninsula Water District** (i.e., referred to herein as the "Owner" or as the "District").

The CONTRACT DOCUMENTS may be examined at the following location:

Pakpour Consulting Group  
5776 Stoneridge Mall Road, Suite 320  
Pleasanton, CA 94588  
(925) 224-7717

San Francisco Builders Exchange  
850 South Van Ness Avenue  
San Francisco, CA 94110  
(415) 282-8220

Builders Exchange of Santa Clara  
400 Reed Street  
Santa Clara, CA 95050  
(408) 727-4000

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

If a BIDDER wishes to review a set of CONTRACT DOCUMENTS at Pakpour Consulting Group, the bidder must contact Victor Fung at (925) 224-7717 to schedule a date and a time.

To bid the project, potential BIDDER must purchase the CONTRACT DOCUMENTS from the District. Plan houses and Bidders who purchased the CONTRACT DOCUMENTS will receive copies of the addendums and updates.

Copies of the CONTRACT DOCUMENTS may be obtained from Pakpour Consulting Group, Inc. at the above address upon payment of \$50.00 for each set. **Make checks payable to “Mid-Peninsula Water District.” The payment is nonrefundable.**

**A mandatory pre-bid meeting and tour is tentatively scheduled to be held on Thursday, June 10, 2021 at 10:00 A.M.** at District’s office (see Figure 1), located at 3 Dairy Lane, Belmont, CA 94002. Please contact Victor Fung at (925) 224-7717 to verify the date, time, and location and to receive further updates on this project.

BIDDER must have purchased a copy of the CONTRACT DOCUMENTS and complete the mandatory pre-bid meeting to be considered eligible to bid the project. PROPOSALS submitted by parties not attending the pre-bid meeting will be rejected.

The BIDDER must possess a valid Class A Contractor’s license in the State of California at the time of CONTRACT award and throughout the CONTRACT term. The tank contractor must have performed and successfully completed three (3) welded steel water tank (over 0.5 MG capacity) projects over the last five (5) years. In addition, the project foreman must verify he/she was in charge of at least five (5) previous projects, three (3) of which were welded steel water tank projects.

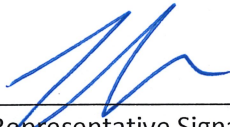
The pipeline contractor responsible for installing the water main must have successfully completed three (3) ductile iron pipe (DIP) water main installation projects of 12” or larger diameter with appurtenances over the last five (5) years.

This project includes public works as defined by California Labor Code section 1720. The successful BIDDER shall be responsible for the payment of prevailing wage rates, the training of apprentices and compliance with other related requirements. The prevailing wage rates for the Contract include the California Department of Industrial Relations’ General Prevailing Wage Determinations: 2020-1. Copies of applicable prevailing wage rates may be viewed online at <http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm>.

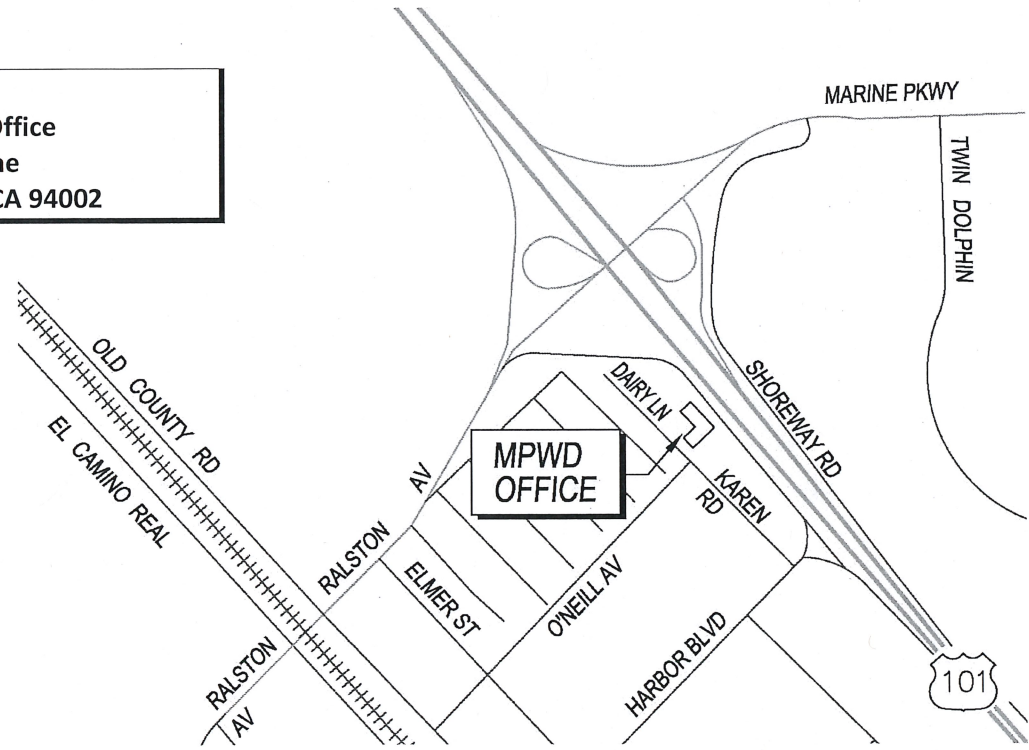
Contractors and subcontractors must be registered with the Department of Industrial Relations (DIR) at the time of bid, or else the bid may be rejected as non-responsive. (See Labor Code sections 1725.5 and 1771.1.) Each BIDDER must submit proof of Contractor registration with DIR (e.g. a hard copy of the relevant page of the DIR’s database found at: <https://efiling.dir.ca.gov/PWCR/Search>). This Contract is subject to monitoring and enforcement by the DIR pursuant to Labor Code Section 1771.4.

Pursuant to Public Contract Code Section 22300, the successful BIDDER may submit certain securities in lieu of the Owner retaining a portion of progress payments during the Project. The successful BIDDER will be required to furnish a Performance Bond and a Payment Bond, both in the amounts not less than one hundred percent (100%) of the contract price.

5/28/21  
Date

  
District Representative Signature

**Figure 1 –  
District's Office  
3 Dairy Lane  
Belmont, CA 94002**



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## INFORMATION FOR BIDDERS

Sealed PROPOSALS for the **Dekoven Tanks Replacement** whether mailed or personally delivered, must be received by the **Mid-Peninsula Water District** staff by **2:00 P.M., Thursday, July 8, 2021**, at District's administrative office located at **3 Dairy Lane, Belmont, CA 94002**. PROPOSALS will then be publicly opened and read aloud at the administrative offices.

PROPOSALS received after 2:00 P.M. will not be accepted. No telephonic, facsimile or other electronically transmitted PROPOSALS will be accepted. Bidders dropping a PROPOSAL in the District's mail slot are advised to confirm receipt by District staff via e-mail. BIDDER can contact Victor Fung, at 925-224-7717 with any questions.

Each PROPOSAL must be submitted in a sealed envelope, addressed to the **Mid-Peninsula Water District**. Each sealed envelope containing a PROPOSAL must be plainly marked on the outside as PROPOSAL for **Dekoven Tanks Replacement**. The envelope should bear on the outside the BIDDER'S name, address, and license number.

All PROPOSALS must be made on the required PROPOSAL form. All blank spaces for PROPOSAL prices must be filled in (in ink or typewritten), and the PROPOSAL form must be fully completed and executed when submitted. Only one copy of the PROPOSAL form is required.

At its discretion, the DISTRICT may waive minor irregularities in the proposal, or reject any and all PROPOSALS. Any PROPOSAL may be withdrawn prior to the above scheduled time for the opening of PROPOSALS or authorized postponement thereof. Any PROPOSAL received after the time and date specified shall not be considered. No BIDDER may withdraw a PROPOSAL within One Hundred Twenty (120) calendar days after the actual date of the opening thereof. Should there be reasons why the CONTRACT cannot be awarded within the specified period, the time may be extended by mutual agreement between the DISTRICT and the BIDDER.

The CONTRACT DOCUMENTS contain the provisions required for completing the project. Information obtained from an officer, agent, or employee of the DISTRICT or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve the CONTRACTOR from fulfilling any of the conditions of the CONTRACT.

Each PROPOSAL must be accompanied by a Bidder's Bond, or a certified or cashier's check, payable to the DISTRICT for ten (10) percent of the total amount of the PROPOSAL. The DISTRICT will return the bonds of the remaining unsuccessful BIDDERS after the CONTRACT is executed. The Bidder's Bond of the successful BIDDER will be retained until the Performance Bond and Payment Bond have been executed and approved, after which it will be returned.

The party, or parties, to whom the CONTRACT is awarded will be required to execute the CONTRACT and obtain the Performance/Payment Bonds (both in the amounts not less than one hundred percent (100%) of the contract price), and insurance within fifteen (15) calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The NOTICE OF AWARD shall be accompanied by the necessary CONTRACT and bond forms. In case of failure of the BIDDER to execute the CONTRACT, the DISTRICT may consider the BIDDER in default, in which case the Bid Bond accompanying the proposal shall be forfeited by the BIDDER.

After receiving the signed CONTRACT with acceptable bonds and insurance certificates from the successful BIDDER, the DISTRICT will sign the CONTRACT.

As soon as practicable, after execution of the CONTRACT by the DISTRICT, approval by the DISTRICT of Contract Bonds and all other documents listed in the CONTRACT, and after receipt of acceptable insurance certificates by the DISTRICT, a written NOTICE TO PROCEED will be mailed to the BIDDER. The effective date of the NOTICE TO PROCEED will be the date stated as such in the NOTICE TO PROCEED, provided that the effective date will not be earlier than the day following the issuance of the NOTICE TO PROCEED.

The DISTRICT may make such investigations as deemed necessary to determine the ability of the BIDDER to perform the work, and the BIDDER shall furnish to the DISTRICT all such information and data for this purpose as the DISTRICT may request.

The DISTRICT reserves the right to reject any PROPOSAL if the evidence submitted by, or investigation of, such BIDDER fails to satisfy the DISTRICT that such BIDDER is a "responsible bidder" as defined in Public Contract Code Section 1103.

A conditional or qualified PROPOSAL will not be accepted.

Award will be made to the lowest responsive, responsible BIDDER. The lowest responsive, responsible BIDDER will be determined by: (1) lowest overall cost to the DISTRICT, (2) evaluation of BIDDER's experience to determine that it meets the minimum qualifications, (3) a BIDDER's proposal that complies with all the requirements prescribed in this document. The BIDDER must possess a valid Class A Contractor's license in the State of California at the time of CONTRACT award and throughout the CONTRACT term. The Contractor will also be required to ensure that all subcontractors working on the project are holding valid licenses suitable for their trades. The proposals will be compared on the basis of the "Total Bid Price".

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the CONTRACT throughout.

Each BIDDER shall certify that he, or his representative, has inspected the site and has attended the pre-bid meeting and tour and has read and is thoroughly familiar with the CONTRACT DOCUMENTS. Failure to attend and complete the pre-bid meeting and tour disqualifies the BIDDER. A sign-in sheet will be used to confirm completion of the pre-bid meeting. Late arrivals will also be disqualified. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to its PROPOSAL. After PROPOSALS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the nature of the work to be done.

Pursuant to Public Contract Code Section 22300, the successful BIDDER may submit certain securities in lieu of the Owner withholding retention of payments during the project.

Further, the BIDDER agrees to abide by the requirements under Executive Order No. 11246, as amended, including specifically the provisions of the Equal Opportunity Clause.

Each BIDDER shall supply, using the forms provided in this document, the names and addresses of all SUBCONTRACTORS and shall complete and submit the STATEMENT OF QUALIFICATIONS, EXPERIENCE, AND BUSINESS REFERENCES when submitting his PROPOSAL.



The services of the Contractor required under this Contract constitute a "public works" project as defined by the California Labor Code. Therefore, the Contractor agrees to comply with all applicable prevailing wage requirements set forth in California Labor Code Sections 1770 to 1781 inclusive. All workers employed on or in the execution of the project shall be paid not less than the applicable current general prevailing wage as determined by the Director of Industrial Relations. The current General Prevailing Wage Determinations located on the Department of Industrial Relations' website (<https://www.dir.ca.gov/opri/PWD/index.htm>), shall be incorporated into this Contract. The Contractor shall be responsible for the compliance of its subcontractors. The Contractor's attention is directed to the payroll records requirement of Labor Code Section 1776, and Contractor and its subcontractors will keep an accurate payroll record, showing the name, address, social security number, work classification, straight time, and overtime hours worked each day and week, and the actual per diem wages paid to each worker in connection with services performed under this Contract, and will make payroll records available upon request.

Pursuant to Labor Code Section 1725.5, no Contractor may submit a Bid Proposal for this project, and no subcontractor may be listed in the Bid Proposal for this project, unless the Contractor/Subcontractor is registered with the California Department of Industrial Relations ("DIR") at the time of the Bid Proposal submission. Failure of the Contractor or any Subcontractor to be registered with the DIR may result in rejection of the Bid Proposal. This project is subject to monitoring and enforcement by the DIR pursuant to Labor Code Section 1771.4. The Contractor must post site notices, as described by Title 8, CCR Section 16541(d).

Also, prior to the beginning of work, a pre-construction meeting will be held at the DISTRICT for the purpose of discussing with the Contractor the scope of work, contract drawings, Specifications, existing conditions, materials to be ordered, equipment used, and all essential matters pertaining to the prosecution of and the satisfactory completion of the project as required. The Contractor's Project Manager, Project Foreman, and subcontractor shall attend the pre-construction meeting.

Pakpour Consulting Group, Inc., the ENGINEER, is the project engineer representing the Mid-Peninsula Water District, the DISTRICT. Questions should be directed to the ENGINEER's Pleasanton office as follows:

Pakpour Consulting Group, Inc.  
5776 Stoneridge Mall Road, Suite 320  
Pleasanton, CA 94588  
(925) 224-7717  
(925) 224-7726 fax  
Attention: Victor Fung

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## PROPOSAL

**TO: Mid-Peninsula Water District  
3 Dairy Lane  
Belmont, CA 94002**

**PROJECT TITLE: Dekoven Tanks Replacement**

### **BIDDER'S DECLARATIONS AND AGREEMENTS**

The undersigned, \_\_\_\_\_ hereinafter called the Bidder,  
(Contractor's Name)

hereby proposes to perform all work and to furnish all labor, services, materials, tools, equipment, supplies, transportation and all other items and facilities necessary to complete all work for the above-named Project as specified or indicated in the Contract Documents for the price set forth below in this Proposal.

The Bidder has carefully examined all of the Contract Documents for the Project, including the Notice to Contractors, this Proposal and documents submitted together with it, the Contract, the General Provisions, the Special Provisions, the Specifications, the Contract Drawings and all Addenda. All provisions of the Contract Documents are hereby accepted and all representations and warranties required thereby are hereby affirmed.

The Bidder has by investigation of the site of the work and otherwise satisfied himself as to the nature, scope and location of the work and has fully informed himself as to all conditions and matters which can in any way affect the work or the cost thereof, including quantities of materials and equipment required. The Bidder has exercised his own judgment regarding the interpretation of subsurface information and has utilized all data, which he believes pertinent from the District and other sources in arriving at his conclusions.

The Bidder has carefully checked all the words and figures inserted in this Proposal and understands that it may not be revoked or withdrawn for One Hundred Twenty (120) calendar days after the date on which Proposals are opened and all bids shall be subject to acceptance by the District.

### **QUALIFICATIONS OF THE BIDDER**

The Bidder certifies that he or she is familiar with all applicable federal, state, and local laws applicable to the work, and hereby agrees to comply with all such laws.

Furthermore, the Bidder hereby declares that he or she can perform all work as described in the advertisement of proposal.

The BIDDER must possess a valid Class A Contractor's license in the State of California at the time of CONTRACT award and throughout the CONTRACT term. The tank contractor must have performed and successfully completed three (3) welded steel water tank (over 0.5 MG capacity) projects over the last five (5) years. In addition, the project foreman must verify he/she was in charge of at least five (5) previous projects, three (3) of which were welded steel water tank projects.

The pipeline contractor responsible for installing the water main must have successfully completed three (3) ductile iron pipe (DIP) water main installation projects of 12" or larger diameter with appurtenances over the last five (5) years.

**CONTRACT EXECUTION AND BONDS**

The Bidder agrees that if this Proposal is accepted, they will, within fifteen (15) calendar days after having received notice of award, sign and deliver the Contract in the form included in the Contract Documents and will at that time deliver to the District the Performance Bond and Payment Bond required herein.

**CERTIFICATES OF INSURANCE**

The Bidder agrees that if this Proposal is accepted, he will, within fifteen (15) calendar days after receiving notice of award, furnish the District with certificates and policies of insurance as specified in the Contract Documents.

**START OF CONSTRUCTION AND CONTRACT COMPLETION TIME**

If awarded the Contract, the Bidder agrees to begin work within five (5) working days after the effective date of the Notice to Proceed and to complete the work, in all respects, within **Three-Hundred-Seventy-Five (375) working days** from the effective date of the Notice to Proceed.

**LIQUIDATED DAMAGES**

If the Bidder is awarded the Contract but fails to complete the work within the Contract time of completion limit set forth above, or as it may be extended as provided in the Contract Documents, the Bidder agrees to pay liquidated damages to the District at the rate of **One-Thousand-Seven Hundred-Fifty Dollars (\$1,750.00) per day** until the work is completed.

**ADDENDA**

The Bidder hereby acknowledges that they have received the following attached Addenda Nos.: \_\_\_\_\_ (Bidder: insert number of each Addendum received **and attach a copy to this Proposal**) and agrees that all Addenda issued are a part of the Contract Documents. The Bidder agrees that this Proposal includes all impacts resulting from these Addenda.

**SALES AND USE TAXES**

The Bidder agrees that all federal, state and local sales and use taxes are included in the price for the work set forth below.

**BID SECURITY**

Bidder has accompanied this proposal with a Bid Security in the amount and in the form required by these Contract Documents. The Bid Security and the proceeds there from shall become the property of the District in the event that Bidder's proposal is accepted by the District and Bidder fails to sign and deliver the Contract and to furnish the required bonds and certificates of insurance within the time period set forth in this Proposal and in the Contract Documents.

**AWARD OR REJECTION OF BIDS**

Award will be made or proposals rejected by the District within the time specified in the Special Provisions or proposal documents, or if not specified, within a reasonable time after bids have been opened. The District may reject any or all bids, and shall reject a bid of any party who has been delinquent or non-responsible in any former Contract with the District. The District also reserves the right to waive any minor irregularities in any bid or in the bidding procedures.

Contractor shall submit for review a Bidder’s Statement of Qualifications, Experience, and Business References for this type of work.

The award of the project will be compared on the basis of the “Total Bid Price.”

All Bidders shall be notified of the award.

**PROPOSAL DOCUMENTS**

Accompanying this Proposal are the following documents, which have been properly completed and executed, and the same hereby are made a part of this Contract by reference: List of Subcontractors, Non-Collusion Declaration, Bidder's Bond or Bid Security Form, Bidder's Statement of Qualifications, Experience, and Business References

**BID SCHEDULE**

The Bidder agrees to accept as full payment for the construction of the Project, in accordance with the Contract Documents, the amount computed in accordance with the following prices, which includes all costs for labor, materials, tools, equipment, services, taxes, insurance, overhead, profit, warranty performance and all other costs necessary to perform the work in accordance with the Contract Documents. It is expressly agreed that unit prices are not dependent on the exact quantity furnished. Bid prices shall be shown in both words and figures. In case of a discrepancy, the amount in words has precedence.

**SURETY**

If the Bidder is awarded the Contract, the surety who will provide the Performance Bond

and Payment Bond will be \_\_\_\_\_

Whose address is \_\_\_\_\_

\_\_\_\_\_  
(City)

\_\_\_\_\_  
(State)

\_\_\_\_\_  
(Zip Code)

**BIDDER**

The name of the Bidder submitting this Proposal is \_\_\_\_\_

The address to which all communications concerned with this Proposal and the contract shall be sent is \_\_\_\_\_

\_\_\_\_\_  
(City) (State) (Zip Code)

The Bidder declares under penalty of perjury that the Bidder's Contractor's License No. is \_\_\_\_\_ and that this license expires on \_\_\_\_\_, \_\_\_\_\_  
Date

and Bidder is registered with the Department of Industrial Relations (DIR) No. is \_\_\_\_\_ and that this license expires on \_\_\_\_\_.  
Date

The Bidder's Telephone Number ( ) \_\_\_\_\_

**SIGNATURE**

1. If Sole Owner

I sign as sole owner of the business named above as Bidder.

\_\_\_\_\_  
Signature of Bidder  
Name: \_\_\_\_\_ Date: \_\_\_\_\_

2. If Partnership

The undersigned certifies that he is a general partner in the Partnership named above as Bidder and that he has full authority to sign this Proposal on behalf of the Partnership.

\_\_\_\_\_  
Signature of Partner  
Name: \_\_\_\_\_ Date: \_\_\_\_\_

3. If Corporation

The undersigned certify that they are officers of the Corporation named above as Bidder and have full authority to sign this Proposal on behalf of the Corporation.

\_\_\_\_\_  
Name of Corporation \*

\*If Bidder is a Corporation, two corporate officers must execute the proposal (or agreement) consisting of the following: 1.) the President, Vice President or Chair of the Board and 2.) the Secretary, Assistant Secretary, Chief Financial Officer or Assistant Treasurer. If only one officer signs or an officer other than those specified above, the Corporation shall provide satisfactory evidence that the individual signing is authorized to sign on behalf of the corporation (e.g. copy of a certified resolution delegating authority, copy of the corporation bylaws addressing execution of contracts.)

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

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

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

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

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

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

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

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

4. If Joint Venture

The undersigned certify that they have full authority to sign this Proposal on behalf of the Joint Venture named above as Bidder.

\_\_\_\_\_  
Name of Joint Venture

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

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

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

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

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

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

Date: \_\_\_\_\_, 20 \_\_\_\_\_

Date \_\_\_\_\_, 20 \_\_\_\_\_

(Submit statement explaining the nature of the individual entities which comprise the Joint Venture and evidence of authority of individuals who sign this Proposal to do so on behalf of the Joint Venture.)

5. If Limited Liability Company (LLC)

The undersigned certifies that he/she is an officer or member of the LLC named above as Bidder and full authority to sign this Proposal on behalf of the LLC.

\_\_\_\_\_  
Name of LLC

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



**BID SCHEDULE  
DEKOVEN TANKS REPLACEMENT**

ITEM NO.	ITEM DESCRIPTION	UNITS	QTY	UNIT COST	TOTAL COST
1	Mobilization	LS	1	_____	_____
2	Construction Funding Signs and Traffic Control	LS	1	_____	_____
3	Water Trailer – Fire Protection	LS	1	_____	_____
4	Street Sweeper	DAY	10	_____	_____
5	Site Demolition	LS	1	_____	_____
6	Landscape Clearing	LS	1	_____	_____
7	Site Grading	LS	1	_____	_____
8	East Tank Demolition	LS	1	_____	_____
9	West Tank Demolition	LS	1	_____	_____
10	Phase 2 – Positive Location #1 thru #3	LS	1	_____	_____
11	Phase 3 – East Tank Connection Feed	LS	1	_____	_____
12	Phase 4 –East Tank, Pump Station, and Zone 3 Connection	LS	1	_____	_____
13	Phase 5 – Positive Location #4 thru #6	LS	1	_____	_____
14	Phase 7 – 12” Connections	LS	1	_____	_____
15	Phase 8 – West Tank Connection	LS	1	_____	_____
16	East Tank Foundation	LS	1	_____	_____
17	East Tank Concrete Foundation	LS	1	_____	_____
18	East Water Tank (0.82 MG) and Appurtenances	LS	1	_____	_____
19	East Tank Coating	LS	1	_____	_____

**BID SCHEDULE  
DEKOVEN TANKS REPLACEMENT**

ITEM NO.	ITEM DESCRIPTION	UNITS	QTY	UNIT COST	TOTAL COST
20	East Tank Concrete Swale	LF	170	_____	_____
21	West Tank Foundation	LS	1	_____	_____
22	West Tank Concrete Foundation	LS	1	_____	_____
23	West Water Tank (0.97 MG) and Appurtenances	LS	1	_____	_____
24	West Tank Coating	LS	1	_____	_____
25	West Concrete Swale	LF	190	_____	_____
26	East and West Tank Inlet/Outlet Flex-Tend Tank Assembly	EA	2	_____	_____
27	Tank Mixer Unit	EA	2	_____	_____
28	Tank Level Copper Line Sensor	LS	1	_____	_____
29	Tank Cathodic Protection	EA	2	_____	_____
30	Chemical Feed Mixing System, Building Enclosure and Foundation	LS	1	_____	_____
31	Electrical Line Fee Connection	LS	1	_____	_____
32	Pneumatic Tank 6" Seismic Retrofit	LS	1	_____	_____
33	Dehumidification Equipment	WK	10	_____	_____
34	Pneumatic Tank Coating	LS	1	_____	_____
35	12" DIP Water Main	LF	155	_____	_____
36	10" DIP Water Main	LF	20	_____	_____
37	8" DIP Water Main	LF	20	_____	_____
38	12" Gate Valves	EA	7	_____	_____

**BID SCHEDULE  
DEKOVEN TANKS REPLACEMENT**

ITEM NO.	ITEM DESCRIPTION	UNITS	QTY	UNIT COST	TOTAL COST
39	8" Gate Valves	EA	1	_____	_____
40	2" Combination Air Valve	EA	1	_____	_____
41	3x2 Drop Inlet and Apron	EA	2	_____	_____
42	2x2 Area Drain/ Drop Inlet Structures	EA	3	_____	_____
43	2X2 Drop Inlet Replacement Covers	EA	2	_____	_____
44	8" Schedule 40 PVC SD Line	LF	80	_____	_____
45	Removable Bollards	EA	4	_____	_____
46	6" AC Berm	LF	210	_____	_____
47	6" Concrete Berm	LF	15	_____	_____
48	4" AC Paving Replacement	TON	300	_____	_____
49	Fire Hydrant Wood Retaining Wall	EA	1	_____	_____
50	Type E Curb and Gutter	LF	25	_____	_____
51	Type A Curb and Gutter	LF	93	_____	_____
52	Concrete Driveway and Approach	SF	360	_____	_____
53	Concrete Step Removal and Aluminum Step Replacement	LS	1	_____	_____
54	1" Service and Backflow Preventer	LS	1	_____	_____
55	Weather Stee Tank (A588) Cost Difference	LS	1	_____	_____

**Total Bid Price:** \_\_\_\_\_

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## LIST OF SUBCONTRACTORS

The Bidder is required to furnish the following information in accordance with the provisions of Sections 4100 to 4114, inclusive, of the Public Contract Code of the State of California. This list and information shall include all subcontractors that will perform work, provide labor or render services to the Bidder in connection with the project in an amount in excess of one-half of one percent of the total amount of Bidder's proposal. Each subcontractor shall be registered with the Department of Industrial Relations (DIR) and shall provide and list their Registration Number.

1. Name of Subcontractor: \_\_\_\_\_

Licensed Number: \_\_\_\_\_

DIR Registration No: \_\_\_\_\_

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

Description of Work to be Done Under Subcontractor: \_\_\_\_\_

Total Value of Work: \_\_\_\_\_

2. Name of Subcontractor: \_\_\_\_\_

Licensed Number: \_\_\_\_\_

DIR Registration No: \_\_\_\_\_

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

Description of Work to be Done Under Subcontractor: \_\_\_\_\_

Total Value of Work: \_\_\_\_\_

3. Name of Subcontractor: \_\_\_\_\_

Licensed Number: \_\_\_\_\_

DIR Registration No: \_\_\_\_\_

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

Description of Work to be Done Under Subcontractor: \_\_\_\_\_

Total Value of Work: \_\_\_\_\_

Do not list alternative subcontractors for the same work.

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

The undersigned declares:

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

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

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

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on \_\_\_\_\_ [date], at \_\_\_\_\_ [city], \_\_\_\_\_ [state]."

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

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

**INTENTIONALLY LEFT BLANK**



**BIDDER'S BOND**

BOND NO. \_\_\_\_\_

AMOUNT: \$ \_\_\_\_\_

KNOW ALL PERSONS BY THESE PRESENTS, that  
\_\_\_\_\_ hereinafter called  
the PRINCIPAL, and \_\_\_\_\_,  
a corporation duly organized under the laws of the State of \_\_\_\_\_ having its  
principal place of business at \_\_\_\_\_, in  
the State of \_\_\_\_\_, and authorized to do business in the State of California,  
hereinafter called the SURETY, are held and firmly bound unto the **Mid-Peninsula Water District**,  
hereinafter called the OBLIGEE, or order in the sum of \_\_\_\_\_  
Dollars (\$ \_\_\_\_\_) (being at least ten percent (10%) of the total amount of Principal's  
proposal) lawful money of the United States, for the payment of which we bind ourselves, our  
heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these  
presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT:

WHEREAS, the PRINCIPAL has submitted its Proposal for the project entitled **Dekoven Tanks Replacement** to the OBLIGEE, said Proposal, by reference thereto, being hereby made a part hereof.

NOW, THEREFORE, if said Proposal is rejected, or in the alternate, if said Proposal is accepted and the PRINCIPAL signs and delivers a Contract and furnishes a Performance Bond, Payment Bond, and a Certificate of Insurance evidencing the required insurance in the form and within the time required by the Proposal and the Contract Documents, then this obligation shall become null and void, otherwise the same shall remain in full force and effect, it being expressly understood and agreed that the liability of the SURETY for any and all default of the PRINCIPAL shall be the amount of this obligation as herein stated.

The SURETY, for value received, hereby agrees that the obligations of said SURETY and its bond shall not be impaired or affected by any extension of the time within which the OBLIGEE may accept such Proposal, and the SURETY hereby waives notice of any such extension.

In the event suit is brought upon this bond by the OBLIGEE and judgment is recovered, the SURETY shall pay, in addition to the sum set forth above, all costs incurred by the OBLIGEE in such suit, including a reasonable attorney's fees, to be fixed by the Court.

Signed this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_

(SEAL)

Principal: \_\_\_\_\_

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

(SEAL AND NOTARIAL  
ACKNOWLEDGEMENT  
OF SURETY

Surety:

By \_\_\_\_\_  
Attorney-in-Fact

\* \* \*

Note: To be considered complete, both the principal and the surety must sign this bidder's bond. In addition, the surety's signature must be notarized and a copy of the surety's power of attorney must be attached.

**BID SECURITY FORM**

(TO BE USED IF A CHECK, RATHER THAN A  
BIDDER'S BOND, ACCOMPANIES PROPOSAL)

Accompanying this Proposal is a cashier's check or certified check payable to the **Mid-Peninsula Water District** (hereinafter referred to as "Owner")

for \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) this amount being at least 10 percent of the total amount of the Proposal. This check shall become the property of the Owner, and it shall be entitled to its proceeds, if the Bidder's Proposal is accepted by the Owner and the Bidder fails to sign and deliver the Contract and to furnish the required bonds and a Certificate of Insurance evidencing the required insurance within the time set forth in the Proposal and other Contract Documents. Otherwise the check shall be returned to the Bidder at the time set forth in the Contract Documents.

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**BIDDER'S STATEMENT OF QUALIFICATIONS  
EXPERIENCE AND BUSINESS REFERENCES**

**MID-PENINSULA WATER DISTRICT  
DEKOVEN TANKS REPLACEMENT**

The Bidder shall provide all of the following information requested, and shall ensure that all items are filled out completely. The Bidder hereby agrees that the submission of incomplete or false information may be considered as just cause for rendering the Bidder's Proposal as "non-responsive."

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

Address of Principal Office \_\_\_\_\_

1. Are you an individual \_\_\_\_\_, a partnership \_\_\_\_\_, a corporation \_\_\_\_\_, or a joint venture \_\_\_\_\_, or LLC \_\_\_\_\_? (Check as applicable)

If a partnership, list names and addresses of partners; if a corporation or LLC, list names of officers and directors and State of incorporation; if a joint venture, list names and addresses of venturers and if any venturer is a corporation, partnership or joint venture, list the same information for each such corporation, partnership and joint venture.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

For the following questions, if a joint venture, give information for each of the venturers, by name. Attach additional sheets if necessary.

2. How many years has your organization been in business as a Contractor under your present business name? \_\_\_\_\_

3. How many years of experience has your organization had in construction work similar to the work you are interested in bidding?

(a) As a general contractor? \_\_\_\_\_

(b) As a subcontractor? \_\_\_\_\_

**MANDATORY MINIMUM EXPERIENCE AND QUALIFICATION REQUIREMENTS**

Bidders must satisfy each of the following mandatory minimum experience and qualification requirements. The requirements are "Pass/Fail" in that, if a bidder does not satisfy any of the mandatory requirements, the bid may be rejected as non-responsive.

Name of Contractor \_\_\_\_\_

4. Are you licensed as a Contractor to do business in California? \_\_\_\_\_  
License No. \_\_\_\_\_ Classification \_\_\_\_\_  
Department of Industrial Relations (DIR) Registration No. \_\_\_\_\_

5. **For Tank Builders Bidders (or Subcontractor)** - It is mandatory that the bidder has successfully completed, or is currently working on at least three (3) welded steel water tank (over 0.5 MG capacity) projects over the last five (5) years. Accordingly, the following information must be provided for each project:

(a) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(b) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(c) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

**For Pipeline Bidders (or Subcontractor)** - It is mandatory that the bidder has successfully completed, or is currently working on at least three (3) ductile iron pipe (DIP) water main installation projects of 12" or larger diameter with appurtenances over the last five (5) years. Accordingly, the following information must be provided for each project:

(a) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(b) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(c) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

6. **For Tank Builders Bidders (or Subcontractor)** - It is mandatory that the foreman designated for this project must have been the person in charge for at least (5) previous construction projects three (3) of which must be exclusively welded steel water tanks. Accordingly, the following information must be provided for each project for which the foreman was in charge.

Name of Individual \_\_\_\_\_

Detail of Similar Projects

(a) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference Name: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(b) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference Name: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(c) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference Name: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(d) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference Name: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(e) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference Name: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

**For Pipeline Bidders (or Subcontractor)** - It is mandatory that the foremen designated for this project must have been the person in charge for at least three (3) ductile iron pipe (DIP) water main installation projects of 12" or larger diameter with appurtenances over the last five (5) years. Accordingly, the following information must be provided for each project:

Name of Individual \_\_\_\_\_

Detail of Similar Projects

(a) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference Name: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(b) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference Name: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(c) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference Name: \_\_\_\_\_  
Phone Number: \_\_\_\_\_



(d) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference Name: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(e) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference Name: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

**BIDDER'S GENERAL QUALIFICATION INFORMATION**

7. Please provide the following information all projects performed over the last five (5) years:

(a) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(b) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(c) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(d) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

(e) Project: \_\_\_\_\_ Year: \_\_\_\_\_  
Value of Work: \$ \_\_\_\_\_ Location: \_\_\_\_\_  
Owner Reference: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

8. Please provide the following information regarding the individual designated as the project foreman:

Name of Foreman: \_\_\_\_\_

All Construction Training and Education: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

All Construction –Related Certifications: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9. Have you or your organization, or any officer or partner thereof, failed to complete a contract? \_\_\_\_\_ If so, give details.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10. In what other lines of business are you financially interested?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11. Name the persons with whom you have been associated in business as partners or business associates in each of the last four years.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

12. Provide information below about the experience of the principal individuals of your present organization including those individuals to be in charge of this project.

Name: \_\_\_\_\_

Present Position: \_\_\_\_\_ No. Years of Construction Experience \_\_\_\_\_

Type of Work: \_\_\_\_\_

Name: \_\_\_\_\_

Present Position: \_\_\_\_\_ No. Years of Construction Experience \_\_\_\_\_

Type of Work: \_\_\_\_\_

Name: \_\_\_\_\_

Present Position: \_\_\_\_\_ No. Years of Construction Experience \_\_\_\_\_

Type of Work: \_\_\_\_\_

13. Provide information below about your five (5) most current contracts underway, or for which you are committed.

(a) Type of Work \_\_\_\_\_ Location \_\_\_\_\_

Value \$ \_\_\_\_\_ Percent Complete % \_\_\_\_\_ Completion Date \_\_\_\_\_

Performed for Whom? \_\_\_\_\_

(b) Type of Work \_\_\_\_\_ Location \_\_\_\_\_

Value \$ \_\_\_\_\_ Percent Complete % \_\_\_\_\_ Completion Date \_\_\_\_\_

Performed for Whom? \_\_\_\_\_

(c) Type of Work \_\_\_\_\_ Location \_\_\_\_\_

Value \$ \_\_\_\_\_ Percent Complete % \_\_\_\_\_ Completion Date \_\_\_\_\_

Performed for Whom? \_\_\_\_\_

(d) Type of Work \_\_\_\_\_ Location \_\_\_\_\_

Value \$ \_\_\_\_\_ Percent Complete % \_\_\_\_\_ Completion Date \_\_\_\_\_

Performed for Whom? \_\_\_\_\_

(e) Type of Work \_\_\_\_\_ Location \_\_\_\_\_

Value \$ \_\_\_\_\_ Percent Complete % \_\_\_\_\_ Completion Date \_\_\_\_\_

Performed for Whom? \_\_\_\_\_

14. References: Provide the names of at least five (5) engineers, architects, or owners, including public bodies, for whom you have done work recently:

(a) Name \_\_\_\_\_ Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address/City/State \_\_\_\_\_  
Phone Number \_\_\_\_\_

(b) Name \_\_\_\_\_ Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address/City/State \_\_\_\_\_  
Phone Number \_\_\_\_\_

(c) Name \_\_\_\_\_ Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address/City/State \_\_\_\_\_  
Phone Number \_\_\_\_\_

(d) Name \_\_\_\_\_ Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address/City/State \_\_\_\_\_  
Phone Number \_\_\_\_\_

(e) Name \_\_\_\_\_ Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address/City/State \_\_\_\_\_  
Phone Number \_\_\_\_\_

15. References: The following bank or banks can provide references as to the financial responsibility of the Bidder:

(a) Name of Bank: \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City, State and Zip Code: \_\_\_\_\_  
Officer Familiar with Bidder's Account: \_\_\_\_\_  
Telephone: \_\_\_\_\_

(b) Name of Bank: \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City, State and Zip Code: \_\_\_\_\_  
Officer Familiar with Bidder's Account: \_\_\_\_\_  
Telephone: \_\_\_\_\_

(c) Name of Bank: \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City, State and Zip Code: \_\_\_\_\_  
Officer Familiar with Bidder's Account: \_\_\_\_\_  
Telephone: \_\_\_\_\_

16. References: The following surety company or companies can provide references as to the financial responsibility and general reliability of the Bidder:

(a) Name of Surety Company: \_\_\_\_\_  
Name of Local Agent (if different) \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City, State and Zip Code: \_\_\_\_\_  
Person Familiar with Bidder's Account: \_\_\_\_\_  
Telephone: \_\_\_\_\_

(b) Name of Surety Company: \_\_\_\_\_  
Name of Local Agent (if different) \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City, State and Zip Code: \_\_\_\_\_  
Person Familiar with Bidder's Account: \_\_\_\_\_  
Telephone: \_\_\_\_\_

17. Is any litigation pending against your organization in the past 2 years? \_\_\_\_\_ If so, provide details below and on attached pages, if needed.

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The undersigned bidder represents and warrants that the foregoing information is true and accurate to the best of his knowledge and the undersigned intends that the **Mid-Peninsula Water District** rely thereof in awarding the attached contract.

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

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

Dated: \_\_\_\_\_

## CONTRACT

THIS CONTRACT is made and entered into as of this \_\_\_\_ day of \_\_\_\_\_, 2021, by and between the **MID-PENINSULA WATER DISTRICT**, hereinafter called the "Owner" or "District" and \_\_\_\_\_, hereinafter collectively called the "Contractor."

THE PARTIES AGREE AS FOLLOWS:

1. **SCOPE OF WORK.** The Contractor shall perform all the work and furnish all the labor, materials, tools, equipment, machinery, services, transportation, incidentals and appurtenances required to complete the construction and installation of the work in accordance with the plans and specifications approved by the District entitled: **DEKOVEN TANKS REPLACEMENT, dated May 2021**, and which are appended hereto and made part of this agreement.

2. **BEGINNING OF WORK AND CONTRACT TIME OF COMPLETION.** After the Contract has been executed by the Owner, the Contractor shall begin work within five (5) working days from the effective date of the Notice to Proceed, issued by Owner, and shall complete all items required under this Contract within **Three-Hundred-Seventy-Five (375) working days from the effective date of the Notice to Proceed.**

3. **CONTRACT PRICE.** In consideration of the performance of the work as set forth in the Contract Documents, the Owner agrees to pay to the Contractor the amounts set forth in the Contractor's Proposal dated \_\_\_\_\_ 2021, as it may be hereafter adjusted in accordance with the Contract Documents, and to make such payments in the manner and at the times provided in the Contract Documents. The Contractor agrees to complete the work within the time specified herein and to accept as full payment the amounts provided for herein.

4. **COMPONENTS OF CONTRACT.** This Contract shall consist of the following documents each of which is on file in the Owner's office and all of which are hereby referred to and by this reference made a part hereof as fully and completely as if they were fully set forth herein:

- a) This Contract
- b) Notice Inviting Sealed Bids
- c) The Contractor's signed Proposal
- d) General Provisions
- e) Special Provisions (including permits)
- f) Technical Specifications
- g) Contract Drawings
- h) Addenda (if any)
- i) Contract Bonds
- j) Standard Specifications

The Contract will also include Contract Change Orders, if any, issued by the Owner as provided in the Contract Documents. The Contract represents the entire integrated agreement between the parties hereto and supersedes prior negotiations, agreements or representations, whether

written or oral, except representations contained in the Contractor's Qualifications Statement submitted prior to the award of Contract, if one was required. In the event of a conflict or inconsistency between Contractor's Proposal and this Contract, this Contract shall prevail.

5. **WORKERS' COMPENSATION CERTIFICATION.** By its signature hereunder, the Contractor certifies that it is aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that Code, and agrees to comply with such provisions before commencing the performance of the work of this Contract.

6. **NOTICES.** Any notices required or permitted under this Contract may be given by personal delivery to an authorized representative of the recipient or by certified or registered United States mail. In the case of the Contractor, notices shall be addressed to the business address specified in its Proposal. In the case of the Owner, notices shall be addressed to:

**Mid-Peninsula Water District  
4 Dairy Lane  
Belmont, CA 94002  
Attn: Tammy Rudock**

A copy of any notices to the Owner shall also be concurrently mailed or delivered personally to the District Engineer.

Notice shall be presumed to be received three (3) business days after deposit in the mail, postage prepaid, or upon the date of delivery, if personally given.

7. **GOVERNING LAW.** This Contract is executed and shall be performed in Santa Clara County, California. It shall be governed by and construed in accordance with the laws of the State of California.

8. **RECORDS.** Owner representatives shall have the right to review and inspect any records of the Contractor related to this Contract during normal business hours at the location where such records are maintained.

9. **LEGAL ACTIONS; AGENT FOR SERVICE OF PROCESS.** Any action relating to this Contract, including all disputes between the parties, shall be instituted and prosecuted in a court of competent jurisdiction in Santa Clara County in the State of California.



Each party hereby appoints the individual listed opposite its name to act as its initial agent for service of process relating to any such action.

**Mid-Peninsula Water District**

3 Dairy Lane  
Belmont, CA 94002  
650-591-8941

\_\_\_\_\_  
Name of Individual Agent for  
Service of Process

CONTRACTOR:

\_\_\_\_\_  
Name of Individual Agent for  
Service of Process

\_\_\_\_\_  
Street Address

\_\_\_\_\_  
Telephone

IN WITNESS WHEREOF, the parties hereto have signed this Contract as of the day and year first above written.

**MID-PENINSULA WATER DISTRICT:**

**CONTRACTOR:**

BY: \_\_\_\_\_  
General Manager

\_\_\_\_\_  
Name Under Which Business is Conducted

ATTEST: \_\_\_\_\_  
District Secretary

Name: \_\_\_\_\_

Title: \_\_\_\_\_  
President or Vice President

APPROVED AS TO FORM:

California Contractor License Number:

Attorney for the District

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

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

**Note:** Format for Contract execution by Contractor will be adapted for a sole owner, partnership, corporation, LLC or joint venture, as appropriate.

**INTENTIONALLY LEFT BLANK**

**PERFORMANCE BOND**

KNOW ALL PERSONS BY THESE PRESENTS, that

WHEREAS **MID-PENINSULA WATER DISTRICT** (hereinafter referred to as "District") has entered into a contract with \_\_\_\_\_ (hereinafter referred to as "Principal") for construction of the **Dekoven Tanks Replacement** (the "Contract"); and

WHEREAS said Principal is required under the terms of said Contract to furnish a bond of faithful performance of said Contract,

NOW, THEREFORE, we, the undersigned Principal, and \_\_\_\_\_, as Surety, are held and firmly bound unto the District, in the sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) lawful money of the United States, to be paid to the District or its successors and assigns; for which payment, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if the above-bound Principal, or its heirs, executors, administrators, successors, or assigns approved by the District, shall promptly and faithfully perform the covenants, conditions and agreements in the Contract during the original term and any extensions thereof as may be granted by the District, with or without notice to Surety, and during the period of any guarantees or warranties required under the Contract, and shall also promptly and faithfully perform all the covenants, conditions, and agreements of any alteration of the Contract made as therein provided, notice of which alterations to Surety being hereby waived, on Principal's part to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify, defend, protect, and hold harmless the District as stipulated in the Contract, then this obligation shall become and be null and void; otherwise it shall be and remain in full force and effect.

No extension of time, change, alteration, modification, or addition to the Contract, or of the work required thereunder, shall release or exonerate Surety on this bond or in any way affect the obligation of this bond; and Surety does hereby waive notice of any such extension of time, change, alteration, modification, or addition.

Whenever Principal shall be and declared by the District to be in default under the Contract, Surety shall promptly remedy the default, or shall promptly do one of the following at District's election:

1. Undertake through its agents or independent contractors, reasonably acceptable to the District, to complete the Contract in accordance with its terms and conditions and to pay and perform all obligations of Principal under the Contract, including without limitation, all obligations with respect to warranties, guarantees, and the payment of liquidated damages.
2. Reimburse the District for all costs the District incurs in completing the Contract, and in correcting, repairing or replacing any defects in materials or workmanship and/or materials and workmanship which do not conform to the specifications in the Contract.

Surety's obligations hereunder are independent of the obligations of any other surety for the performance of the Contract, and suit may be brought against Surety and such other sureties, jointly and severally, or against any one or more of them, or against less than all of them without impairing the District's rights against the others.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the District or its successors or assigns.

In the event suit is brought upon this bond by the District, Surety shall pay reasonable attorney's fees and costs incurred by the District in such suit.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their seals this \_\_\_\_\_ day of \_\_\_\_\_, 2021, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Principal:

\_\_\_\_\_

By

\_\_\_\_\_

Surety:

\_\_\_\_\_

By

\_\_\_\_\_

Attorney-In-Fact

\*\*\*

**Note:** To be considered complete, both the principal and surety must sign this payment bond. In addition, the surety's signature must be notarized and a copy of the surety's power of attorney must be attached.

**PAYMENT BOND**

BOND NO. \_\_\_\_\_

AMOUNT: \$ \_\_\_\_\_

KNOW ALL PERSONS BY THESE PRESENTS, that \_\_\_\_\_ hereinafter called the PRINCIPAL, and \_\_\_\_\_ a corporation duly organized under the laws of the State of \_\_\_\_\_ having its principal place of business at \_\_\_\_\_, in the State of \_\_\_\_\_, and authorized to do business in the State of California, hereinafter called the SURETY, are held and firmly bound unto the **MID-PENINSULA WATER DISTRICT** hereinafter called the OBLIGEE, or order in the sum of \_\_\_\_\_ Dollars (\$\_\_\_\_\_) lawful money of the United States, being a sum equal to the total Contract price, for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT:

WHEREAS, the PRINCIPAL has entered into a Contract with the OBLIGEE for the construction of **Dekoven Tanks Replacement** and said PRINCIPAL is required under the terms of said Contract to furnish a bond securing payment of claims to which reference is made in Section 9554 of the Civil Code.

NOW, THEREFORE, if said PRINCIPAL or any of its subcontractors fails to pay any of the persons named in Section 9100 of the Civil Code, or amounts due under the Unemployment Insurance Code with respect to work or labor performed under the Contract, or any amounts required to be deducted, withheld and paid over to the Employment Development Department from the wages of employees of the Contractor and his subcontractors pursuant to Section 13020 of the Unemployment Insurance Code with respect to such work and labor, the SURETY will pay for the same, in an amount not exceeding the sum specified in this bond, and also will pay, in case suit is brought upon this bond, a reasonable attorney's fee, to be fixed by the court.

This bond will insure to the benefit of any of the persons named in Section 9100 of the Civil Code so as to give a right of action to such persons or their assigns in any suit brought upon this bond.

This bond is given to comply with Sections 9550 and 9554 of the Civil Code. The liability of the PRINCIPAL and SURETY hereunder is governed by the provisions of said Code, all acts amendatory thereof, and all other statutes referred to therein.

PAYMENT BOND No. \_\_\_\_\_

The SURETY, for value received, hereby agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or to the specifications incorporated therein shall impair or affect its obligations and its bond and it hereby waives notice of any such change, extension of time, alteration or addition.

IN WITNESS WHEREOF the above-bounded parties have executed this instrument this \_\_\_\_ day of \_\_\_\_\_, 20\_\_, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representatives, pursuant to authority of its governing body.

PRINCIPAL:

\_\_\_\_\_

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

\_\_\_\_\_

SURETY:

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

Attorney-In-Fact

\*\*\*

**Note:** To be considered complete, both the principal and surety must sign this payment bond. In addition, the surety's signature must be notarized and a copy of the surety's power of attorney must be attached.

# **GENERAL PROVISIONS**

## **DEKOVEN TANKS REPLACEMENT**





**DEKOVEN TANKS REPLACEMENT  
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## SECTION 1 DEFINITIONS AND TERMS

### G1.01 GENERAL

Whenever the following abbreviations and terms, or pronouns in place of them, appear in the Contract Documents, the intent and meaning shall be interpreted as provided in this Section 1. Working titles having a masculine gender, such as “workman” and “flagman” and the pronoun “he,” are used for the sake of brevity, and are intended to refer to persons of either sex.

### G1.02 DEFINITIONS

As used herein, unless the context otherwise requires, the following terms have the following meaning:

**Acceptance:** The formal written acceptance by the Owner of an entire contract which has been completed in all respects in accordance with the Contract Documents.

**Addenda:** Written interpretations or revisions to any of the Contract Documents issued by the Owner before the bid opening.

**Agents:** The term “agents” means, in the case of the Owner, its Consulting Engineer/Architect, (if not the Engineer of the work and defined as the Engineer in the Contract Documents) and the Owner’s Legal Counsel.

**As Approved:** The words “as approved,” unless otherwise qualified, shall be understood to be followed by the words “by the Engineer/Architect for conformance with the Contract Documents.”

**As Built Drawings:** Hand drawings which depict field dimensions on the Project site.

**As Shown; and As Indicated:** The words “as shown” and “as indicated” shall be understood to be followed by the words “on the Contract Plans,” “in the Specifications” or “by the Contract Documents” as appropriate.

**Bidder:** Any individual, firm, partnership, corporation or combination thereof, submitting a proposal for the work contemplated, acting directly or through a duly authorized representative.

**Board, Board of Directors or Directors:** The Board of Directors of the **Mid-Peninsula Water District**, the Owner

**CalTrans:** The Department of Transportation, Business & Transportation Agency, State of California.

**Contract Change Order:** An order authorized by the Owner and issued to the contractor amending the Contract Documents. An “approved Contract Change Order” is an order signed by the Engineer or the General Manager. An “executed Contract Change Order” is an order signed by the Engineer or the General Manager and the Contractor.

**Contract:** The written agreement covering the performance of the work and the furnishing of labor, materials, tools and equipment in the construction of the work. The Contract shall include the Contract Documents, and any and all supplemental agreements. Supplemental agreements are written agreements covering alterations, amendments or extensions to the Contract and include contract change orders.

**Contract Completion:** The date the Owner accepts the entire work as being in compliance with the Contract Documents, or formally waives nonconforming work to the extent of nonconformity, and issues the final payment in accordance with Section 9 of these General Provisions.

**Contract Documents:** The Contract Documents consist of the Advertisement for Proposals, Information for Bidders, Notice to Contractors, General Provisions, Specifications, Technical Specifications, Proposal and Proposal Documents, Contract, Contract Drawings, Addenda, Change Orders, Clarifications, Responses to RFIs, and Field Changes.

**Contractor:** The person or persons, firm, partnership, corporation or combination thereof, private or municipal, who enters into the Contract with the Owner.

**Contract Drawings:** The official plans, profiles, cross sections, elevations, details, and supplemental drawings furnished by the Engineer, which show the locations, character, dimensions and details of the work to be performed. Contract Plans may either be bound in the same book as the balance of the Contract Documents or bound in separate sets and are a part of the Contract Documents regardless of the method of binding, also referred to as "Contract Plans," "Plans" and "Drawings."

**County:** The County of San Mateo.

**Days:** Unless otherwise designated, "days" will be understood to mean calendar days.

**DIR:** Department of Industrial Relations, State of California

**District:** Mid-Peninsula Water District.

**Engineer:** Pakpour Consulting Group, Inc., the Owner's Engineer, unless otherwise defined in the Special Provision.

**Engineer Estimate:** The list of estimated quantities of work to be performed as contained in the Proposal Form.

**Federal Agencies:** Whenever, in the Specifications, reference is made to any Federal agency or officer, such reference shall be deemed made to any agency or officer succeeding, in accordance with law, to the powers, duties, jurisdiction and authority of the agency or officer mentioned.

**Field Changes:** A document that records minor variations or changes in the plans and/or specifications, which minor variations do not affect the basic design, schedule, compensation or other material terms of the contract.

**Fixed Costs:** Any necessary labor, material and equipment costs directly expended on the item or items under consideration which remain constant regardless of the quantity of the work done.

**General Manager:** General Manager of the Mid-Peninsula Water District.

**General Notes:** The written instructions, provisions, conditions or other requirements appearing on the Contract Drawings, and so identified thereon, which pertain to the performance of the work.

**Legal Holidays:** Those days designated as State holidays by the Government Code or declared by the Board.

**Liquidated Damages:** The amount prescribed in the Contract Documents to be paid to the Owner or to be deducted from any payments due or to become due the Contractor for each calendar day's delay in completing the whole, or any specified portion, of the work beyond the time allowed in the Contract Documents.

**Notice to Proceed:** A written notice given by the Owner to the Contractor fixing the date on which the Contract time will commence to run and on which the Contractor shall start to perform his obligation under the Contract Documents.

**Office of the Owner:** Whenever reference is made to the Office of the Owner or the Owner's office, such reference shall be deemed made to the Owner's office at 3 Dairy Lane, Belmont CA, 94002.

**Or Equal:** The term "or equal" shall mean that the "equal" product is the same or better than the product named in function, performance, reliability, quality and general configuration. Determination of equality in reference to the project design requirements will be made by the Engineer. Such equal products shall not be purchased or installed by the Contractor without written acknowledgement of the Engineer.

**Owner:** Mid-Peninsula Water District.

**Plans:** Refer to Contract Drawings.

**Professional Engineer:** An engineer licensed by the Board of Registration for Professional Engineers, State of California.

**Project:** A term sometimes used to reference the work of improvement called for under the Contract.

**Proposal:** The offer of the bidder for the work, when made out and submitted on the prescribed proposal form, properly executed and guaranteed, and all related documents submitted with the proposal.

**Proposal Form:** The approved form upon which the Owner requires formal bids be prepared and submitted for the work.

**Proposal Guaranty:** The cashier's check or Bidder's Bond accompanying the proposal submitted by the bidder, as a guaranty that the bidder will enter into a contract with the Owner for the performance of the work, if the Contract is awarded to him. Also referred to as "Bidder's Security."

**Provide:** The term "provide" shall be understood to mean "furnish and install, complete and in place."

**Record Drawings:** Contract plans which depict the Project as finally constructed, including any modifications during the construction phase.

**Responsive:** A "responsive" Proposal is one which complies with the requirements prescribed in the Contract Documents for Proposals.

**Standards Specifications:** The current revision of the Standard Specifications of the State of California, Department of Transportation, unless noted otherwise on the plans and Technical Specifications. Any

reference there in to the State of California or state agency, office of officer shall be interpreted to refer to the County or its corresponding agency, office or officer acting under this contract.

**Special Provisions:** The Special Provisions are specific clauses setting forth conditions or requirements of the work and supplementary to these General Provisions, and also may be referred to as Division 1 Specifications.

**Standards Specifications:** The current revision of the Standard Specifications of the State of California, Department of Transportation, unless noted otherwise on the plans and Technical Specifications. Any reference therein to the State of California or a state agency, office or officer shall be interpreted to refer to the County or its corresponding agency, office or officer acting under this contract.

**Specifications:** The term “Specifications” refers to those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards, and workmanship as applied to the work and certain administrative details applicable thereto. Where standard specifications, such as those of ASTM, AASHTO, etc., have been referred to, the applicable portions of such standard specifications shall become a part of these Contract Documents. If referenced specifications conflict with Specifications contained herein, the requirements contained herein shall prevail. Also referred to as “Technical Specifications.”

**State:** The State of California.

**Work:** The word “work” includes all material, labor, tools, and all appliances, machinery, transportation, and appurtenances necessary to perform and complete the Contract, and such additional items not specifically indicated or described which can be reasonably inferred as belonging to the item described or indicated and as required by good practice to provide a complete and satisfactory system or structure.

**Work Site:** The area or areas of actual construction and the areas immediately adjacent thereto.

### **G1.03            ABBREVIATIONS**

As used herein, unless the context otherwise requires, the following abbreviations have the following meanings:

<b>AAMA</b>	Architectural Aluminum Manufacturers’ Association
<b>AAN</b>	American Association of Nurserymen
<b>AASHTO</b>	American Association of State Highway and Transportation Officials
<b>ACI</b>	American Concrete Institute
<b>AGA</b>	American Gas Association
<b>AIA</b>	American Institute of Architects
<b>AIEE</b>	American Institute of Electrical Engineers
<b>AISC</b>	American Institute of Steel Construction
<b>AISI</b>	American Iron and Steel Institute
<b>AITC</b>	American Institute of Timber Construction
<b>AMCA</b>	Air Movement and Control Association
<b>ANSI</b>	American National Standards Institute
<b>APA</b>	American Plywood Association
<b>APWA</b>	American Public Works Association
<b>API</b>	American Petroleum Institute



<b>AREA</b>	American Railway Engineering Association
<b>ARI</b>	American Refrigeration Institute
<b>ASA</b>	American Standards Association
<b>ASHRAE</b>	American Society of Heating, Refrigeration and Air Conditioning Engineers
<b>ASME</b>	American Society of Mechanical Engineers
<b>ASTM</b>	American Society for Testing and Materials
<b>AT&amp;T</b>	American Telephone and Telegraph
<b>AWG</b>	American Wire Gage
<b>AWPA</b>	American Wood Preservers' Association
<b>AWS</b>	American Welding Society
<b>AWWA</b>	American Water Works Association
<b>CS</b>	Commercial Standards (US Department of Commerce)
<b>CSI</b>	Construction Specifications Institute
<b>DIR</b>	Department of Industrial Relations
<b>DOT</b>	United States Department of Transportation
<b>EIA</b>	Electronic Industries Association
<b>EPA</b>	Environmental Protection Agency
<b>FGMA</b>	Flat Glass Marketing Association
<b>FHWA</b>	Federal Highway Administration
<b>FM</b>	Factory Mutual
<b>FS</b>	Federal Specification
<b>IAMPO</b>	International Association of Mechanical and Plumbing Officials
<b>ICBO</b>	International Conference of Building Officials
<b>IEEE</b>	Institute of Electrical and Electronics Engineers
<b>NAAMM</b>	National Association of Architectural Metal Manufacturers
<b>NBFU</b>	National Owner Council Fire Underwriters
<b>NEC</b>	National Electrical Code
<b>NEMA</b>	National Electrical Manufacturers' Association
<b>NFC</b>	National Fire Code
<b>NFPA</b>	National Fire Protection Association
<b>OSHA</b>	Occupational Safety and Health Administration
<b>PEI</b>	Porcelain Enamel Institute
<b>PG&amp;E</b>	Pacific Gas and Electric Company
<b>PS</b>	Product Standard (US Department of Commerce)
<b>SAE</b>	Society of Automotive Engineers
<b>SCPO</b>	Structural Clay Products Institute
<b>SMACNA</b>	Sheet Metal and Air Conditioning Contractors' National Association
<b>SSPC</b>	Steel Structures Painting Council
<b>TCA</b>	Tile Council of America
<b>TPI</b>	Truss Plate Institute
<b>UBC</b>	Uniform Building Code
<b>UL</b>	Underwriters' Laboratory
<b>UMC</b>	Uniform Mechanical Code
<b>UPC</b>	Uniform Plumbing Code
<b>WCLIB</b>	West Coast Lumber Inspection Bureau
<b>WIC</b>	Woodwork Institute of California
<b>WWPA</b>	Western Wood Products' Association

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## **SECTION 2 PROPOSAL REQUIREMENTS, INSTRUCTIONS TO BIDDERS**

### **G2.01 OBTAINING PROPOSAL FORMS**

Proposal forms and other bid documents shall be obtained from the **Mid-Peninsula Water District, 4 Dairy Lane, Belmont, CA 94002**

### **G2.02 ENGINEER'S ESTIMATE**

If an Engineer's Estimate of quantities is given in the Proposal, the quantities are approximate only, being given as a basis for the comparison of bids. The Owner does not, expressly or by implication, agree that the actual amount of work will correspond to the estimate. The Owner reserves the right to increase or decrease the amount of any class or portion of the work or to omit portions of the work.

### **G2.03 EXAMINATION OF CONTRACT DOCUMENTS AND SITE OF WORK**

The bidder shall examine carefully the Contract Documents and the site of work and shall inform himself of the conditions relating to the execution of the work. Failure to do so will not relieve the successful bidder of his obligation to enter into a Contract and complete the work in strict accordance with the Contract Documents. If the bidder does not investigate the site, the bidder is responsible for all site conditions had the bidder performed a reasonable site inspection. "Conditions relating to the execution of the work" include the requirements of federal, state and local laws, statutes and ordinances relative to the execution of the work, including, but not limited to, applicable regulations concerning minimum wage rates, non-discrimination in the employment of labor, protection of public and employee health and safety, and environmental protection. The submission of a Proposal shall be conclusive evidence that the bidder has investigated and is satisfied as to the conditions to be encountered, the character, quality and scope of work to be performed, the quantities of materials to be furnished and the requirements of the Contract Documents.

### **G2.04 SURFACE TOPOGRAPHY; SUBSURFACE CONDITIONS DATA**

Where an investigation of surface topography and/or subsurface conditions has been conducted in areas where work is to be performed, prospective bidders may inspect the records of such investigations at the Owner's office subject to and upon the conditions set forth in these Contract Documents.

Investigations of surface topography and/or subsurface conditions were made for the purpose of study and design only and neither the Owner nor the Engineer(s) which conducted such investigations assumes any responsibility whatsoever in respect to the sufficiency or accuracy of the investigations thus made, the records thereof, or of the interpretations set forth therein or made by the Owner in its use thereof. There is no warranty or guaranty, either express or implied, that the conditions indicated by such investigations are representative of those existing throughout such areas, or any part thereof, or hat unforeseen developments may not occur, or that materials other than or in proportions different from those indicated may not be encountered.

Logs of test borings, geotechnical reports, or topographic maps showing a record of the data obtained by the Owner's investigations of surface and subsurface conditions that are made available shall be considered a part of the Contract Documents. While such logs, reports and maps represent the opinion

of the consultant retained by the Owner as to the character of the materials encountered by him in his investigations, the Owner provides no assurances as to their accuracy and they are made available only for the convenience of the bidder and Contractor. In the event that Contractor encounters differing site conditions, please refer to General Provision G4.03.

The availability or use of information described in this Section G2.04 is not intended to be and shall not be construed to be a waiver of the provisions of Section G2.03, and will not relieve the bidder or Contractor from any risk, or from properly examining the site and making such additional investigations as he may elect, or from properly fulfilling all the terms of the Contract Documents.

## **G2.05 EXPLANATIONS**

Any explanation of the Contract Documents desired by a prospective bidder shall be requested in writing from the Engineer, and delivered to Owner no less than fourteen (14) calendar days prior to the date for opening of proposals. Any explanation, instruction, or change to Contract Documents will be made by written addendum which will be mailed or delivered to each firm receiving a set of the Contract Documents. Upon mailing or delivery, such addendum will become a part of Contract Documents and binding on all bidders. The receipt of the addendum by the bidder shall be acknowledged and so noted in the space provided on the Proposal Form. All addenda shall be attached to the Proposal. Only written explanations, instructions or changes so given by the Owner will be effective. Oral explanations or instructions will not be binding on the Owner.

## **G2.06 PREPARATION OF PROPOSALS**

The form of Proposal in this book, when filled out and executed by the bidder, shall be submitted as his bid. Bids not presented on such forms will be disregarded.

All blank spaces in the Proposal form must be filled in, as required, preferably in black ink. All price information shall be shown, clearly legible, in both words and figures, where required. No changes shall be made in the phraseology of the forms. Written amounts shall govern in the case of discrepancy between the amounts stated in writing and the amounts stated in figures. In case of discrepancy between unit prices and extended totals, unit prices shall prevail.

The bidder shall sign his Proposal in the blank space provided for that purpose. If bidder is the sole owner, the Proposal shall be signed by the owner. If bidder is a corporation, it must be signed by two officers of the corporation consisting of (1) the chair of the board, president or vice president; and (2) the secretary, assistant secretary, chief finance officer or assistant treasurer, or by a person authorized by the corporation to execute written contracts on its behalf, and the corporate seal affixed thereto. If the corporate seal is not affixed to the contract, or if it is executed by a person other than an officer, or by only one officer, there must be attached to the contract a certified copy of a resolution of the corporation authorizing such officer or person to execute written contracts for and on behalf of the corporation. If bidder is a partnership, the true name of the firm shall be set forth above, the names and addresses of all partners shall be given and the Proposal shall be signed by a partner in the firm authorized to sign contracts on behalf of the partnership. If the bidder is a joint venture, the Proposal shall be signed by each participating company by officers or other individuals who have the full and proper authorization to do so. If the Proposal is signed by an agent of the bidder other than an officer of a corporation or a member of a partnership, a notarized power of attorney must be on file with the Owner prior to opening

of Proposals or must be submitted with the Proposal. If requested by the Owner, the bidder shall promptly submit evidence satisfactory to the Owner of the authority of the person signing the Proposal.

## **G2.07 SUBMISSION OF PROPOSALS**

All Proposals must be submitted not later than the time prescribed, at the place, and in the manner set forth in the Notice to Contractors. Proposals must be made on the Proposal forms provided. Proposals and other required forms may be copied and submitted as a separate package or may be left attached to this book. Any Proposal received after the prescribed time shall be rejected, regardless of whether or not Proposals are opened exactly at the prescribed time.

Each Proposal must be submitted in a sealed envelope. The envelope must be clearly marked to show the bidder's name and the Contract name, without being opened, and be addressed in conformance with the instructions in the Information for Bidders.

## **G2.08 LIST OF SUBCONTRACTORS**

The bidder shall submit with his Proposal, on the List of Subcontractors provided, the names and business addresses of each subcontractor who will perform work under this Contract in excess of one-half (1/2) of one percent (1%) of the amount of the total Proposal, and shall list the portion of the work which will be done by each such subcontractor as required by Public Contract Code Sections 4100 et. seq. If the bidder fails to specify a subcontractor for any portion of the work, the bidder agrees to perform that portion of the work himself, and represents that he is qualified to perform that portion of the work himself.

Pursuant to Labor Code Section 1725.5, no subcontractor may be listed on a Bid Proposal for a public work project unless they are registered with the DIR.

## **G2.09 PROPOSAL GUARANTY**

All Proposals shall be accompanied by a cashier's check or certified check, payable to the Owner or a Bid Bond so payable executed by a corporation admitted and authorized to transact business as a surety in the State of California in an amount not less than ten percent (10%) of the total amount of the Proposal submitted.

This bid security shall be given as a guaranty that the bidder will not withdraw his Proposal for one hundred twenty (120) days after bid opening, and that if awarded the Contract, the successful bidder will execute the attached Contract and furnish a properly executed Performance Bond and Payment Bond each in the full amount of the Contract price within the time specified.

If the bidder elects to furnish a Bid Bond, he shall use the Bid Bond form bound herewith; additional forms may be obtained from the Owner. The Attorney-in-Fact who executes this bond on behalf of the surety must attach a notarized copy of his power of attorney as evidence of his authority to bind the surety on the date of execution of the bond. Any conditions or limitation placed upon the check or any alteration of the form of said bond, or imperfection in the execution thereof, will render it informal and may, at the option of the Owner, result in the rejection of the Proposal.

If the Bidder elects to furnish a certified or cashier's check, he shall also submit therewith the Bid Security Form included herewith.

## **G2.10 NON-COLLUSION DECLARATION**

All Proposals shall be accompanied by an executed non-collusion declaration in the form required by Public Contract Code Section 7106.

## **G2.11 WITHDRAWAL OF PROPOSALS**

A bidder may withdraw his Proposal at any time prior to the time fixed in the Information for Bidders for the opening of bids only by filing a written notice with the Owner. The notice shall be executed by the bidder in conformance with Section G2.06. A telegraphic notice of withdrawal is not effective. Withdrawal of a Proposal does not prejudice the right of a bidder to submit a new Proposal. No Proposal may be withdrawn after the time scheduled for opening of Proposals, unless and until the time specified in Section G3.02, Time of Award, has elapsed.

## **G2.12 PUBLIC OPENING OF PROPOSALS**

Proposals will be opened and read aloud publicly at the date, time and place designated in the Information for Bidders. Bidders and their authorized representatives are invited to be present.

## **G2.13 REJECTION OF PROPOSALS**

Proposals may be rejected if they show such items as: any alteration of form; additions not called for; conditional bids; incomplete bids; erasures; irregularities which make the Proposals incomplete, indefinite or ambiguous; obviously unbalanced prices; no acceptable Bid Security; or if the Proposal is not properly executed.

Proposal may be rejected if contractor or subcontractor(s) is not registered with the Department of Industrial Relations (DIR).

## **G2.14 DISQUALIFICATION OF BIDDERS**

More than one Proposal from an individual, firm, partnership, corporation or combination of such under the same or different names will not be considered. Reasonable grounds for believing that any individual, firm, partnership, corporation or combination of such is interested in more than one Proposal for the work contemplated may cause the rejection of all Proposals in which such individual, firm, partnership, corporation or combination thereof is interested. If there is reason for believing that collusion exists among the bidders, any or all Proposals may be rejected. A party who has quoted prices on materials or work to a bidder is not thereby disqualified from quoting prices to other bidders, or from submitting a bid directly for the materials or work. A Proposal may be rejected on the basis of a bidder, any officer of such bidder, or any employee of such bidder who has a proprietary interest in such bidder, having been disqualified, removed, or otherwise prevented from bidding on or completing, a federal, state or local project because of a violation of law or a safety regulation.

## **G2.15 LICENSING AND REGISTRATION OF BIDDERS**

Bidders and their proposed subcontractors shall hold such licenses as may be specified in the Information for Bidders and as may be required by Division 3, Chapter 9 of the California Business and Professions Code concerning the licensing of contractors. As a matter of bidder responsibility, each bidder shall be

properly licensed in accordance with the laws of the State of California at the time of bid award. This Contract is subject to monitoring and enforcement by the DIR pursuant to Labor Code Section 1771.4. Contractor must post notices, as prescribed by Title 8 California Code of Regulations Section 16451(d). Contractor and all of its subcontractors must be registered with the DIR.

## **G2.16 RESPONSIBILITY OF BIDDERS**

Bidders shall, if requested by the Owner, submit a statement of qualifications which shall include experience in the type of work to be performed, financial condition, available construction equipment, and listing of all agencies for which work has been performed during the past two years. The Owner may reject the Proposal of any bidder on the basis of insufficient work experience, insufficient financial capability, inadequate equipment, poor performance on work previously completed for the Owner or other agencies or previous violation of safety or other legal requirements resulting in disqualification or otherwise being prevented from bidding on federal, state or local agency projects.

## **G2.17 RELIEF OF BIDDERS**

Unless the Owner in its sole discretion elects otherwise, a bidder shall not be relieved of his bid nor shall any change be made in his bid because of mistake, but he may bring an action against the Owner in a court of competent jurisdiction in the county in which the bids were opened for the recovery of the amount forfeited, without interest or costs. In the event the bidder who brings an action against the District fails to recover a judgment, the bidder shall pay all costs incurred by the District in the suit, including reasonable attorneys' fees to be fixed by the court.

If the bidder brings such action it shall be his responsibility to establish that:

- A. A mistake was made;
- B. He gave the Owner written notice within five (5) days after the opening of the Proposals of the mistake, specifying in the notice in detail how the mistake occurred;
- C. The mistake made the Proposal materially different than he intended it to be; and
- D. The mistake was made in filling out the Proposal and was not due to error in judgment nor to carelessness in inspecting the site of the work, nor in reading the Contract Documents.

## **G2.18 INELIGIBLE CONTRACTORS**

Pursuant to Public Contract Code Section 6109, by submitting its bid, a bidder certifies that it has not been deemed ineligible to bid, work on or be awarded a public works project pursuant to California Labor Code Sections 1777.1 or 1777.7 and that it will not use any subcontractors to perform work on the public works project that have been deemed ineligible to perform work on a public works project pursuant to California Labor Code Sections 1777.1 and 1777.7. Any contract on a public works project between a contractor and a debarred subcontractor by the Contractor is void as a matter of law. Any public money paid to a debarred subcontractor by the Contractor shall be returned to the City. The Contractor shall be responsible for the payment of wages to any workers of the debarred subcontractor who worked on the project.

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

### **G3.01   AWARD OF CONTRACT**

The Owner reserves, in its sole discretion, the right to reject any and all Proposals and to waive any informalities and irregularities in Proposals received, other provisions in the Contract Documents notwithstanding.

The Proposals will be compared on the basis of the Total Bid Price which is the sum of the lump sum bid items and, for unit price items, the sum of the products of the Engineer's Estimate of quantities shown in the Proposal multiplied by the unit bid price. In the event of a discrepancy between the unit bid price and the extension price, the unit price shall govern and the mathematical error corrected accordingly. Any mathematical errors that appear on the face of the bid will be corrected by the Owner and the Owner will use the mathematically correct Total Bid Price to determine the lowest monetary bidder.

The award of the Contract, if it be awarded, will be made to the lowest responsible, responsive bidder.

In addition, the Owner reserves, in its sole discretion, the right to award the Contract for all or some of the bid items included in the Bid Schedule. The Owner may eliminate some of the bid items prior to or after award of the Contract due to budgetary constraints.

### **G3.02   TIME OF AWARD**

Within sixty (60) days after the opening of Proposals, the Owner will either reject all Proposals or award the Contract to the lowest responsible, responsive bidder. If the lowest responsible, responsive bidder refuses or fails to execute the Contract and provide an acceptable Performance Bond, Payment Bond and insurance certificate(s), the Owner may award the Contract to the second lowest responsible, responsive bidder. Such award, if made, will be made within seventy-five (75) days after the opening of Proposals. If the second lowest responsible, responsive bidder refuses or fails to execute the Contract and provide an acceptable Performance Bond, Payment Bond and insurance certificate(s), the Owner may award the Contract to the third lowest responsible, responsive bidder. Such award, if made, will be made within ninety (90) days after the opening of Proposals. The periods of time specified above within which an award of Contract may be made shall be subject to extension for such further period as may be agreed upon in writing by the Owner and the bidder or bidders concerned.

### **G3.03   EXECUTION OF CONTRACT**

The successful bidder shall, within fifteen (15) calendar days after having received notice that the Contract has been awarded, sign and deliver to the Owner a Contract in the attached form together with the Contract Bonds and insurance certificates executed as required in the Contract Documents. After receiving the signed Contract with acceptable bonds and insurance certificates from the successful bidder, the Owner will promptly sign the Contract.

### **G3.04   MANNER OF EXECUTION OF CONTRACT**

If the Contractor is an individual, the contract shall be executed personally by the Contractor. If the Contractor is a co-partnership, it is desirable that the contract be executed by all of the partners, but it may be executed by one of them. If the Contractor is a corporation, it must be executed by two officers

of the corporation consisting of (1) the chairman of the board, president or vice president; and (2) the secretary, assistant secretary, chief finance officer or assistant treasurer, or by a person authorized by the corporation to execute written contracts on its behalf, and with the corporate seal affixed. If the corporate seal is not affixed to the contract, or if it is executed by a person other than an officer, or by only one officer, there must be attached to the contract a certified copy of a resolution of the corporation authorizing such officer or person to execute written contracts for and on behalf of the corporation. If the Contractor is a joint venture, the contract must be executed on behalf of each participating firm by officers or other individuals who have the full and proper authorization to do so. If the Contractor is a limited Liability Company (LLC), the contractor must be executed by an officer or member who has full and proper authorization to do so.

### **G3.05 CONTRACT BONDS**

The bidder to whom the Contract is awarded shall furnish the following bonds ("Contract Bonds"):

- A. Performance Bond, in an amount not less than one hundred percent (100%) of the Contract price, to secure faithful performance of the Contract and guarantee the correction of work during the warranty period of two (2) years from the date of final acceptance by the Owner.
- B. Payment Bond, in an amount not less than one hundred percent (100%) of the Contract price, to secure payment of all persons supplying labor or materials for the construction of the work.

Contract Bonds shall be on the attached forms and shall be executed as surety by a corporation admitted and authorized to issue surety bonds in the State of California, with a financial condition and record of service satisfactory to Owner.

All alterations, extensions of time, extra and additional work and other changes authorized by the Contract Documents may be made without securing the consent of the surety or sureties on the Contract Bonds.

### **G3.06 FAILURE TO EXECUTE CONTRACT**

Failure of a bidder to whom the Contract is awarded to promptly and properly execute the Contract or furnish acceptable Contract bonds, or certificates of insurance, shall be just cause for the annulment of the award and the forfeiture of such bidder's Proposal Guaranty. The Proposal Guaranty shall be retained by the Owner as liquidated damages and it is agreed that this sum is a fair estimate of the amount of damages the Owner will sustain in case the successful bidder fails to enter into a Contract.

### **G3.07 RETURN OF PROPOSAL GUARANTY**

Within fifteen (15) days after the award of the Contract, the Owner will return the Bidder's Bond, or the certified or cashier's check to all the BIDDERS except for the three lowest responsible BIDDERS. When the CONTRACT is executed, the bonds of the two remaining unsuccessful BIDDERS will be returned. Retained Proposal guaranties will be held until one hundred twenty (120) days after opening of Proposals or until the Contract has been finally executed, whichever occurs first, after which all Proposal guaranties, other than Bidder's Bonds and any guaranties that have been forfeited, will be returned.

### **G3.08 BID PROTESTS**

The Owner will consider written bid protests subject to the following procedures. All protests must clearly specify in writing the grounds and evidence on which the protest is based. Protests based upon restrictive specifications or alleged improprieties in the bidding procedure which are apparent or reasonably should have been discovered prior to the bid opening shall be filed in writing with the Owner, at least five (5) days prior to bid opening. Protests based upon alleged improprieties that are not apparent or which could not reasonably have been discovered prior to bid opening shall be submitted in writing to the Owner, within forty-eight (48) hours from receipt of notice from the Owner advising of the recommendation for award of contract.

Failure to comply with these requirements may result in rejection of the protest.

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## **SECTION 4 SCOPE OF WORK**

### **G4.01 INTENT OF CONTRACT DOCUMENTS**

The Contract Documents are complementary, and what is called for by one shall be as binding as if called for by all. The intent of the Contract Documents is to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. When the Contract Documents describe portions of the work in general terms but not in complete detail, it is understood that the best general practice shall be followed and only materials and workmanship of the best standard quality shall be used. Any work, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result shall be supplied, whether or not specifically called for. When words which have a well-known technical or trade meaning are used to describe work, materials or equipment, such words shall be interpreted in accordance with that meaning.

Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code or laws or regulations in effect on the first published date of the Advertisement for Proposals, except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of Owner or Contractor, or any of their consultants, agents or employees from those set forth in the Contract Documents, nor shall it be effective to assign to Owner, or any of Owner's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the work or any duty or authority to undertake responsibility contrary to the other provisions of the Contract Documents.

The Contract Documents are divided into parts, divisions and sections for convenient organization and reference. Generally, there has been no attempt to divide the specification sections into work performed by the various building trades, work by separate subcontractors, or work required for separate facilities in the project.

The Owner makes no warranty whatsoever, express or implied, with respect to the Contract Documents other than that the Contract Plans and Specifications were prepared by a professional engineer registered to practice in the State of California.

### **G4.02 EXAMINATION AND VERIFICATION OF CONTRACT DOCUMENTS**

The Contractor shall thoroughly examine and become familiar with all of the various parts of these Contract Documents and determine the nature and location of the work, the general and local conditions, and all other matters which can in any way affect the work under this Contract. Failure to make an examination necessary for this determination shall not release the Contractor from the obligations of this Contract. No oral agreement or conversation with any officer, agent or employee of the Owner, or with the Engineer either before or after the execution of this Contract, shall affect or modify any of the terms or obligations contained in the Contract Documents.

#### **G4.03 DIFFERING SITE CONDITIONS**

Pursuant to Public Contract Code Section 7104, the Contractor shall promptly, and before such conditions are disturbed, notify the Engineer in writing of: (1) material that the Contractor believes may be material that is hazardous waste, as defined in California Health and Safety Code Section 25117, that is required to be removed to a Class I, Class II or class III disposal site in accordance with provisions of existing law; (2) subsurface or latent physical conditions at the site differing materially from those indicated in this Contract; or (3) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract.

The Engineer/Architect shall promptly investigate the conditions. If the Engineer/Architect finds that such conditions do materially differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the work under this Contract, whether or not changed as a result of such conditions, then an equitable adjustment shall be made and the Contract modified in accordance with the change order procedures set forth below. In the event of any dispute between the Owner and the Contractor over the significance or existence of the changed conditions, the Contractor shall not be excused from the scheduled completion date, but shall retain such rights it may have as provided in these Contract Documents.

No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required by this Section, except that the Owner may extend the prescribed time. No claim by the Contractor for an equitable adjustment hereunder shall be allowed if asserted after final payment under this Contract.

#### **G4.04 CHANGES; CONTRACT CHANGE ORDER**

The Owner may, without notice to the sureties, and without invalidating the Contract, at any time make alterations, deviations, additions to or deletions from the Contract Documents, and may increase or decrease the quantity of any item or portion of the work, or delete any item or portion of the work, and may require extra work, as determined by the Owner to be necessary or advisable. All such work shall be performed under applicable provisions of the Contract Documents, unless specifically provided otherwise at the time the change is ordered.

Any such changes will be set forth in a written Contract Change Order issued by the Owner. The Contract Change Order will specify: (1) the work to be done in connection with the change to be made; (2) the amount of the adjustment of the Contract price, if any, and the basis for compensation for the work ordered; and (3) the extent of the adjustment in the Contract time, if any. A Contract Change Order shall not become effective until it has been signed by the General Manager. When signed by the General Manager it is an "approved Contract Change Order."

No changes or deviations from the Contract Documents shall be made without the authority of an approved Contract Change Order, except that in cases of emergency the Engineer/Architect may direct a change in writing. Upon receipt of such written directive, the Contractor shall proceed with the ordered work and the Engineer will prepare a written Contract Change Order for approval and issuance to the Contractor as soon as practicable.

Upon receipt of an approved Contract Change Order, the Contractor shall promptly proceed with the ordered work, unless otherwise provided in the approved Contract Change Order. When ordered by the Engineer/Architect, the Contractor shall halt work in the area affected by a proposed change.

Whenever it appears to the Contractor that a change is necessary, the Contractor shall immediately, but no later than five (5) days after becoming aware of the need for a change, notify the Engineer/Architect in writing of the change he believes necessary and the reasons for such change. However, work in the area affected shall not be discontinued unless ordered by the Engineer/Architect.

#### **G4.05 REQUEST FOR QUOTATIONS FOR CHANGE IN WORK**

Owner may request Contractor to provide quotations for performing proposed changes to the work. Such requests for quotations shall not be considered authorization to proceed with the change prior to issuance of an approved Contract Change Order, nor shall such request justify any delay in executing existing work. Contractor shall, upon such a request, provide quotations for increases or decreases in the Contract Price and the Contract time associated with performing the proposed change. Quotations shall be in the form specified by the Engineer/Architect and shall include substantiating documentation with an itemized breakdown of Contractor and Subcontractor costs, including labor, materials, rentals, services, overhead and profit. The cost of preparing such quotations is included in the Contract price and Contractor shall not be entitled to any additional compensation for preparing them.

#### **G4.06 PROPOSED CONTRACT CHANGE ORDER**

A Contract Change Order may be presented to the Contractor for his consideration prior to its having been approved. If the Contractor accepts the terms and conditions of such proposed Contract Change Order, and if the Contract Change Order is then approved and issued to the Contractor, the Contract Change Order shall be considered to be an executed Contract Change Order for all purposes to the same extent as if the Contract Change Order had been initially issued to the Contractor as an approved Contract Change Order. The Owner need not present a proposed Contract Change Order to the Contractor for his review prior to issuing it as an approved Contract Change Order.

#### **G4.07 EXECUTED CONTRACT CHANGE ORDER**

An approved Contract Change Order which has been signed by the Contractor is an “executed Contract Change Order.” Compensation paid pursuant to Contract Change Orders shall comprise the total compensation for the work described in the Contract Change Order. By signing the Contract Change Order, the Contractor agrees that the specified compensation constitutes full compensation for the work or change, including payment for interruption of schedules, extended overhead, delay or any other “impact” claim or “ripple effect” claim, and by signing, the Contractor specifically waives any reservation or claim for additional compensation in respect to the Contract Change Order.

#### **G4.08 CONTRACT PRICE ADJUSTMENT**

If a Contract Change Order provides for an adjustment to the Contract price, the increased payment to Contractor, or the deduction to the credit of the Owner, shall be determined by one of the following methods, or a combination of these methods, as determined by the Owner and at its sole option:

- A. **Unit Prices.** The unit prices set forth in the Proposal shall be utilized where they are applicable. If the Contract Change Order increases or decreases the quantity of an item of work by more than twenty-five percent (25%), such that the application of unit prices in the Proposal will cause substantial inequity to the Owner or Contractor, unit prices will be adjusted by mutual agreement or, in the absence of agreement, as determined by the Engineer and subject to protest by the Contractor pursuant to Section G4.09. Unit prices for new items included in the Contract Change Order shall be as mutually agreed upon or, in the absence of agreement, as determined by the Engineer/Architect and subject to protest by the Contractor pursuant to Section G4.09.

Payment for any contract item of work which has a final total value of less than five percent of the total contract bid price will be made at the contract unit price regardless of increased or decreased quantities.

- B. **Lump Sum.** A total lump sum addition or deduction from the Contract Price as mutually agreed upon.

Lump sum quotations for changes to the work shall include substantiating documentation with an itemized breakdown of Contractor and Subcontractor costs, including labor, materials, equipment rental, approved services, overhead and profit, all as negotiated. The costs of a negotiated change order for work performed by Contractor's own forces shall be limited to a maximum markup of fifteen percent (15%) to include up to ten percent (10%) for overhead and up to five percent (5%) for profit. Where the whole or a part of the work under a negotiated change order is performed by a first tier subcontractor, the Owner shall limit the Contractor's markup on the direct costs of the subcontractor to a total of eight percent (8%) to include up to five percent (5%) for overhead and three percent (3%) for profit. No markup will be considered or allowed for costs of a negotiated change order involving subcontractors below the first tier. The overhead markup percentages referenced above shall cover all overhead costs of the Contractor, including administrative, insurance, extended overhead and similar costs and expenses.

- C. **Force Account Payment.** Payment for the work will be made on a time and expense basis, that is, on an accounting of the Contractor's forces, materials, equipment and other items of cost as required to do the work.

If compensation for work done under a Contract Change Order is to be made on a force account basis, the compensation will be calculated as set forth in Section G9.03, "Force Account Payment." Contractor agrees that the markups provided in Section G9.03 are adequate.

In any case in which the method of payment cannot be agreed upon prior to the beginning of the work, the Owner may direct that the work be done on a unit price, lump sum or force account basis depending on the nature of the work and at the sole discretion of the Owner.

#### **G4.09 PROTEST PROCEDURE**

If the Contractor disagrees with any terms or conditions set forth in an approved Contract Change Order which he has not executed, he shall submit a written protest to the Engineer/Architect within fifteen (15) days after receipt of such approved Contract Change Order. The protest shall state the points of disagreement, Contract Document references, quantities and costs involved and shall propose a modification of the items with which he does not agree. If a written protest is not submitted within this 15-day period, payment will be made as set forth in the approved Contract Change Order. Approved



Contract Change Orders which are not protested within fifteen (15) days will be considered as executed Contract Change Orders and such payment will constitute full compensation for all work included therein or required thereby. In the event that the Contractor disagrees with the Engineer's response to a protest, the Contractor may submit a claim pursuant to G9.15.

When the protest of an approved Contract Change Order relates to compensation, the Contractor shall keep full and complete records of such work and shall permit the Owner and the Engineer to have access to all records relating to the protested Contract Change Order to determine the compensation payable. The Contractor shall cooperate with the Engineer to reach agreement at the earliest practical date on the terms of compensation for the Contract Change Order. When agreement has been reached, a revised Contract Change Order may be approved by the Owner and issued to the Contractor for signature. Unless and until the Owner and Contractor agree upon other terms of compensation incorporated in a revised executed Contract Change Order, the compensation shall be as specified under the protested approved Contract Change Order.

When the protest of an approved Contract Change Order relates to the adjustment of Contract Time for the completion of the work, the time will be determined in accordance with the provisions of Section G8.11.

#### **G4.10 CONTINUANCE OF CONSTRUCTION**

Disagreement by the Contractor with the Owner's determination of the need for, or amount of, an adjustment in Contract price or Contract time associated with an approved Contract Change Order (or disagreement by the Contractor with the Owner's determination that a change has not occurred and no Contract Change Order is needed) shall not, under any circumstances, relieve the Contractor from its obligation to promptly begin and diligently perform the work, including the change, as described in the approved Contract Change Order.

#### **G4.11 FIELD CHANGES**

Conditions may arise during the prosecution of the work on construction necessitating minor variations in the contract plans and/or specification. In order to address these conditions, the Owner may without notice to the sureties and without invalidating the contract, make minor alterations, deviations or changes to the Contract, including the plans or specifications, without affecting any of the material or basic terms of the contract, including the contract price, schedule for performance, the basic design, or other terms. Such minor alterations, deviations or changes shall be documented in a Field Change on a form provided by the Owner and executed by the Engineer and the Contractor. By execution of the Field Change, Contractor agrees to make the specified change at no additional cost and without an alteration in the schedule of performance or other terms and conditions of the Contract.

#### **G4.12 DETOURS**

When required by the Technical Specifications, or shown on the Contract Plans, or required by responsible public agencies, the Contractor shall construct, maintain and remove detours for the use of public traffic, without additional cost to the Owner, unless separate payment is specified in the Technical Specifications.

The failure or refusal of the Contractor to construct and maintain detours at the proper time shall be sufficient cause for closing down the work until such detours are in satisfactory condition for use by public traffic.

#### **G4.13 ARCHAEOLOGICAL DISCOVERIES**

All articles of archaeological interest which may be uncovered by the Contractor during the progress of the work shall be reported immediately to the Engineer/Architect. The further operations of the Contractor with respect to the find will be decided under the direction of the Engineer.

#### **G4.14 PRESERVATION AND CLEANING**

The Contractor shall clean up the work at frequent intervals and at other times when directed by the Engineer/Architect. While finish work is being accomplished, floors shall be kept clean, free of dust, construction debris and trash.

Before final inspection of the work, the Contractor shall clean the project site, material sites, surrounding roadways and all ground occupied by him in connection with the work, of all rubbish, excess materials, false work, temporary structures and equipment. All parts of the work shall be left in a neat and presentable condition. Final cleaning shall include washing, dusting and sweeping, as applicable, of exposed architectural finish surfaces. Full compensation for final cleaning up will be considered as included in the prices paid for the various Contract items of work and no separate payment will be made therefore.

#### **G4.15 GUARANTY OF WORK**

Notwithstanding inspections and acceptance by the Owner of work furnished under this Contract, the Contractor warrants to the Owner that all materials and equipment furnished under the Contract, including that provided pursuant to Change Orders, will be of good quality and new, that the work will be free from defects in material or workmanship, and that the work will conform to the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective.

This warranty by the Contractor is in addition to any warranties or guarantees required by the Technical Specifications for specified items of equipment or materials. This warranty shall be in effect notwithstanding any disclaimers, or limiting or conditional terms contained in such separate warranties furnished by manufacturers or suppliers.

#### **G4.16 CORRECTION OF WORK DURING WARRANTY PERIOD**

If, within two (2) years after the date of final acceptance of the work by the Owner, any of the work is found not to be in accordance with the Contract Documents, specifically including Section G4.15 ("Guaranty of Work"), the Contractor shall correct it promptly after written notice from the Owner to do so, and pay for any damage to other property resulting from such non-conforming work. If the Contractor fails to make the repairs or replacements promptly, or in an emergency when delay could cause risk of damage or loss, the Owner may have the non-conforming work removed, replaced or corrected at the expense of the Contractor and his surety. Non-conforming work which is remedied under this Section

shall be subject to an extended warranty obligation, identical in terms to that provided by Section G4.15 and this Section for a period of two (2) years after the non-conforming work has been remedied.

Nothing contained in this Section G4.16 shall be construed to establish a period of limitation with respect to other obligations which the Contractor may have under the Contract Documents. Establishment of the period of two (2) years as described in this Section relates only to the specific obligation of the Contractor to correct the work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the work.

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## **SECTION 5 CONTROL OF WORK**

### **G5.01 AUTHORITY OF ENGINEER/ARCHITECT**

The Engineer/Architect shall decide all questions which may arise as to the quality or acceptability of materials furnished and work performed and as to the manner of performance and rate of progress of the work; all questions which may arise as to the interpretation of the Contract Documents; all questions as to the acceptable fulfillment of the Contract on the part of the Contractor; and all questions as to compensation. The Engineer/Architect will have authority to reject work which does not conform to the Contract Documents. His decision shall be final and he shall have authority to enforce and make effective such decisions and orders which the Contractor fails to carry out promptly.

### **G5.02 CONTRACT DRAWINGS**

The Contract Drawings furnished consist of general drawings and show such details as are necessary to give a comprehensive idea of the construction contemplated. All authorized alterations affecting the requirements and information given on the Contract Drawings shall be in writing.

Upon written request, the Owner will furnish to the Contractor for his use, at no expense to the Contractor, up to twenty (20) copies of all Contract Documents, including the Contract Drawings. Additional copies may be obtained at cost.

### **G5.03 SHOP DRAWINGS**

The Contract Drawings shall be supplemented by shop drawings furnished by the Contractor. Shop drawings shall have been reviewed by the Engineer/Architect before any work involving such drawings is performed. No change shall be made by the Contractor in any shop drawing after it has been approved by the Engineer/Architect.

Shop drawing submittals shall contain adequate information to permit the Engineer to evaluate each submission for conformance with the Contract Documents. Each submittal shall be complete; partial submittals will not be reviewed. All drawings shall include a graphical scale and indicate the amount of reduction used, if any. The quality of lettering and draftsmanship shall be such as to insure easily read reproductions by microfilming process.

Each shop drawing submitted by the Contractor (including any provided by suppliers and/or subcontractors) shall bear the approval stamp of the Contractor, and shall be clearly and conspicuously marked to indicate any deviation in the shop drawing from the requirements of the Contract Documents. By approving and submitting shop drawings, the Contractor thereby represents that he has determined and verified all field measurements, field construction criteria, materials, catalog numbers and similar data, and that he has checked and coordinated each shop drawing with the requirements of the work and the Contract Documents. Where applicable, shop drawings will be certified for construction by the manufacturer. Owner review of any shop drawing shall not constitute a change to the Contract. Contract changes can be effected through Change Orders only.

Each submittal shall be accompanied by a transmittal letter in the form specified by the Engineer from the Contractor stating the name of the material or equipment items as shown on the Contract Documents, a

specification reference consisting of a section number, and any proposed deviations from the Contract Documents requested or shown on the submittal.

Review of shop drawings is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Review and approval of the Contractor's shop drawings shall not relieve Contractor of any of his responsibility for the successful completion of the work in conformity with the requirements of the Contract Documents. The Contractor is responsible for conformance with all requirements of the Contract Documents, including, but not limited to, dimensions which shall be conformed and correlated at the job site, fabrication processes and techniques of construction, coordination of work with that of all others, and satisfactory performance of all work. Review of shop drawings shall not waive any requirement of the Contract Documents and defective work may be rejected notwithstanding such review.

It is the Contractor's responsibility to submit shop drawings and other submittals so as to allow sufficient time for review and for possible revisions and resubmittal. Minimum review time by the Engineer/Architect shall be thirty (30) calendar days; complex submittals may require up to 45 days. The Contractor shall schedule his shop drawing submittals so that this anticipated shop drawing review time does not delay his work.

Owner will make its best efforts to review submittals within the time period scheduled by the Contractor, provided it is consistent with the minimum time period specified in the preceding paragraph, but the Owner's inability to do so shall not automatically entitle the Contractor to additional time to complete the Contract. If the Engineer/Architect fails to complete his review of shop drawing submittals within a reasonable time (not to be less than the time period specified in this section), and if the Contractor's controlling operation is delayed by reason of the delay in review, an extension of time commensurate with the delay in completion of the work thus caused will be granted pursuant to Section G8.11, but no additional compensation will be allowed for such delay.

Shop drawings reviewed by the Engineer/Architect will be returned to the Contractor. The Engineer/Architect's action on each submittal will consist of one of the following: "No Exceptions Taken," "Exceptions Taken as Noted," "Revise and Resubmit" or "Rejected." When shop drawings are required to be resubmitted, the revisions are to be clearly defined on the revised drawings. Resubmittals will be reviewed in accordance with the provisions applicable to initial submittals and the time period for the Engineer's review shall be equal to that for initial submittals.

Submittal and processing of shop drawings shall conform to the requirements of Section 01 33 00, "Submittals," of the Technical Specifications.

Full compensation for furnishing all shop drawings shall be considered as included in the prices paid for the Contract items of work to which such drawings relate and no additional compensation will be allowed therefor.

When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in strict accordance therewith. Any further changes will require a resubmittal of the drawings.

#### **G5.04 CONFORMITY WITH CONTRACT DOCUMENTS**

Work and materials shall conform to the lines, grades, cross sections, dimensions and material requirements, including tolerances, shown on the Contract Drawings or indicated in the Specifications. Although measurement, sampling and testing may be considered evidence as to such conformity, the Engineer/Architect shall be the sole judge as to whether the work or materials deviate from the Contract Drawings and Specifications, and his decision as to any allowable deviations shall be final.

#### **G5.05 COORDINATION AND INTERPRETATION OF CONTRACT DOCUMENTS**

The General Provisions, Technical Specifications, Contract Drawings, Contract Change Orders and all supplementary 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 a complete work.

In the event of inconsistencies between requirements contained in different components of the Contract Documents, the order of precedence to govern interpretation is as follows: (1) Change Orders, (2) Addenda, (3) Contract, (4) Bid Forms (all documents submitted by the bidder), (5) General Provisions, (6) Information for Bidders, (7) Technical Specifications, (8) Contract Drawings, (9) Notice Inviting Sealed Bids. In case of differences between small and large scale drawings, the large scale drawings shall govern. Schedules on drawings shall take precedence over conflicting notations on drawings. In the event of discrepancy between any drawing and the figures written thereon, the figures, unless otherwise directed, will govern over scaled dimensions.

Should it appear that the work to be done or any of the related matters is not sufficiently detailed or explained in the Contract Documents, the Contractor shall request from the Engineer/Architect for such further written explanations as may be necessary and shall conform to them as part of the Contract. In the event of any doubt or question arising respecting the true meaning of the Contract Documents, clarification shall be sought from the Engineer/Architect, whose decision shall be final.

#### **G5.06 ORDER OF WORK**

When required by the Technical Specifications or Contract Drawings, the Contractor shall follow the sequence of operations as set forth.

Full compensation for conforming with such requirements will be considered as included in the prices paid for the various Contract items of work and no additional compensation will be allowed.

#### **G5.07 SUPERINTENDENCE**

The Contractor shall supervise and direct the work using his best skill and attention and shall keep at the project site competent supervisory personnel at all times while work is in progress. The Contractor shall designate, in writing, before starting work, a project superintendent who shall be an employee of Contractor and shall have complete authority to represent and act for the Contractor. The Contractor shall notify the Engineer in writing prior to any change in superintendent assignment.

The Contractor shall be solely responsible for and have control over construction means, methods, techniques and procedures for providing adequate safety precautions and coordinating all portions of the

work under the Contract, unless the Contract Documents give other specific instructions concerning these matters.

#### **G5.08 LINES AND GRADES**

Contractor shall set primary control lines, monuments and bench marks as he determines to be necessary to control establishment of the lines and grades required for the completion of the work. In general, these will consist of the primary horizontal and vertical control points shown on the Contract Drawings. The Contractor shall notify Engineer a minimum of five (5) working days after such stakes are set.

Monuments, stakes and marks set by the Contractor shall be care-fully preserved by the Contractor. If such monuments, stakes or marks are destroyed or damaged, they will be replaced at no cost by the Contractor.

The Contractor shall temporarily suspend work at such points and for such reasonable times as the Engineer may require for transferring or setting monuments, stakes or marks, and the Contractor shall not be entitled to any additional compensation or extension of time therefore.

All other stakes or marks required to establish the lines and grades required for the completion of the work shall also be the responsibility of the Contractor. Payment for all work related to setting stakes or marks shall be considered as included in the prices paid for the various Contract items of work and no additional compensation will be allowed therefore.

Contractor shall take field measurements and verify field conditions consistent with prudent construction industry standards and shall carefully compare such field measurements and conditions and other information known to Contractor with the Contract Documents before commencing construction activities on the work site. Errors, inconsistencies or omissions in the Contract Documents discovered by Contractor shall be reported to the Engineer at once.

#### **G5.09 OBSERVATION OF CONSTRUCTION**

The Engineer/Architect, and all authorized representatives of the Owner, shall at all times have safe access to the work during its construction, and shall be furnished with every reasonable facility for ascertaining that the materials and the workmanship are in accordance with the requirements and intentions of the Contract Documents. All work done and all materials furnished shall be subject to the Engineer/Architect's on-site and off-site observation.

The observation of the construction or materials by the Engineer shall not relieve the Contractor of any obligations to fulfill his Contract as prescribed. Work and materials not meeting such requirements shall be corrected, and unsuitable work or material may be rejected, notwithstanding that such work or materials have been previously reviewed by the Engineer, or that payment for such work or materials has been included in a progress estimate.

Re-examination of questioned work may be ordered by the Engineer/Architect at any time before final acceptance. If so ordered, the work shall be uncovered by the Contractor. If such work is found to be in accordance with the Contract Documents, the Owner will pay for the cost of uncovering; removal, recovering and replacing of the parts removed; but if such work so exposed or examined is not in accordance with the Contract Documents, the uncovering, removal, recovering and replacement shall be at the Contractor's expense. Work which has been covered prior to observation by the Engineer/Architect



does not qualify as re-examined work; the Owner may order it uncovered for observation without payment of costs.

The Contractor shall give due notice to the Engineer/Architect before backfilling so that the Owner's Geotechnical Inspector may observe the materials and installation.

Whenever the Contractor intends to perform work on Saturday, Sunday, or a legal holiday, he shall give notice to the Architect and Owner Engineer of such intention twenty-four (24) hours prior to performing such work, or such longer period as may be specified, so that the Owner's material testing lab may make necessary arrangements.

The observations performed by the Engineer shall not relieve the Contractor of his responsibility to conduct comprehensive inspections of the work and to furnish materials and perform work in conformance with the Contract Documents.

#### **G5.10 DOCUMENTS ON JOB SITE**

The Contractor shall keep one copy of all Contract Documents (including Change Orders), approved Shop Drawings and approved progress payments on the job site, in good order, available to the Engineer and all authorized representatives of the Owner.

#### **G5.11 CORRECTION, REMOVAL OF REJECTED WORK**

The Contractor shall promptly correct work rejected by the Engineer as failing to conform to the requirements of the Contract Documents, whether or not fabricated, installed or completed, so that it does comply with the Contract Documents. The Contractor shall bear the costs of correcting such rejected work, including additional testing, inspections and compensation for the Engineer's services and expenses made necessary thereby.

The Contractor shall remove, at his cost, from the site portions of the work which are not in accordance with the Contract Documents or which are not corrected by the Contractor.

The Contractor shall correct, at his cost, damaged or destroyed construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractors' correction or removal of work which is not in accordance with the requirements of the Contract Documents.

Any work done beyond the lines shown on the Contract Drawings or established by the Engineer, and all extra work done without written authority, will be considered as unauthorized work. Upon order of the Engineer, unauthorized work shall be remedied, removed or replaced at the Contractor's cost.

If the Contractor fails to promptly correct non-conforming or rejected work, or to comply promptly with any order of the Engineer under this Section, the Owner may cause such work to be remedied, removed or replaced and the costs thereof will be deducted from any monies due or to become due the Contractor.

Failure on the part of the Engineer to reject non-conforming work shall not be construed to imply acceptance of such work.

#### **G5.12 [Intentionally left blank]**

### **G5.13 CHARACTER OF WORKERS**

The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons nor persons unskilled in tasks assigned to them.

### **G5.14 FINAL INSPECTION**

When the work has been completed, the Engineer will make the final inspection. The Contractor shall notify the Engineer/Architect in writing when it considers the work complete and shall request a final inspection.

### **G5.15 SUBMITTAL OF RECORD DATA**

The Contractor shall maintain up-to-date a separate, neat and legible set of construction drawings showing as-built conditions. The intention is that a separate full-size set of the construction drawings will be neatly and accurately marked in colored ink to show any condition, dimension, installation or location that is different from that originally shown. Deviations from the drawings, utilities and services, mechanical and electrical lines, details, and other work shall be incorporated on this set. The locations of installed underground and hidden utilities will be shown and dimensioned to appropriate reference points. No work shall be permanently concealed until the required information has been recorded. The requirement is that these record construction drawings and the "as-built" material and equipment drawing submittals provided will reflect the complete as-built condition of the project.

Where the contract drawings are not of sufficient size, scale, or detail, the Contractor shall furnish his own drawings for incorporation of details and dimensions. In such cases, the Contractor shall provide a reproducible set of his drawings, suitably cross-referenced to the contract drawings.

The record drawings will be maintained up to date on a "day by day" basis. That is, information will be recorded as it is known. Prior to any progress payments, the Engineer/Architect will review the status of the record construction drawings. The Engineer/Architect may withhold approval of progress payments until such time as the record drawings are brought up to date.

Prior to the completion of the contract, the Contractor shall furnish a satisfactory set of record drawings and certify on each drawing that conditions shown are as-built. Submittal of the record drawings is made a condition for acceptance of the project and final payment under the contract.

### **G5.16 EMERGENCIES**

In an emergency affecting the safety of life, the work, or adjoining property, the Contractor, without special instructions or authorization from the Engineer/Architect, shall act at his discretion to prevent such threatened loss or injury. In such an emergency, the Contractor shall perform such additional work as is required. Any compensation claimed by the Contractor on account of emergency work shall be determined in accordance with the provisions of Section 9.

## **G5.17 RIGHTS-OF-WAY**

The Owner will provide the rights-of-way over private lands or the site for permanent works or installations, and right-of-way for access, unless otherwise indicated. The Contractor will be permitted to use such land for construction purposes, but any additional right-of-way or land desired by the Contractor for construction purposes shall be provided by the Contractor without expense to the Owner.

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## **SECTION 6 CONTROL OF MATERIALS**

### **G6.01 SOURCE OF SUPPLY AND QUALITY OF MATERIALS**

The Contractor shall provide all materials required to complete the work, except materials that are designated in the Specifications to be furnished by the Owner and materials furnished by the Owner in accordance with force account work as described in Section G9.03. As used in this Section, the term "materials" shall mean materials and equipment furnished for incorporation in the work.

Notwithstanding any prior inspection, only materials conforming to the requirements of the Contract Documents shall be incorporated in the work.

The materials furnished and used shall be new, except as may specifically be provided elsewhere in the Contract Documents. The materials shall be manufactured, handled, and used in a workmanlike manner to ensure completed work in accordance with the Contract Documents.

The Contractor shall submit to the Engineer/Architect a list of his sources of materials and the locations at which such materials will be available for inspection. The list shall be submitted in sufficient time to permit proper inspection and testing of materials to be furnished from such listed sources in advance of their use. The Contractor shall assure that the Engineer/Architect or his authorized representative has free access at all times to the material to be inspected, sampled or tested. The Engineer/Architect may inspect, sample or test materials at the source of supply or other locations. It is understood that such inspections and tests in no way shall be considered as a guaranty of continued acceptance of material presumed to be similar to that upon which inspections and tests have been made, and that inspection and testing performed by the Owner shall not relieve the Contractor or his suppliers of responsibility for quality control.

Manufacturers' warranties, guaranties, instruction sheets and parts lists, which are furnished with certain materials incorporated in the work, shall be delivered to the Engineer/Architect before final acceptance of the Contract.

Reports and records of inspections made and tests performed, when available at the site of the work, may be examined by the Contractor and the Engineer.

### **G6.02 STORAGE OF MATERIALS**

Materials shall be stored by the Contractor in such a manner as to ensure the preservation of their quality and fitness for the work and to facilitate inspection.

### **G6.03 DEFECTIVE MATERIALS**

All Contractor-furnished materials not conforming to the requirements of the Contract Documents may be rejected, whether in place or not. They shall be removed immediately from the site of the work unless otherwise permitted by the Engineer/Architect. No rejected material, the defects of which have been subsequently corrected, shall be used in the work unless approval in writing has been given by the Engineer/Architect. Upon failure of the Contractor to comply promptly with any order of the Engineer/Architect made under the provisions of this Section, the Engineer/Architect may cause the

removal and replacement of rejected material and deduct the cost from any monies due or to become due the Contractor.

#### **G6.04 TRADE NAMES AND ALTERNATIVES**

For convenience in designation in the Contract Documents, certain articles or materials to be incorporated in the work may be designated under a trade name or the name of a manufacturer and his catalog information. Except in those instances where the product is designated to match others in use in a particular improvement, either completed or in the course of completion, the use of an alternative article or material which is of equal quality and of the required characteristics for the purpose intended will be permitted, subject to the following requirements:

1. The Contractor shall submit his Proposal for an alternative in writing. Such request shall be made in ample time to permit review and approval without delaying the work.
2. No such Proposal will be considered unless accompanied by complete information and descriptive data necessary to determine the equality of the offered materials, articles, or equipment. Samples shall be provided when requested by the Engineer. The Contractor shall satisfy the Engineer as to the comparative quality, suitability and performance of the offered materials, articles or equipment. In the event that the Engineer/Architect rejects the use of such alternative materials, articles or equipment, then one of the particular products designated by brand name will be furnished.
3. The burden of proof as to the quality and suitability of alternatives shall be upon the Contractor and he shall furnish all information necessary as required by the Engineer/Architect. The Engineer/Architect shall be the sole judge as to the quality and suitability of alternative articles or materials and his decisions shall be final. Where use of an alternative material involves redesign of, or changes to, other parts of the work, the cost and the time required to effect such redesign or changes will be considered in evaluating the suitability of the alternative material. Cost of redesign by the Engineer/Architect will be borne by the Contractor.
4. Whenever classification, rating or other certification by a body such as UL or NEMA is a part of the specification for any material, proposal for use of alternative materials shall be accompanied by reports from the listed or equivalent independent testing laboratory indicating compliance with specification requirements. The cost of all testing required to prove equality of the material proposed shall be borne by the Contractor. Approval of an alternative material shall be only for the characteristics or use named in such approval, and shall not be used to change or modify any Contract requirement.

#### **G6.05 PLANT INSPECTION**

The Engineer/Architect may inspect the production of material, or the manufacture of products, at the source of supply. Plant inspection, however, will not be undertaken until the Engineer/Architect is assured of the cooperation and assistance of both the Contractor and the material producer. The Engineer/Architect or his authorized representative shall have free entry at all times to such parts of the plant as concern the manufacture or production of the materials. Adequate facilities shall be furnished free of charge to make the necessary inspection. The Engineer/Architect assumes no obligation to inspect

materials at the source of supply. The responsibility of incorporating satisfactory materials in the work rests entirely with the Contractor, notwithstanding any prior inspections or tests.

#### **G6.06 PRODUCT AND REFERENCE STANDARDS**

When descriptive catalog designations, including manufacturer's name, product brand name or model number are referred to in the Contract Documents, such designations shall be considered as being those found in industry publications in effect on the day the Notice to Contractors for the work is dated.

#### **G6.07 SAMPLES**

After the award of the Contract, the Contractor shall furnish to the Owner samples indicated in the Specifications or requested by the Engineer/Architect. Samples shall be submitted without charge, with shipping charges prepaid. Materials for which samples are required shall not be used in the work until approved in writing by the Engineer/Architect.

Each sample shall be submitted in duplicate unless otherwise directed, and shall be labeled with the following data: name of project; name of Contractor; material represented and location in the project including specification reference; and producer information including brand, model, place of origin, and other pertinent information.

The Contractor shall forward a transmittal letter to the Architect with each shipment of samples containing the information required in the previous paragraph. Approval of a sample shall be only for the characteristics and use named in the submittal and approval shall not be construed to change or modify any Contract requirement. Before submitting samples, the Contractor shall assure himself that the materials or equipment will be available in the quantities required in the project, as no change or substitution will be permitted after a sample has been approved unless approved by the Architect in writing.

Samples of material from local sources shall be taken by or in the presence of the Engineer/Architect if so required by the Engineer/Architect; otherwise the samples will not be considered for testing.

Approved samples not damaged in testing may be incorporated in the finished work if marked for identification and approved by the Engineer/Architect. Materials incorporated in the work shall match the approved samples.

Failure of any material to pass the specified tests will be sufficient cause for refusal to consider under this Contract any further samples of the same brand, make or source of that material. The Engineer/Architect reserves the right to reject the use of any material which has previously proven unsatisfactory in service.

Samples of material delivered to the site or in place may be taken by the Owner for testing. Failure of samples to meet Contract requirements will annul previous approvals of the item tested.

#### **G6.08 TESTING OF MATERIALS OR WORK**

Materials to be used in the work will be subject to inspection and tests by the Owner or designated representative. The Contractor shall furnish, without charge, such samples as may be required.

Materials and work shall be tested in accordance with the methods in use by the State of California, Department of Transportation, or by nationally recognized testing organizations or as specified in the Contract Documents. The Engineer/Architect will make or approve all testing. Unless otherwise noted in the Technical Specifications, testing will be made at the expense of the Contractor. In the event that any materials and work fail to pass tests, the cost of subsequent testing of similar materials and work as may be required by the Engineer/Architect shall be borne by the Contractor.

Whenever a reference is made in the Specifications to a test method by Calif. number, it shall mean the test method in effect on the date of the Notice for Proposals for the work. Whenever a reference is made in the Specifications to a specification or test designation of the American Society for Testing and Materials, the American Association of State Highway Officials, Underwriters' Laboratories, Inc., or any other recognized national organization, and the number accompanying the test designation representing the year of adoption of the test has been omitted, the reference shall mean the test method in effect on the date of the Notice for Proposals for the work.

Whenever the Contract Documents provide an option between two or more test methods, the Engineer/Architect will determine the test method to be used.

Whenever a specification, manual or test designation provides for test reports (such as certified mill test reports) from the manufacturer, copies of such reports, identified as to the lot of material, shall be furnished to the Engineer/Architect. The manufacturer's test report shall supplement the inspection, sampling and testing provisions of this Section and shall not constitute a waiver of the Owner's right to inspect. When material which cannot be identified with specific test reports is proposed for use, the Owner may, at its discretion, select random samples from the lot for testing. Testing specimens from the random samples, including those required for retest, shall be prepared in accordance with the referenced specification and furnished by the Contractor at his expense. The number of such samples and test specimens shall be entirely at the discretion of the Engineer/Architect.

## **G6.09 CERTIFICATE OF COMPLIANCE**

A Certificate of Compliance shall be furnished prior to the use of any materials for which the Specifications require that such Certificate be furnished. In addition, the Engineer/Architect may permit the use of certain materials prior to sampling and testing if accompanied by a Certificate of Compliance stating that the materials involved comply in all respects with the requirements of the Specifications. The Certificate shall be signed by the manufacturer of the material. A Certificate of Compliance shall be furnished with each lot of material delivered to the work and the lots so certified shall be clearly identified in the Certificate.

All materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the work which conforms to the requirements of the Contract Documents, and any such material not conforming to such requirements will be subject to rejection whether in place or not.

The Engineer/Architect reserves the right to refuse to permit the use of material on the basis of a Certificate of Compliance.

The form of the Certificate of Compliance and its disposition shall be as shown in the Special Provisions.



## SECTION 7 LEGAL RELATIONS AND RESPONSIBILITIES

### G7.01 LAWS TO BE OBSERVED

The Contractor shall keep himself fully informed concerning all requirements of law, including but not limited to all State and Federal laws and county and municipal ordinances and regulations which in any manner affect those engaged or employed in the work, the materials used in the work, or which in any way affect the conduct of the work, and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same. The Contractor shall at all times observe, and shall cause all his agents and employees to observe, all such requirements of laws and shall protect, indemnify and hold harmless the Owner and the Engineer/Architect, and all of their respective officers, agents and employees against all claims and liabilities arising from or based on the violation of any such requirement of law whether by the Contractor or his employees. If any discrepancy or inconsistency is discovered in the Contract Documents for the work in relation to any such requirements of laws, the Contractor shall immediately report the same to the Engineer/Architect in writing. The Contract Documents shall be governed by the laws of the State of California.

### G7.02 LABOR CODE REQUIREMENTS

Attention is directed to the following requirements of the Labor Code:

- A. **Hours of Labor.** Eight hours labor constitutes a legal day's work. The Contractor shall forfeit, as penalty to the Owner, Twenty-Five Dollars (\$25) for each worker employed in the performance of the Contract by the Contractor or by any subcontractor under him for each calendar day during which such workman is required or permitted to work more than eight (8) hours in any one (1) day and forty (40) hours in any one calendar week in violation of the provisions of the California Labor Code and in particular, Sections 1810 to 1815 thereof, inclusive, except that work performed by employees of the Contractor in excess of eight (8) hours per day and forty (40) hours during any one (1) week shall be permitted upon compensation for all hours worked in excess of eight hours per day at not less than one and one-half (1-1/2) times the basic rate of pay, as provided in said Section 1815.
- B. **Labor Non-Discrimination.** Attention is directed to Section 1735 of the Labor Code which provides the Contractor shall not discriminate against any employee who is employed on the work because of race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, genetic information, marital status, sex gender, gender identity, gender expressing age or sexual orientation of such persons, except as provided in Section 12940 of the Government Code.
- C. **Prevailing Wages.** The Contractor shall comply with California Labor Code Sections 1770 to 1780, inclusive. In accordance with said Section 1775, the Contractor shall forfeit as a penalty to an amount determined by the Labor Commissioner, not to exceed Two Hundred Dollars (\$200) for each calendar day or portion thereof for each worker paid less than stipulated prevailing wage rates for such work or craft in which such worker is employed for any work done under the Contract by him or by any subcontractor under him 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 the provisions of Section 1773 of the Labor Code, the Owner has obtained the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work applicable to the work to be done from the Director of the Department of Industrial Relations. Copies of the prevailing rates are on file at the Owner's Office and are available to any interested party on request. Such wage rates must be prominently posted at the construction site.

The Owner will not recognize any claim for additional compensation because of the payment by the Contractor of any wage rate in excess of the prevailing wage rate set forth in the Contract. The possibility of wage increases is one of the elements to be considered by the Contractor in determining his bid, and will not under any circumstances be considered as the basis of a claim against the Owner on the Contract.

D. **Payroll Records.** The Contractor's attention is directed to the following provisions of Labor Code Section 1776. The Contractor shall be responsible for the compliance with these provisions by his subcontractors.

- (a) Each contractor and subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work.
- (b) Contractor and subcontractors(s) will be obligated to submit all certified payroll records directly to the Department of Industrial Relations (DIR) in electronic format.
- (c) The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of the Contractor on the following basis:
  - (1) A certified copy of an employee's payroll record shall be made available for inspection or furnished to such employee or his or her authorized representative on request.
  - (2) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection or furnished upon request to the Owner, the Division of Labor Standards Enforcement and the Division of Apprenticeship Standards of the Department of Industrial Relations.
  - (3) A certified copy of all payroll records enumerated in subdivision (a) shall be made available upon request to the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through either the Owner, the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to paragraph (2), the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the Contractor, subcontractor and the entity through which the request was made. The public shall not be given access to such records at the principal office of the Contractor.
- (d) The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the Division.
- (e) Each contractor shall file a certified copy of the records enumerated in subdivision (a) with the entity that requested such records within ten (10) days after receipt of a written request.

- (f) Any copy of records made available for inspection as copies and furnished upon request to the public or the Owner, the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address and social security number. The name and address of the Contractor shall not be marked or obliterated.
- (g) The Contractor shall inform the Owner of the location of records enumerated under subdivision (a), including the street address, city and county, and shall, within five (5) working days of the Owner's request, provide a notice of a change of location and address.
- (h) In the event of noncompliance with the requirements of this Section, the Contractor shall have ten (10) days in which to comply subsequent to receipt of written notice specifying in what respects such contractor must comply with this Section. Should noncompliance still be evident after such 10-day period, the Contractor shall, as a penalty to the State or the Owner, forfeit One Hundred Dollars (\$100) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, such penalties shall be withheld from progress payments then due.

The penalties specified in subdivision (g) of Labor Code Section 1776 for noncompliance with the provisions of said Section 1776 may be deducted from any monies due or which may become due to the Contractor.

The Contractor and each subcontractor shall preserve their payroll records for a period of three (3) years from the date of completion of the Contract.

- E. **Apprentices.** The Contractor shall fully comply with the requirements of Sections 1777.5 and 1777.6 of the California Labor Code and the regulations of the California Apprenticeship Council. In accordance with Section 1777.5, the Contractor shall secure the necessary certificates and shall contribute to the apprenticeship fund or funds, as provided for therein. The Contractor shall require each subcontractor who will perform work or labor or render service to the Contractor in or about the construction of the work to comply fully with Sections 1777.5 and 1777.6 of the Labor Code. Information relative to apprenticeship standards, wage schedules and other requirements may be obtained from the State Division of Apprenticeship Standards and its branch offices.
- F. **Workers' Compensation.** Pursuant to the requirements of Section 1860 of the California Labor Code, the Contractor will be required to secure the payment of workers' compensation to his employees in accordance with the provisions of Section 3700 of the Labor code.

Prior to commencement of work, the Contractor shall sign and file with the Owner, a certification in the following form:

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

Said certification is included in the Contract, and signature and return of the Contract as provided in Section G3.03, "Execution of Contract," of the General Provisions, shall constitute signing and filing of the said certificate.

### **G7.03 REMOVAL, RELOCATION OR PROTECTION OF UTILITIES**

Pursuant to California Government Code Section 4215, the Owner shall identify and provide for the timely removal, relocation or protection of any existing main or trunkline utility facilities located on the site of the work to be completed with reasonable accuracy in the plans and specifications made part of the invitation for bids. If the Contractor discovers utility facilities not identified by the Owner while performing the work, the Contractor shall immediately notify the Owner and the owner of the utility in writing. For those main or trunk line utility facilities discovered by the Contractor, the Owner will compensate the Contractor for the costs of locating, removing or relocating such utility facilities; repairing damage not due to the failure of the Contractor to exercise reasonable care; and for equipment on the project necessarily idled during such work. The Contractor will not be assessed liquidated damages for delays in completion of the project due to the failure of the Owner or owner of the utility to provide for removal or relocation of such utility facilities.

### **G7.04 AIR POLLUTION CONTROL**

The Contractor shall comply with all air pollution control rules, regulations, ordinances and statutes which apply to any work performed pursuant to the Contract, including any air pollution control rules, regulations, ordinances and statutes specified in Section 11017 of the Government Code.

Material to be disposed of shall not be burned, either inside or outside the work site.

### **G7.05 WATER POLLUTION CONTROL**

The Contractor shall exercise every reasonable precaution to protect streams, lakes, reservoirs, bays and coastal waters from pollution with fuels, oils, bitumens, calcium chloride and other harmful materials and shall conduct and schedule his operations so as to avoid or minimize muddying and silting of said streams, lakes, reservoirs, bays and coastal waters. The Contractor shall comply with all laws, regulations, ordinances and rules regarding water pollution. Care shall be exercised to preserve roadside vegetation beyond the limits of construction.

Water pollution control work is intended to provide prevention, control, and abatement of water pollution to streams, waterways and other bodies of water, and shall consist of constructing those facilities which may be shown on the plans, specified in the General Provisions or in the Technical Specifications Section 01530, or directed by the Engineer/Architect.

### **G7.06 SOUND CONTROL REQUIREMENTS**

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.

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.

### **G7.07 USE OF PESTICIDES**

The Contractor shall comply with all rules and regulations of the Department of Food and Agriculture, the Department of Health, the Department of Industrial Relations and all other agencies which govern the use of pesticides required in the performance of the work on the Contract.

Pesticides shall include but shall not be limited to herbicides, insecticides, fungicides, rodenticides, germicides, nematocides, bactericides, inhibitors, fumigants, defoliant, desiccants, soil sterilants, and repellents.

Any substance or mixture of substances intended for preventing, repelling, mitigating or destroying weeds, insects, diseases, rodents or nematodes and any substance or mixture of substances intended for use as a plant regulator, defoliant or desiccant shall be considered as pesticide.

### **G7.08 WEIGHT LIMITATIONS**

Unless expressly permitted in the Technical Specifications, the Contractor shall not operate construction equipment or vehicles of any kind which, laden or unladen, exceed the maximum weight limits set forth in Division 15 of the Vehicle Code, over completed or existing base, surfacing, pavement or structures.

### **G7.09 PAYMENT OF TAXES**

The Contract prices paid for the work shall include full compensation for all taxes which the Contractor is required to pay, whether imposed by Federal, State or local government, including, without being limited to, Federal excise tax. No tax exemption certificate nor any document designed to exempt the Contractor from payment of any tax will be furnished to the Contractor by the Owner, as to any tax on labor, services, materials, transportation, or any other items furnished pursuant to the Contract.

The Contractor shall withhold and pay any and all sales and use taxes, withholding taxes, whether State or Federal, Social Security taxes, State Unemployment Insurance charges and all other taxes which are now or hereafter may be required to be paid or withheld under any laws.

### **G7.10 PERMITS AND LICENSES**

The Contractor shall procure all permits and licenses (except those procured or to be procured by the Owner which are listed in the Technical Specifications or Specifications), pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work.

The Environmental Quality Act (Public Resources Code, Section 21000 to 21176) may be applicable to permits, licenses and other authorizations which the Contractor must obtain from State or local agencies in connection with performing the work of the Contract. The Contractor shall comply with the provisions of that Act in obtaining such permits, licenses and other authorizations and they shall be obtained in sufficient time to prevent delays to the work.

The Contractor shall comply with permits obtained by the Owner for the work which are listed in the Technical Specifications or Specifications.

## **G7.11 SUBSURFACE EXCAVATIONS, NOTIFICATION**

Attention is directed to Government Code Sections 4216 to 4216.9, and in particular Section 4216.2 which provides, in part:

Except in an emergency, every person planning to conduct any excavation shall contact the appropriate regional notification center at least two (2) working days, but no more than fourteen (14) calendar days, prior to commencing that excavation, if the excavation will be conducted in an area which is known, or reasonably should be known, to contain subsurface installations other than the underground facilities owned or operated by the excavator, and, if practical, the excavator shall delineate with white paint or other suitable markings the area to be excavated. The regional notification center shall provide an inquiry identification number to the person who contacts the center and shall notify any member, if known, who has a subsurface installation in the area of the proposed excavation.

The Contractor shall contact the regional notification center, "Underground Service Alert," and schedule the work to allow ample time for the center to notify its members and, if necessary, for any member to field locate and mark its facilities.

The following provisions, drawn from Section 7104 of the Public Contracts Code, shall apply to any work which involves digging trenches or other excavations which extend deeper than four feet below the surface:

- (a) The Contractor shall promptly, and before the following conditions are disturbed, notify the District, in writing, of any:
  - (1) 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 provisions of existing law.
  - (2) Subsurface or latent physical conditions at the site differing from those indicated.
  - (3) Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract.
- (b) The District shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the work shall issue a change order under the procedures described in the Contract.
- (c) In the event that a dispute arises between the Owner and the Contractor as to whether the conditions materially so differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the work, the Contractor shall not be excused from any scheduled completion date provided for by the Contract, but shall proceed with all work to be performed under the Contract. The Contractor shall retain any and all rights provided either by Contract or by law which pertain to the resolution of disputes and protests.

## **G7.12 PATENTS**

The Contractor shall assume all costs arising from the use of patented materials, equipment, devices or processes, used on or incorporated in the work and shall indemnify, save harmless and defend the Owner, the Engineer/Architect, and their duly authorized representatives from all suits at law, or actions of every nature for, or on account of, the use of patented materials, equipment, devices or processes. In case such materials, equipment, devices or processes are held to constitute an infringement and their use enjoined, the Contractor, at his expense, shall: (a) secure for the Owner the right to continue using said materials, equipment, devices or processes by suspension of the injunction or by procuring a license or licenses, or (b) replace such materials, equipment, devices or processes, or (c) modify them so that they become noninfringing or remove the enjoined materials, equipment, devices or processes and refund the sums paid therefor without prejudice to any other rights of the Owner or the Engineer/Architect.

## **G7.13 SAFETY REQUIREMENTS**

The Contractor shall promptly and fully comply with and carry out, and shall without separate charge to the Owner, enforce compliance with the safety and first aid requirements prescribed by applicable State and Federal laws and regulations, rules and orders and, including but not limited to US Department of Labor (OSHA) and the CA Occupational Safety and Health Act (Cal-OSHA), as may be necessary to the end that work shall be done in a safe manner and that the safety and health of the employees and the people of local communities is safeguarded. In the event of conflicting requirements, the most stringent requirement as it pertains to the Contractor's safety responsibility applies.

Compliance with the provisions of this Section by subcontractors shall be the responsibility of the Contractor. All installed material, equipment and structures, without separate charge to the Owner, shall fully conform with all applicable State and Federal safety laws, rules, regulations and orders and it shall be the Contractor's responsibility to furnish only such material, equipment and structures, notwithstanding any omission in the Contract Documents thereof or that a particular material, equipment or structure was indicated.

Upon the failure of the Contractor to comply with any of the requirements of this Section, the Owner, Engineer or Architect shall have the authority, but not the duty, to stop any operations of the Contractor affected by such failure until such failure is remedied. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for increased costs or damages by the Contractor.

Contractor at all times shall conduct all operations under the Contract in a manner to avoid the risk of bodily harm to persons or risk of damage to any property. The Contractor shall continuously inspect all work, materials and equipment to ensure safe working conditions are maintained and damage to persons and property is avoided. During the performance of the work, the Contractor shall institute controls and procedures for the control and safety of persons visiting the job site.

The Contractor shall maintain an accurate record of, and shall report to the Owner in writing, exposure data and all accidents resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies or equipment incident to work performed under the Contract. If death or serious injuries or serious damages are caused, the accident shall be reported to the Owner immediately by telephone or messenger. In addition, the Contractor shall furnish the Owner with a copy of the Employer's Report of Injury immediately following any incident requiring the filing of said report during the

prosecution of the Work. The Contractor also shall furnish the District with a copy of the Employer's Report of Injury involving any subcontractors on the project. The Contractor shall make all reports as are, or may be, required by any authority having jurisdiction, and permit all safety inspections of the Work being performed under the Contract.

The Contractor may not submit a claim for extension of time or for extra costs or for any damages as a result of any stop work order for items related to this section that is issued by a proper authority, including the Owner.

No provisions of this Contract will act to make the Owner and Engineer/Architect, its consultants, or any other party other than the Contractor responsible for safety. The Contractor will indemnify, defend, and hold harmless the District, its officers, employees, and agents from and against any and all actions, damages, fines, and losses arising from the Contractor's failure to meet all the safety requirements or provide a safe work site.

#### **G7.14 TRENCH EXCAVATION SAFETY PLAN**

Attention is directed to California Labor Code Section 6705. At least five (5) days in advance of excavation of any trench five feet or more in depth, the Contractor shall submit to the Engineer a detailed plan showing the design of shoring, bracing, sloping and other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If such plan varies from the shoring system standards established by the State Construction Safety Orders, the plan shall be prepared and signed by a registered civil or structural engineer employed or hired by the Contractor. Nothing in this Section shall be deemed to allow the use of a shoring, sloping or protective system less effective than that required by the Construction Safety Orders of the Division of Industrial Safety. Nothing in this Section shall be construed to impose liability on the Owner, the Engineer/Architect or any of their employees.

Acceptance by Owner or Engineer/Architect constitutes acknowledgement of the submission, and does not constitute review or approval of the designs, design assumptions or criteria, completeness of submission, applicability to areas of intended use or implementation of the plan, all of which are solely the responsibility of the Contractor.

#### **G7.15 SANITARY PROVISIONS**

The Contractor shall conform to the rules and regulations pertaining to sanitary provisions established by the State, and to County, City and municipal laws and ordinances as may be applicable. Toilets for use of employees on the work shall be furnished where needed and shall be maintained by the Contractor. Their use shall be strictly enforced.

#### **G7.16 PUBLIC SAFETY AND CONVENIENCE**

The Contractor shall so conduct his operations as to offer 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.



The Contractor shall adequately warn and give notice to the general public of the construction and protect the general public from any and all dangerous conditions resulting from the work by means such as signs, lights, fences, barriers, guards and flaggers. Additional means may be specified in the Special Conditions.

The Contractor shall furnish, maintain throughout, and remove at the end of the construction period all construction signs, warning lights, lights for illumination, traffic strapping, delineators, barricades and flaggers which may be required or deemed necessary for public safety, including the safe and orderly movement of vehicular and pedestrian traffic. All traffic devices shall be as specified in the Manual of Traffic Controls for Construction and Maintenance Work Zones, issued by the California Department of Transportation (Caltrans). For work in a public right of way, the Contractor must comply with all the rules and regulations of the State, County, or local agency that owns the right of way.

The adequacy of the Contractor's means is subject to review by the Owner and other public agencies having jurisdiction and the Contractor shall promptly, at no additional cost to the Owner, comply with any order or direction regarding public safety and/or convenience.

All trucks coming to the site or leaving the site with materials or loose debris shall be loaded in a manner which will prevent dropping of material or debris on public streets. Spillage resulting from hauling operations along or across any public traveled way shall be removed immediately at the Contractor's expense.

Construction operations shall be conducted in such a manner as to cause as little inconvenience as possible to owners of abutting property. Convenient access to driveways, houses and buildings along the line of work shall be maintained, and temporary approaches to roads or highways shall be provided and kept in good condition. Roadway excavations shall be conducted in such a manner as to provide a reasonably smooth and even surface satisfactory for use by public traffic at all times.

For work in public right-of-way, the Contractor shall comply with the rules and regulations of the State, County or local agency that owns the right-of-way.

All costs of complying with public convenience requirements of all public agencies shall be included in the Contract price.

The Owner/Engineer/Architect shall have the authority, but not the duty, to stop the Contractor from beginning new work until the provisions of this Section have been met.

Liquidated damages for noncompliance with this section may be assessed at the amount per day, if any, specified in this Contract for failure to comply with this provision

#### **G7.17 SAFETY PROGRAM**

The Contractor shall establish, implement, monitor, supervise, and maintain a written injury and illness prevention program (IIPP) as required by Labor Code Section 6401.7. Before beginning the Work, the Contractor shall submit a copy of its IIPP plan to the Owner.

The Contractor's compliance with requirements for safety and the Owner's review of the Contractor's IIPP shall not relieve or decrease the liability of the Contractor for safety. The District's review of the Contractor's IIPP is only to determine if the above listed elements are included in the plan.

## **G7.18 PRESERVATION OF PROPERTY**

Due care shall be exercised to avoid injury to existing improvements or facilities, utility facilities, adjacent property and trees, shrubs and other plants that are not to be removed.

Trees, shrubs and other plants that are not to be removed, and pole lines, fences, signs, survey markers and monuments, buildings and structures, conduits, pipe lines, sewer and water lines, highway facilities, and any other improvements or facilities, under or above ground, that are within or adjacent to the work limit line shall be protected from injury or damage, and the Contractor shall provide and install suitable safeguards to protect such objects from injury or damage. If such objects are injured or damaged by reason of the Contractor's operations, they shall be replaced or restored at the Contractor's expense. The facilities shall be replaced or restored to a condition as good as when the Contractor entered upon the work, or as good as required by the Specifications if any such objects are a part of the work being performed under the Contract. The Engineer/Architect may make or cause to be made such temporary repairs as are necessary to restore to service any damaged facility. The cost of such repairs shall be borne by the Contractor and may be deducted from any monies due or to become due to the Contractor under the Contract.

The fact that any underground facility is not shown on the Contract Plans shall not relieve the Contractor of his responsibility under Section G8.14, "Non-Owner Facilities," of the General Provisions. It shall be the Contractor's responsibility to ascertain the location of such underground improvements or facilities which may be subject to damage by reason of his operations.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in protecting or repairing property as specified in this Section, shall be considered as included in the prices paid for the various Contract items of work and no additional compensation will be allowed therefor.

## **G7.19 RESPONSIBILITY FOR DAMAGE**

**The Mid-Peninsula Water District**, its directors, officers, employees and authorized agents thereof connected with the work, and the Engineer/Architect, shall not be answerable or accountable in any manner: for any loss or damage that may happen to the work or any part thereof; for any loss or damage to any of the materials or other things used or employed in performing the work; for injury to or death of any person (including but not limited to workers or the public) from any cause whatsoever; or damage to property from any cause whatsoever.

The Contractor shall be responsible for any liability imposed by law and injuries to or death of any person (including but not limited to workers and the public) or damage to property resulting from defects or obstructions or from any cause whatsoever during the progress of the work or at any time before its completion and final acceptance.

To the maximum extent permitted by law, the Contractor shall indemnify and save harmless the **Mid-Peninsula Water District**, its directors, officers, employees and authorized agents thereof, and the Engineer/Architect, from all claims, suits or actions of every name, kind and description, brought for, or on account of, injuries to or death of any person (including but not limited to employees of Contractor, of subcontractors, or of any other person, firm or entity and the public) or damage to property arising from any cause whatsoever during the progress of the work or at any time before its final completion and

acceptance; or economic harm arising from any cause whatsoever during the progress of the work or at any time before its final completion and acceptance, excluding such injuries etc. caused by the sole negligence, willful misconduct, or active negligence of the Owner or its representatives. The duty of the Contractor to indemnify and save harmless includes the duties to defend (by legal counsel satisfactory to the indemnitees) as set forth in Section 2778 of the Civil Code and to pay attorney's fees and litigation costs required by such defense.

With respect to third party claims against Contractor, the Contractor waives any and all rights to any type of express or implied indemnity against the **Mid-Peninsula Water District**, its directors, officers, employees or authorized agents, or the Engineer/Architect. It is the intent of the parties that the Contractor shall indemnify and hold harmless the **Mid-Peninsula Water District**, its directors, officers, employees and authorized agents, and the Engineer, from any and all claims, suits, or actions arising from any cause whatsoever as set forth above regardless of the existence or degree of fault or negligence on the part of the **Mid-Peninsula Water District**, the Engineer/Architect, the Contractor, a subcontractor or employee of any of these, except that in no event shall Contractor be required to indemnify for the sole negligence, willful misconduct, or active negligence of the **Mid-Peninsula Water District** or its directors, officers, employees or authorized agents, or the Engineer.

Pursuant to Public Contract Code section 9201, District shall have full authority to compromise or otherwise settle any claim relating to the Contract at any time. The District shall provide for timely notification to the Contractor of the receipt of any third-party claim, relating to the contract. Notice shall be in writing and will be provided within thirty (30) days. The District shall be entitled to recover its reasonable costs incurred in providing the notification required herein.

## **G7.20 RESPONSIBILITY FOR WORK AND MATERIALS**

Until the acceptance of the Contract, the Contractor shall have the charge and care of the work and of the materials to be used therein, including materials for which he has received partial payment, and shall bear the risk of injury, loss or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or from the nonexecution of the work. Relief from maintenance and responsibility for a portion of the total work will not be granted by the Owner. The Contractor shall rebuild, repair or restore all injuries, losses or damages to any portion of the work and materials occasioned by any cause before its completion and acceptance and shall bear the expense thereof. Where necessary, the Contractor shall, at his expense, provide suitable drainage and erect such temporary structures as are necessary to protect the work and materials from damage. The suspension of the work from any cause whatever shall not relieve the Contractor of his responsibility for the work and materials as herein specified. The Contractor shall properly store materials which have been partially paid for by the Owner. Such storage by the Contractor shall be on behalf of the Owner and the Owner shall at all times be entitled to the possession of such materials, and the Contractor shall promptly return the same to the site of the work when requested. The Contractor shall not dispose of any of the materials so stored except on written authorization from the Engineer.

## **G7.21 CONTRACTOR'S LIABILITY INSURANCE**

- A. Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in California (and acceptable to the Owner) policies of insurance as will protect the Contractor and the Owner from claims set forth below which may arise out of or result from the Contractor's operations under the Contract and for which the Contractor may be legally liable,

whether such operations be by the Contractor or by a subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- (1) claims under workers' compensation, disability benefits and any other similar employee benefit acts, which are applicable to the work;
  - (2) claims for damage because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
  - (3) claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
  - (4) claims for damages insured by comprehensive personal injury liability coverage which are sustained by (1) a person as a result of an offense directly or indirectly related to employment of such person by the Contractor, or (2) by another person;
  - (5) claims for damages, other than to the work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
  - (6) claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle; and
  - (7) claims involving contractual liability insurance applicable to the Contractor's indemnity obligations under Section G7.18.
- B. The general and commercial liability insurance required by paragraph A shall include all major divisions of coverage and be on a comprehensive basis including:
- (1) Premises Operations (including X, C & U coverages)
  - (2) Independent Contractors' Protection
  - (3) Products and Completed Operations
  - (4) Personal Injury Liability with Employment Exclusion deleted
  - (5) Broad Form Blanket Contractual, including specified provision for Contractor's obligation under Section G7.18
  - (6) Owned, Non-Owned and hired motor vehicles
  - (7) Broad Form Property Damage, including Completed Operations.
- C. The general and commercial liability insurance required by and described in paragraph A and paragraph B above shall be written for not less than Three Million Dollars (\$3,000,000) per occurrence. Coverages shall be written on an occurrence basis and shall be maintained without interruption from the date of commencement of work until the date of acceptance and final payment, and thereafter as may be required in the Technical Specifications.

- D. The Contractor shall procure and maintain at all times during this Contract Workers' Compensation Insurance in conformance with the laws of the State of California. Employer's Liability Insurance shall be One Million Dollars (\$1,000,000) per accident or disease. Within fifteen (15) days of Notice of Contract award, the Contractor shall file with the Owner a Certificate of Insurance, which shall stipulate that thirty (30) days advance written notice of cancellation, nonrenewal or reduction in limits shall be given in writing to the Owner.
- E. In the event any work is subcontracted, the Contractor shall require the subcontractors to provide statutory workers' compensation insurance and employer's liability insurance for all of the subcontractors' employees engaged in such work. In addition, the Contractor shall be responsible for any liability directly or indirectly arising out of the work performed by a subcontractor, to the extent such liability is not covered by the subcontractor's insurance. Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.
- F. Within fifteen (15) days from receipt of the Notice of Award, Contractor shall furnish to the District original certificates and amendatory endorsements of each policy of insurance required under this Contract. The endorsements are to be on forms that conform to the requirements stated herein and that are acceptable to the District. All documents are to be received and approved by the District before work commences. The District reserves the right to require complete, certified copies of all required insurance policies and/or endorsements effecting coverage required by these specifications at any time. Upon Owner's requirement, copies of each such policy of insurance and all endorsements shall also be promptly delivered to Owner. The policies of insurance required hereunder shall include the stipulations set forth below which also shall be reflected on the certificates of insurance.
- (1) Each insurance policy required under this Contract shall be endorsed to state that coverage shall not be suspended, voided, cancelled, reduced in coverage or in limits or otherwise materially altered except after thirty (30) days prior written notice by certified mail, return receipt requested has been given to the **Mid-Peninsula Water District**.
  - (2) The **Mid-Peninsula Water District**, its directors, officers, employees, authorized agents and the Engineer/Architect shall be named as additional insureds on the policies.
  - (3) **City of Belmont/County of San Mateo**, its directors, officers, employees, authorized agents and the Engineer/Architect shall be named as additional insureds on the policies.
  - (4) The policy shall provide primary insurance coverage and the company providing such policy shall be liable thereunder for the full amount of any claim or loss up to and including the total limits of liability, without right of contribution from any other insurance maintained by the District/County/City or the other additional insureds.
  - (5) The policy shall provide that inclusion of the District/County/City, its officers, directors, employees and agents as additional insureds shall not affect the District's/County's/City's rights as respects any claim, demand, suit or judgment brought or recovered against the Contractor. Said policy shall protect Contractor and District/County/City in the same manner as though a separate policy had been issued to each, but nothing in said policy shall operate to increase the company's liability as set forth in this policy beyond the amount shown or to

which the company would have been liable if only one interest had been named as an insured. The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

- G. Insurance is to be placed with an insurance carrier with a current A.M. Best and Company rating of no less than A:-VII or with a carrier acceptable to the District. The Contractor shall comply with all requirements of the insurers issuing policies. The carrying of insurance shall not be interpreted as relieving Contractor from any obligation under the Contract Documents. If any claim is made by any third person against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the insurance carrier and the Owner. Any failure to comply with reporting or other provisions of the policies shall not effect coverage provided to the **Mid-Peninsula Water District**, its officers, directors or employees.
- H. If Contractor fails to procure and maintain any insurance required under this Section, the Owner may take out and maintain, at the Contractor's expense, such insurance as the Owner may deem proper and deduct the cost thereof from any monies due the Contractor.
- I. For projects located within public right of way, additional insurance requirements may be imposed by the owner of the right of way as a condition of issuing an encroachment or street opening permit to the Contractor. The Contractor shall provide such insurance at his sole cost and expense.

## **G7.22 PROPERTY INSURANCE**

Unless otherwise provided in the Technical Specifications, the Contractor will purchase and maintain, in a company or companies lawfully authorized to do business in California, and acceptable to the Owner, property insurance upon the entire work, in the amount of the Contract price on a replacement cost basis. Such property insurance shall be maintained until final payment has been made.

Property insurance shall be on an all-risk policy form (commonly known as "Builder's Risk-All Risk"), excluding coverage for earthquake and tsunamis. The insurance shall cover reasonable compensation for Engineer's services and expenses required as a result of such insured loss. This insurance shall insure the interests of the Owner, the Contractor, and subcontractors in the work.

The property insurance may contain deductibles not to exceed the amounts. If no amounts are specified in the Special Provisions, the insurance shall be written without deductibles. The Contractor shall pay costs not covered because of such deductibles.

Complete copies of each policy of insurance and certificates of each policy, in form and substance satisfactory to Owner, shall be filed with Owner within fifteen (15) days after Contractor receives notice of award. The policies and certificates shall provide:

- (1) that **Mid-Peninsula Water District** is included as a named insured;
- (2) that losses shall be payable to Contractor and District as their interests appear; and
- (3) the policy will not be cancelled, nor coverage materially altered, without thirty (30) days prior written notice to District."

### **G7.23 DISPOSAL OF MATERIAL OUTSIDE THE WORK SITE**

Unless otherwise specified in the Specifications, the Contractor shall make his own arrangements for disposing of materials outside the work site and he shall pay all costs involved.

When any material is to be disposed of outside the work site, the Contractor shall first obtain a written permit from the property owner on whose property the disposal is to be made. The Contractor shall file with the Engineer/Architect this permit or a certified copy, together with a written release from the property owner absolving the Owner from any and all responsibility in connection with the disposal of material on the property. Before any material is disposed of on said property, the Contractor shall obtain written permission from the Engineer/Architect to dispose of the material at the location designated in said permit.

When material is disposed of as above provided and the disposal location is visible from a highway, the Contractor shall dispose of the material in a neat and uniform manner to the satisfaction of the Owner's geotechnical consultant.

### **G7.24 COOPERATION**

Should construction be under way by other forces or by other contractors within or adjacent to the limits of the work specified, or should work of any other nature be under way by other forces within or adjacent to these limits, the Contractor shall cooperate with all such other contractors or other forces to the end that any delay or hindrance to their work will be avoided. The right is reserved to perform other or additional work at or near the site at any time, by the use of other forces.

When two or more contractors are employed on related or adjacent Owner work, each shall conduct his operations in such a manner as not to cause any unnecessary delay or hindrance to the other. Each contractor shall be responsible to the other for all damage to work, to persons or property caused to the other by his operations, and for loss caused the other due to his unnecessary delays or failure to finish the work within the time specified for completion.

### **G7.25 OCCUPANCY PRIOR TO ACCEPTANCE**

The Owner reserves the right to occupy all or any part of the project prior to completion of the entire Contract, upon written order therefor. In such event, the Contractor will be relieved of responsibility for any injury or damage to such part as results from such occupancy and use by the Owner.

If the Contractor carries insurance against damage to such premises or against liability to third persons covering the premises so used and occupied by the Owner, and if such occupancy results in increased premiums for such insurance, the Owner will pay to the Contractor the added cost for such insurance during the period of occupancy.

Such occupancy does not constitute acceptance by the Owner either of the complete work or of any portion, nor will it relieve the Contractor of full responsibility for correcting defective work or materials found at any time before the formal written acceptance of the entire Contract by the Owner or during the full guarantee period after such acceptance.

### **G7.26 ACCEPTANCE OF THE WORK**

When the Engineer/Architect has made the final inspection as provided in Section G5.14 and determines that the work has been completed in all respects in accordance with the Contract Documents, he will recommend that the Owner formally accept the work. Immediately upon and after such formal written acceptance by the Owner, the Contractor will be relieved of the duty of maintaining the work as a whole, and he will not be required to perform any further work thereon except as provided in Sections G4.15, "GUARANTY OF WORK" and G4.16, "CORRECTION OF WORK DURING WARRANTY PERIOD."

#### **G7.27 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 soil or after partial payment has been made for material delivered on the ground or stored subject to or under the control of the Owner and unused. All such material shall become the property of the Owner upon being so attached or affixed or upon payment for materials delivered on the ground or stored subject to or under the control of the Owner and unused, as provided in Section 9.

#### **G7.28 RIGHTS IN LAND AND IMPROVEMENTS**

The Contractor shall make no arrangements with any person to permit occupancy or use of any land, structure or building within the limits of the work, for any purpose whatsoever, either with or without compensation, in conflict with any agreement between the Owner and any owner, former owner or tenant of such land, structure or buildings. The Contractor shall not occupy Owner-owned property outside the limit of the work as shown on the Contract Drawings unless he obtains prior approval.

#### **G7.29 ANTITRUST CLAIMS**

The Contractor's attention is directed to the following provision of Public Contract Code Section 7103.5(b) which shall be applicable to the Contractor and his subcontractors:

In entering into a public works contract or a subcontract to supply goods, services or materials pursuant to a public works contract, the Contractor or subcontractor offers and agrees to assign to the awarding body all right, title and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 [commencing with Section 16700] of Part 2 of Division 7 of the Business and Professions Code), 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.

#### **G7.30 ACCESS TO THE WORK**

The Contractor shall satisfy himself that the jurisdictions through which his operations and haul routes pass will permit such operations with respect to type of vehicle, laden weights, frequency and dimensions of loads, hours of operation and required traffic control. All necessary permits, licenses or bonds shall be obtained and paid for by the Contractor.



### **G7.31 PERSONAL LIABILITY**

Owner's Directors, General Manager, Secretary, Officers, Agents, Representatives and Employees and Engineer's Principals and Employees shall not be personally responsible for any liability arising under or by virtue of this Contract.

### **G7.32 THIRD PARTY RIGHTS**

Nothing in the Contract is intended to create the public or any member thereof a third party beneficiary hereunder.

### **G7.33 INDEPENDENT CONTRACTOR STATUS**

The Contractor shall independently perform all work under this Contract and shall not be considered as an agent or employee of the Owner, nor shall the Contractor's subcontractors or employees be considered as subagents of the Owner.

### **G7.34 HAZARDOUS CHEMICALS AND WASTES**

The Contractor shall bear full and exclusive responsibility for any release of hazardous or nonhazardous chemicals or substances during the course of the performance of this Contract. The Contractor shall immediately report any such release to the Engineer/Architect. The Contractor shall be solely responsible for all claims and expenses associated with the response to, removal and remediation of the release, including, without limit, payment of any fines or penalties levied against the Owner by any agency as a result of such release and shall hold harmless, indemnify and defend the Owner from any claims arising from such release. For purposes of this section only, the term "claims" shall include (i) all notices, orders, directives, administrative or judicial proceedings, fines, penalties, fees or charges imposed by any governmental agency with jurisdiction, and (ii) any claim, cause of action, or administrative or judicial proceeding brought against the Owner, its directors, officers, employees or agents, or for any loss, cost (including reasonably attorney's fees), damage, or liability, sustained or suffered by any person or entity, including the Owner.

If the performance of the work outlined by these contract specifications creates any hazardous wastes, the Contractor shall properly dispose of such wastes in full accordance with federal, state and local laws, at the expense of the Contractor. The Contractor shall dispose of the wastes under the District's EPA Generator number and shall provide the District with written proof of the Contractor's or its subcontractor's registration as a hazardous waste transporter.

The Contractor shall notify the Engineer/Architect of any hazardous wastes generated and disposed of in connection with this Project and the District reserves the right to a copy of any tests concluded on the wastes and, at the District's cost, to perform additional tests or examine those wastes prior to disposition. The Contractor shall hold harmless, indemnify and defend the District from any claims in connection with the disposal of the hazardous wastes which arise from the negligent or willful misconduct of the Contractor or its subcontractor(s) in the disposal of said hazardous wastes.

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## **SECTION 8 PROSECUTION AND PROGRESS**

### **G8.01 SUBCONTRACTING**

The Contractor shall give his personal attention to the fulfillment of the Contract and shall keep the work under his control.

No subcontractor will be recognized as such and nothing in the Contract Documents shall create any contractual relationship between the Owner and any subcontractor. The Contractor is as fully responsible to the Owner for the acts and omissions of his subcontractors and of persons either directly or indirectly employed by them as he is for the acts and omissions of persons directly employed by him.

Attention is directed to the requirements of the Subletting and Subcontracting Fair Practices Act (commencing with Section 4100 of the California Public Contract Code), which are applicable to this Contract. Each bidder shall list in his Bid the name and business address of each subcontractor to whom the bidder proposes to subcontract a portion of the work, and shall list each subcontractor, licensed by the State of California, proposed by the bidder to specially fabricate and install a portion of the work. The list shall include a description of the portion of the work which shall be done by each subcontractor. The bidder shall execute and submit with his Bid the "List of Subcontractors" on the form included in this book. Additional forms may be obtained from the Engineer/Architect. The Contractor shall not, without the consent of the Owner, either substitute any person as subcontractor in place of the subcontractor designated in the original List of Subcontractors, or sublet or subcontract any portion of the work in excess of one-half of one percent of the total amount of his Bid for which he did not originally designate a subcontractor. All subcontractors shall be registered with the Department of Industrial Relations.

When a portion of the work which has been subcontracted by the Contractor is not being prosecuted in a manner satisfactory to the Owner, the subcontractor shall be removed immediately on the request of the Owner, and shall not again be employed on the work.

The Contractor shall require, by written agreement, each subcontractor to be bound to the Contractor by terms of the Contract Documents and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by the Contract Documents, assumes toward the Owner, to the extent of the work to be performed by the subcontractor. Each subcontract agreement shall preserve and protect the rights of the Owner under the Contract Documents with respect to the work to be performed by the subcontractor, so that subcontracting will not prejudice such rights.

### **G8.02 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 surety of their responsibilities under the Contract nor will the Owner consent to any assignment of a part of the work under the Contract.

The Contractor may assign monies due or to become due him under the Contract and such assignment will be recognized by the Owner, if given proper notice, to the extent permitted by law. However, any assignment of monies shall be subject to all proper set-offs 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.

### **G8.03 NOTICE TO PROCEED**

As soon as practicable after the Owner receives acceptable insurance certificates, approves the Contract Bonds and other Contract Documents, executes the Contract and reviews all submittals required prior to the start of the Work, the Owner will issue a written Notice to Proceed, which will be mailed to the Contractor. The effective date of the Notice to Proceed will be the date stated as such in the Notice to Proceed, provided that the effective date will not be earlier than the day following the issuance of the Notice to Proceed.

### **G8.04 BEGINNING OF WORK**

The Contractor is not authorized to perform any work until he has received a Notice to Proceed from the Owner. Within five (5) working days after the effective date of such Notice to Proceed, the Contractor shall commence work and shall diligently prosecute the same to completion within the time limit provided in the Technical Specifications.

The Contractor shall notify the Engineer/Architect, in writing, of his intent to begin work at least seventy-two (72) hours before work is begun and shall specify the date the Contractor intends to start. If the project has more than one location of work, a separate notice shall be given for each location.

Should the Contractor begin work in advance of receiving the Notice to Proceed and providing notice to the Engineer/Architect, any work performed by him in advance of such notice shall be considered as having been done by him at his own risk and as a volunteer without compensation.

### **G8.05 SCHEDULES AND PROGRESS REPORTS**

The Contractor shall, within the time specified in the Technical Specifications after the effective date of the Notice to Proceed, submit to the Engineer/Architect the specified number of copies of a construction schedule covering his operations for the work. The construction schedule shall be in the form required by the Technical Specifications or Specifications. The schedule shall show the order in which the Contractor proposes to carry out the work and the dates on which he expects to start and finish each part or division of the work (including procurement of materials, plant and equipment). The construction schedule shall be consistent with the time and order of work requirements of the Contract Documents and shall provide for expeditious and practicable execution of the work; provided that it shall not show a completion date earlier than the date by which the Contract must be completed pursuant to Section G8.07 and the corresponding Special Provision unless this early completion date was submitted with the Contractor's Proposal and the Contractor agrees to sign a Change Order reducing the completion time to that proposed by his schedule. If the Contractor desires to revise his construction schedule, or if it becomes necessary to revise it due to major changes, he shall submit the specified number of copies of the revised schedule for review and comment by the Engineer.

Owner will not issue a Notice to Proceed until the District Engineer reviews and comments on the construction schedule and submittal materials. No construction work will begin until the Contractor submits three (3) copies of corrected final submittal materials.

The Contractor shall submit to the Engineer/Architect as a condition of payment, at the time of submittal of the invoice for work completed (See Section G9.08), a schedule summary report in a form and of sufficient detail and character as specified in the Technical Specifications. The schedule summary report shall include the updated current construction schedule and shall specify whether the project is on schedule and, if not, the reasons. The monthly schedule summary report shall also indicate the delivery status of major and critical items of purchased equipment and material, the status of shop drawings and field fabricated work and such other information as may be required and set out in the Technical Specifications.

#### **G8.06 SITE MEETINGS**

The Contractor shall schedule meetings with the Engineer/Architect and each active subcontractor at the work site weekly, or at such other frequency as specified in the Technical Specifications. Each subcontractor shall present a competent representative to report the conditions of his work and to discuss problems.

#### **G8.07 TIME OF COMPLETION**

The Contractor shall complete all or any designated portion of the work called for under the Contract in all parts and requirements within the time set forth in the Technical Specifications.

#### **G8.08 ADDITIONAL SHIFT WORK**

The time limits specified for the completion of the work contemplated may be insufficient to permit completion of the work by the Contractor working a normal number of hours per day or week on a single shift basis. Where additional shifts or premium time pay are necessary to ensure that the work will be completed within the time limits specified, any resulting additional costs will be considered to be included in the price paid for the various Contract items of work and no additional compensation will be allowed.

#### **G8.09 OWNER'S RIGHT TO STOP THE WORK**

If the Contractor fails to correct promptly work which is not in accordance with the requirements of the Contract Documents or persistently fails to carry out work in accordance with the Contract Documents, the Owner may, in writing, order the Contractor to stop the work, or any portion thereof, until the cause for such order has been eliminated. The Contractor shall immediately comply with a written order of the Owner to stop the work. The work stopped shall be resumed as and when ordered by the Owner.

#### **G8.10 LIQUIDATED DAMAGES**

It is agreed by the parties to the Contract that in case all the work called for under the Contract in all parts and requirements is not completed within the number of days as set forth in the Contract Documents damage will be sustained by the Owner and that it is and will be impracticable and extremely difficult to ascertain and determine the actual damage which the Owner will sustain in the event of and by reason of such delay. It is therefore agreed that the Contractor shall pay to the Owner (as liquidated damages for delay and not as a penalty) the sum set forth in the Contract Documents per day for each and every calendar day's delay in finishing the work in excess of the number of days prescribed. The Contractor agrees to pay these liquidated damages, and further agrees that the Owner may deduct this amount from any monies due or that may become due the Contractor under the Contract if the Contractor has not paid

within seven (7) days any demand from the Owner for liquidated damages. If, based on the current approved progress schedule and rate of progress, it is determined by the Owner that completion will exceed the Contract time, as extended by any change orders, the Owner may prospectively assess and withhold liquidated damages from progress payments. If and at such time as progress improves to indicate timely completion, liquidated damages so withheld may be released at the next regular progress payment.

#### **G8.11 DELAYS AND EXTENSIONS OF TIME**

The Contractor will be granted an extension of time and will not be assessed with liquidated damages or the cost of engineering and inspection for any portion of the delay in completion of the work beyond the time set forth in the Technical Specifications caused by unforeseeable causes beyond the control and without the fault or negligence of the Contractor or subcontractor. Examples of such causes include acts of God or of the public enemy, fire, floods, storms, epidemics, quarantine restrictions, strikes and other work stoppages caused by a labor dispute, shortage of materials and freight embargoes, or acts or neglect of the Owner or Engineer/Architect not contemplated by the Contract Documents. In all cases, any extension of time is conditioned on the following: (1) that the cause is not due to the fault of the Contractor or subcontractor and the Contractor has taken reasonable precautions to prevent delays due to such cause; and (2) that the Contractor notifies the Engineer/Architect in writing within (ten) 10 days from the beginning of such delay specifying the nature of the delay, the number of days actually delayed and the measures taken to prevent or minimize the delay. Failure to submit written notice within this time shall constitute an absolute waiver of any claim for a time extension; failure to submit the required information will be sufficient cause for denial of the request for a time extension.

No extension of time will be granted for a delay caused by a shortage of materials, unless the Contractor furnishes to the Engineer/Architect documentary proof that he has diligently made every effort to obtain such materials from all known sources within reasonable reach of the work and further proof, in the form of schedule data as required in Section G8.05, that the inability to obtain such materials when originally planned did in fact cause a delay in final completion of the entire work which could not be compensated for by revising the sequence of the Contractor's operations. Only the physical shortage of material will be considered as a cause for extension of time, and no consideration will be given to any claim that material could not be obtained at a reasonable, practical or economical cost or price, unless it is shown to the satisfaction of the Engineer/Architect that such material could have been obtained only at exorbitant prices entirely out of line with current rates, taking into account the quantities involved and the usual practices in obtaining such quantities.

The term "shortage of materials," as used in this Section, shall apply only to materials, articles, parts or equipment which are standard items and shall not apply to materials, parts, articles or equipment which are processed, made, constructed, fabricated or manufactured to meet the specific requirements of the contract.

No extension of time will be granted for storms or adverse weather conditions which may reasonably be anticipated for the area in which the work is being performed, based on official records of monthly precipitation and other historical data.

No extensions of time will be granted for delays which have no measurable impact on the completion of the total work under the Contract. When extensions of time are granted, they will be limited to the period equivalent to the actual number of days lost on the critical path or controlling operation of construction,

taking into account the extent to which that delay could be decreased by reasonable mitigation measures by the Contractor or its subcontractor. All requests for extensions of time must be supported with a critical path analysis showing the critical path and impacts to it.

Within a reasonable period of time after the Contractor submits the notice and information required by this Section, the Engineer will determine whether an extension of time is justified and, if so, the number of days for the extension. In the event that the Contractor disagrees with the Engineer's decision, the Contractor may submit a protest in compliance with G4.09.

## **G8.12 TERMINATION OF RIGHT TO PROCEED**

If the Contractor should appear to the Engineer/Architect to be in default and the Contractor fails to remedy his default within five (5) working days after receipt from the Engineer/Architect of notice of such default, the Owner may terminate the Contractor's right to proceed with the work or that portion which the Engineer/Architect determines is most directly affected by the default.

The term "default" for purposes of this Section includes, but is not limited to, the performance of work in violation of the terms of the Contract; abandonment, assignment or subletting of the Contract without approval of the Owner; bankruptcy or appointment of a receiver for Contractor's property; refusal or failure properly to prosecute the work; use of materials, supplies, plant or equipment of improper quality or quantity; refusal or failure to use an adequate number of properly skilled workers; failure to provide proper workmanship; failure to take effective steps to end a prolonged labor dispute; and the performance of the Contract in bad faith.

Upon the Owner's termination of the Contractor's right to proceed with the work, or a portion of it, the Owner shall have the right to complete the work, or the portion involved, by whatever means and methods it deems expedient, including the hiring of others on such terms as the Owner deems advisable. The Owner shall have the right to take possession of the Contractor's materials, plant, tools, equipment and property of any kind provided by or on behalf of the Contractor for the purpose of the work, or a portion of them, without being responsible to the Contractor for fair wear and tear. The Contractor shall have no rights in such property during its use by the Owner. The Owner shall not be required to obtain the lowest prices for completing the work or a portion of it but shall make such expenditures as, in the Owner's sole judgment, best accomplish such completion.

The expense of completing such work or portion thereof, together with a reasonable charge for engineering, managerial and administrative services, as certified by the Owner, shall be charged to the Contractor, and the expense so charged shall be deducted by the Owner out of such monies as may be due or as may at any time afterwards become due to the Contractor. In case such expense is more than the sum which otherwise would have been payable to the Contractor under the Contract, then the Contractor or his surety or sureties shall promptly pay the amount of such excess so due. The Owner may, in its sole discretion, withhold all or any part of any progress payments otherwise due the Contractor until completion and final settlement of the work covered by such notice of default.

## **G8.13 TERMINATION OF CONTRACT**

A. **Termination for Cause.** The Owner may terminate the Contract if the Contractor:

- (1) persistently or repeatedly fails or refuses to supply enough properly skilled workers or proper materials;
- (2) fails to make payment to subcontractors for materials or labor in accordance with the respective agreements between the Contractor and subcontractor;
- (3) persistently disregards laws, ordinances or rules, regulations or orders of a public authority having jurisdiction; or
- (4) otherwise is guilty of a substantial breach of a provision of the Contract Documents. A "default" as defined in Section G8.12 shall constitute a substantial breach of the Contract Documents.

When any of the above reasons exist, the Owner may, without prejudice to any other rights or remedies of the Owner under this Contract or otherwise, upon ten (10) days written notice, terminate the Contract and may:

- (1) take possession of the site and of all materials, equipment, tools and construction equipment and machinery thereon owned by the Contractor;
- (2) finish the work by whatever means the Owner deems expedient.

When the Owner terminates the Contract under this Section, the Contractor shall not be entitled to receive any further payments until the work is completed and accepted by the Owner.

The provisions of the last two paragraphs of Section G8.12 shall apply if the Owner terminates the Contract.

The Owner will issue the Contractor a written notice specifying that the Contract is to be terminated. Upon receipt of said written notice and, except as otherwise directed in writing by the Engineer, the Contractor shall:

- (1) stop all work under the Contract except that specifically directed to be completed prior to acceptance;
- (2) perform work the Engineer/Architect deems necessary to secure the project for termination;
- (3) remove equipment from the site of work;
- (4) take such action as is necessary to protect materials from damage;
- (5) notify all subcontractors and suppliers that the Contract is being terminated and that their contracts or orders are not to be further performed unless otherwise authorized in writing by the Engineer;
- (6) provide the Engineer/Architect with an inventory list of all materials previously produced, purchased or ordered from suppliers for use in the work and not yet used in the work, including its storage location, and such other information as the Engineer may request;



- (7) dispose of materials not used in the work as directed by the Engineer/Architect. It shall be the Contractor's responsibility to provide the Owner with good title to all materials purchased by the Owner, including materials for which partial payment has been made as provided in Section G9.10, "Partial Payments," of these General Provisions and with bills of sale or other documents of title for such materials;
- (8) subject to the prior written approval of the Engineer/Architect, settle all outstanding liabilities and all claims arising out of terminated subcontracts or orders for materials. To the extent directed by the Engineer, the Contractor shall assign to the Owner all the right, title and interest of the Contractor under subcontracts or orders for materials terminated hereunder;
- (9) furnish the Engineer/Architect with the documentation required to be furnished by the Contractor under the provisions of the Contract including, on projects as to which federal funds are involved, all documentation required under the federal requirements included in the Contract;
- (10) take such other actions as the Engineer/Architect may direct.

**B. Termination for Convenience.** The Owner may terminate this contract in whole, or from time to time in part, at any time and for any reason, whenever the Owner shall determine that such termination is in the best interests of the Owner. Any termination which is not based on the circumstances set forth in Subsection A above, shall be effected by delivery to the Contractor of a notice of termination specifying the extent to which performance of work under the contract is terminated, and the date upon which such termination becomes effective. In such event, Contractor shall be paid for all actual substantiated direct costs of materials furnished and work performed up to the date of termination and such additional compensation as the Owner deems proper and reasonable to effect termination.

Upon Contractor's receipt of a written notice of termination for convenience, the Contractor shall cease work as to those portions of the project so terminated and shall undertake the steps outlined in Subsection A above.

In the event that the Owner terminates this Contract under Subsection A above and it is determined for any reason that there was not sufficient cause to do so, the Owner's termination automatically will convert to a termination for convenience under this Subsection B and the terms and conditions outlined in this Subsection automatically will be applied to effectuate the Contract termination.

#### **G8.14 NON-OWNER FACILITIES**

The Contractor shall protect from damage those utilities and other non-Owner facilities that are to remain in place, be installed, relocated or otherwise arranged.

Attention is directed to the possible existence of facilities not shown, and of facilities in a location different from that which is indicated. The Contractor shall take steps to ascertain the exact location of all facilities prior to doing work which may damage such facilities or interfere with their service. Where the location of a facility is not indicated or is in doubt, the Contractor shall make such excavations and explorations as are necessary to ascertain the correct location. The cost of such excavations and explorations will be considered as a part of the cost of other items of work and no additional payment will be made. Such excavations and exploratory work shall not entitle the Contractor to an extension of time.

Where it is determined by the Engineer/Architect that the rearrangement of an underground facility, the existence of which is not shown on the drawings, is essential in order to accommodate the work, the Engineer/Architect will provide for the rearrangement of such facility by other forces or, when so ordered by change order, such rearrangement shall be performed by the Contractor and will be paid for as provided under a change order.

The Contractor shall maintain all utility facilities placed by him in temporary locations, and all utilities within the construction area not required to be relocated but which are required to be shored or supported during the construction period. The cost of such maintenance shall be borne by the Contractor and no other compensation shall be due the Contractor for this work.

The cost of providing and maintaining all necessary or required temporary structures, of making any necessary repairs, replacements, or similar operations, or furnishing indemnity or other bonds, if required, and all costs required by this Section shall be paid by the Contractor and shall be included in the prices bid in the schedule for other items of work.

#### **G8.15 TEMPORARY UTILITIES**

The Contractor shall make his own arrangements with utility companies for any services he may require in performance of the work of this Contract and shall pay all costs of these services directly to these utility organizations.

## **SECTION 9 MEASUREMENT AND PAYMENT**

### **G9.01 MEASUREMENT OF QUANTITIES**

All work to be paid for at a Contract price per unit of measurement will be measured by the Engineer/Architect in accordance with United States Standard Measures.

### **G9.02 SCOPE OF PAYMENT**

The Contractor shall accept the compensation provided in the Contract as full payment for furnishing all labor, materials, tools, equipment and incidentals necessary to the completed work and for performing all work contemplated and embraced under the Contract; also for loss or damage arising from the nature of the work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the work until the acceptance by the Owner; and for all risks of every description connected with the prosecution of the work, also for all expense incurred in consequence of the suspension or discontinuance of the work as herein specified; and for completing the work according to the Contract Documents. Neither the payment of any estimate nor of any retained percentage shall relieve the Contractor of any obligation to make good any defective work or materials.

No compensation will be made in any case for loss of anticipated profits; profit in excess of that provided in the Contract Documents; home office overhead; consequential damage (including loss of bonding capacity, loss of bidding opportunities and insolvency); indirect costs or expenses of any nature; or attorneys' fees, claim preparation expenses or costs of litigation.

Except as specifically provided otherwise, no separate payment will be made for work covered in any of these General Provisions nor in the Division 1 Sections (01000 series), if used, of the Technical Specifications, and the cost thereof will be considered as included in the prices paid for the various Contract items included in the Bid.

If the "payment" clause in the Contract Documents relating to any unit price in the bid schedule requires that the said unit price cover and be considered compensation for certain work or material essential to the item, this same work or material will not also be measured nor paid for under any other pay item which may appear elsewhere in the Contract Documents.

### **G9.03 FORCE ACCOUNT PAYMENT**

When extra work or other work done pursuant to a Change Order is to be paid for on a force account basis, materials and equipment used in the performance of such work shall be subject to the approval of the Engineer/Architect and compensation will be determined as set forth below in this Section.

- A. Work Performed by Contractor. The Contractor will be paid the direct costs for labor, materials and equipment used in performing the work determined as hereafter provided.

To the total of the direct costs computed as provided in Sections 9.03.A(1), "Labor," 9.03.A(2), "Materials" and 9.03.A(3), "Equipment Rental," there will be added a markup of twenty-four percent (24%) to the cost of labor, fifteen percent (15%) to the cost of materials and subcontractors, fifteen percent (15%) to the cost of Contractor-owned equipment, and five percent (5%) to rented equipment.

The above markups shall constitute full compensation, covering the cost of general supervision, overhead, profit and any other general expense not specifically designated as cost or equipment rental in Sections 9.03.A(1), (2) and (3). The total payment made as provided above (i.e., direct cost plus applicable markups) shall be deemed to be the actual cost of such work and shall constitute full compensation therefor.

When work paid for on a force account basis is performed by forces other than the Contractor's organization, the Contractor shall reach agreement with such other forces as to the distribution of the payment made by the Owner for such work. No additional payment will be made by the Owner by reason of the performance of the work by a subcontractor or other forces.

1. **Labor.** The Contractor will be paid the cost of labor for the workers (including foremen when authorized by the Engineer/Architect, used in the actual and direct performance of the work. The cost of labor, whether the employer is the Contractor, subcontractor or other forces, will be the sum of the following:
  - (1a) **Actual Wages.** The actual wages paid shall include any employer payments to or on behalf of the workers for health and welfare, pension, vacation and similar purposes.
  - (1b) **Labor Surcharge.** To the actual wages, as defined in Section 9.03A(1a), will be added a labor surcharge set forth in the California Department of Transportation publication entitled Labor Surcharge And Equipment Rental Rates, which is in effect on the date upon which the work is accomplished and which is a part of the Contract. This labor surcharge shall constitute full compensation for all payments imposed by State and Federal laws and for all other payments made to, or on behalf of, the workers, other than actual wages as defined in Section 9.03A(1a).
  - (1c) The Contractor must submit documentary evidence satisfactory to the District Engineer to support any claims for compensation for all labor costs incurred. Such evidence may include certified payroll records or other documentary evidence showing hours worked per individual worker for the relevant time period.
2. **Materials.** The Owner reserves the right to furnish such materials as it deems advisable, and the Contractor shall have no claims for costs and markup on such materials.

Only materials furnished by the Contractor and necessarily used in the performance of the work will be paid for. The cost of such materials will be the cost to the purchaser, whether Contractor, subcontractor or other forces, from the supplier, except as the following are applicable:

- (2a) If a cash or trade discount by the actual supplier is offered or available to the purchaser, it shall be credited to the Owner notwithstanding the fact that such discount may not have been taken.
- (2b) If materials are procured by the purchaser by any method which is not a direct purchase from and a direct billing by the actual supplier to such purchaser, the cost of such materials shall be deemed to be the price paid to the actual supplier as determined by the Engineer/Architect plus the actual costs, if any, incurred in the handling of such materials.

- (2c) If the materials are obtained from a supply or source owned wholly or in part by the purchaser, the cost of such materials shall not exceed the price paid by the purchaser for similar materials furnished from said source on Contract items or the current wholesale price for such materials delivered to the job site, less any discounts as provided in Section 9.03A(2a).
- (2d) If the cost of such materials is, in the opinion of the Engineer/Architect, excessive, then the cost of such material shall be deemed to be the lowest current wholesale price at which such materials were available in the quantities concerned delivered to the job site, less any discounts as provided in Section 9.03A(2a).
- (2e) If the Contractor does not furnish satisfactory evidence of the cost of such materials from the actual supplier thereof within sixty (60) days after the date of delivery of the materials or within fifteen (15) days after acceptance of the Contract, whichever occurs first, the Owner reserves the right to establish the cost of such materials at the lowest current wholesale prices at which such materials were available in the quantities concerned delivered to the location of the work, less any discounts as provided in Section 9.03A(2a).

3. **Equipment Rental.** The Contractor will be paid for the use of equipment at the rental rates listed for such equipment in the California Department of Transportation publication entitled Labor Surcharge And Equipment Rental Rates, which is in effect on the date upon which the work is accomplished and which is a part of the Contract, regardless of ownership and any rental or other agreement, if such may exist, for the use of such equipment entered into by the Contractor. If it is deemed necessary by the Engineer/Architect to use equipment not listed in said publication, a suitable rental rate for such equipment will be established by the Engineer/Architect. The Contractor must furnish cost data to support the Engineer/Architect in the establishment of such rental rate.

The rental rates paid as above provided shall include the cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance and all incidentals.

Operators of rented equipment will be paid for as provided in Section 9.03A(l), "Labor."

All equipment shall, in the opinion of the Engineer/Architect, be in good working condition and suitable for the purpose for which the equipment is to be used.

Individual pieces of equipment or tools not listed in said publication and having a replacement value of \$200 or less, whether or not consumed by use, shall be considered to be small tools and no payment will be made therefor.

Rental time will not be allowed while equipment is inoperative due to breakdowns.

4. **Equipment Not on the Job.** For the use of equipment moved in on the Job and used exclusively for extra work paid for on a force account basis, the Contractor will be paid the rental rates in effect or determined to the location of the work and its return to its original location, all in accordance with the following provisions:

- (4a) The original location of the equipment to be hauled to the location of the work will be agreed to by the Engineer/Architect in advance.
- (4b) The Owner will pay the costs of loading and unloading such equipment.
- (4c) The cost of transporting equipment in low bed trailers shall not exceed the hourly rates charged by established haulers.
- (4d) The cost of transporting equipment shall not exceed the applicable minimum established rates of the Public Utilities Commission.
- (4e) The rental period shall begin at the time the equipment is unloaded at the site of the extra work, shall include each day that the equipment is at the site of the extra work, excluding Saturdays, Sundays, and legal holidays unless the equipment is used to perform the extra work on such days, and shall terminate at the end of the day on which the Engineer directs the Contractor to discontinue the use of such equipment. The rental time to be paid per day will be in accordance with the following:

<u>Hours Equipment is in Operation</u>	<u>Hours To be Paid</u>
0	4
0.5	4.25
1	4.5
1.5	4.75
2	5
2.5	5.25
3	5.5
3.5	5.75
4	6
4.5	6.25
5	6.5
.5	6.75
6	7
6.5	7.25
7	7.5
7.5	7.75
8	8
Over 8	actual hours in operation

The hours to be paid for equipment which is operated less than eight (8) hours due to breakdown shall not exceed eight (8) less than the number of hours the equipment is inoperative due to breakdowns.

When hourly rates are listed, less than thirty (30) minutes of operation shall be considered to be one-half (1/2) hour of operation.

The Contractor must submit documentary evidence satisfactory to the District Engineer showing hours of rental equipment usage to support any claims for compensation.

When daily rates are listed, payment for one-half (1/2) day will be made for one (1) day.

The minimum rental time to be paid for the entire rental period on an hourly basis shall not be less than eight (8) hours or if on a daily basis, shall not be less than one (1) day.

(4f) Should the Contractor desire the return of the equipment to a location other than its original location, the Owner will pay the cost of transportation in accordance with the above provisions; provided such payment shall not exceed the cost of moving the equipment to the work.

(4g) Payment for transporting, and loading and unloading equipment, as above provided, will not be made if the equipment is used on the work in any other way than upon extra work paid for on a force account basis.

B. Work Performed by Special Forces or Other Special Services. When the Engineer/Architect and the Contractor, by agreement, determine that a special service or an item of extra work cannot be performed by the forces of the Contractor or those of any of his subcontractors, such service or extra work item may be performed by a specialist. Invoices for such service or item of extra work on the basis of the current market price may be accepted without complete itemization of labor, materials and equipment rental costs when it is impracticable and not in accordance with the established practice of the special service industry to provide such complete itemization.

In those instances when a contractor is required to perform extra work necessitating a fabrication or machining process in a fabrication or machine shop facility away from the job site, the charges for that portion of the extra work performed in such facility may, by agreement, be accepted as a specialist billing.

To the specialist invoice price, less a credit to the Owner for any cash or trade discount offered or available, whether or not such discount may have been taken, will be added fifteen percent (15%) in lieu of the percentages provided in Section 9.03A, "Work Performed by Contractor."

#### **G9.04 RECORDS**

The Contractor shall maintain his records in such a manner as to provide a clear distinction between the direct costs of work paid for on a force account basis and the costs of other operations.

From the above records, the Contractor shall furnish the Engineer/Architect completed daily reports, on forms furnished by or acceptable to the Owner, for each day's work to be paid for on a force account basis. The daily reports shall itemize the materials used, and shall cover the direct cost of labor and the charges for equipment rental, whether furnished by the Contractor, subcontractor, or other forces, except for charges described in Section G9.03.B, "Work Performed by Special Forces or Other Special Services," of the General Provisions. The daily reports shall provide names or identifications and classifications of workers, the hourly rate of pay and hours worked, and also the size, type and identification number of equipment, and hours operated. Before presenting the daily reports to the Engineer/Architect for payment, the Contractor shall compile the cost of the work to be paid for on a force account basis. The report number shall be left blank for completion by the Engineer/Architect.

Material charges shall be substantiated by valid copies of vendor's invoices. Such invoices shall be submitted with the daily reports, or if not available, they shall be submitted with subsequent daily reports.

Should vendor's invoices not be submitted within sixty (60) days after the date of delivery of the materials or within fifteen (15) days after the acceptance of the Contract, whichever occurs first, the Owner reserves the right to establish the cost of such materials at the lowest current wholesale prices at which said materials are available in the quantities concerned delivered to the location of the work, less any discounts provided in Section G9.03.A.

The daily reports shall be signed by the Contractor or his authorized representative. The daily reports shall be turned in to the Engineer/Architect by the close of business on the day following the day of the report. Failure to turn in reports on this schedule will be the basis for denying payment or use of the Engineer's records only as the final and indisputable basis for payment. Reports must be complete as noted above.

The Engineer/Architect will compare his records with the completed daily reports furnished by the Contractor and make any necessary adjustments.

When the daily reports are agreed upon and signed by both parties, except for delinquent reports as noted above, the reports shall become the basis of payment for the work performed, but shall not preclude subsequent adjustment based on the later audit by the Owner.

Pursuant to Government Code section 8546.7, Contractor shall retain all project-related records for a period of 3 years after final payment on this contract, which shall be subject to audit or inspection by the District or the State Auditor during this period.

Separate and apart from the obligations under Section 8546.7, the District shall have the right to audit project records at District discretion under the following circumstances: (a) submission of a Public Records Act request regarding the project; (b) inability to resolve a disputed contract change order; or (c) submission of a construction claim.

#### **G9.05 STOP NOTICES**

The Owner may, at its option and at any time, retain out of any amounts due the Contractor sums sufficient to cover claims filed pursuant to Section 9350 et seq. of the California Civil Code.

#### **G9.06 PAYMENT SCHEDULES**

The Contractor shall submit a Schedule of Anticipated Contract Payments and a Schedule of Pay Items for review and approval by the Engineer/Architect prior to the initial partial payment to the Contractor. The Schedule of Pay Items shall be prepared by the Contractor in a format approved by the Engineer/Architect and shall include such detail as directed by the Engineer/Architect. The Schedule shall be sufficiently clear and detailed so as to facilitate an accurate and realistic appraisal of monthly progress for the purpose of making partial payments. The value for each bid item shall total the bid amount. The cost breakdown shall include only actual work items. No amounts will be allowed for mobilization and other overhead costs such as bonds and insurance. Costs of these items shall be spread uniformly over the actual items of work. The values in the Schedule will be used only for determining partial payments.

The Schedule of Anticipated Contract Payments shall be coordinated with the Contractor's construction schedule submitted pursuant to Section G8.05 and shall show the anticipated monthly Contract payments for each of the pay items covered in the Schedule for Pay Items, the total of monthly payments and cumulative total of payments for each month. If the construction schedule is revised, the Schedule of



Anticipated Contract Payments shall also be revised and resubmitted for the Engineer/Architect's review and approval. No partial payment will be made until the Engineer/Architect has approved the Schedules required by this Section.

#### **G9.07 PROGRESS ESTIMATES AND INVOICES FOR WORK COMPLETED**

Once each month, at a time, place and location mutually agreeable, the Contractor and Engineer/Architect shall meet to discuss the amount of work completed satisfactorily during the work period since the last invoice for partial payment was prepared. The first such estimate will be of the value of the work done after the Contractor commenced the performance of the contract, and every subsequent estimate, except the final estimate, will be of the value of the work done after that included in the last preceding estimate. Such estimates need not be based on strict measurements, but may be approximate only, and will be in due proportion to the whole amount of money, including payments previously made, that will have become due according to the contract when all work required under the contract shall have been completed. A draft invoice for work completed shall be prepared; the Engineer/Architect's judgment will be final if disputes occur regarding the amount of work completed or its value. Following the meeting, the Contractor shall formally submit the invoice for work completed in a form acceptable to the Engineer/Architect. The invoice will certify, and be supported by evidence if required by the Engineer/Architect, that the work invoiced has been done and that the materials listed have been incorporated into the work. The invoice may include the amount and value of such acceptable material as has been furnished and incorporated into the work.

#### **G9.08 RETENTION**

In addition to amounts, if any, withheld pursuant to any other provision of these General Provisions, including the Owner's right to withhold for the estimated or actual costs of correcting defective work and amounts claimed by the Owner as liquidated damages or other offsets, the Owner will retain an amount equal to 5 percent of the estimated value of the work done as part security for the fulfillment of the Contract by the Contractor.

In addition, when the Engineer/Architect determines that the contract is ninety-five percent (95%) complete, the Owner may reduce the amount withheld from payment to such lesser amount as the Owner determines is adequate security for the fulfillment of the balance of the work and other requirements of the contract, but in no event will said amount be reduced to less than one hundred twenty-five percent (125%) of the estimated value of the work yet to be completed as determined by the Engineer/Architect. In agreeing to any of the above referenced revised method(s) of progress payments, the Owner reserves the right to return to the original method of progress payments in the amount of ninety five percent (95%) of work completed, if at any time, the Engineer/Architect finds that either the Contractor is not making satisfactory progress or there is a specific cause for greater withholding.

#### **G9.09 PARTIAL PAYMENTS**

Pursuant to Public Contract Code Section 20104.50, if the Owner fails to make a progress payment in a timely manner, it shall pay interest to the Contractor at the legal rate set forth in the Code of Civil Procedure Section 685.010(a). No such progress payment will be made when, in the judgment of the Engineer/Architect, (a) the work is not proceeding in accordance with the provisions of the Contract; (b) the Contractor is not complying with the requirements of the Contract; or (c) when the total value of the work done as shown on the invoice does not exceed Three Hundred Dollars (\$300.00).

No such invoice or payment will be construed to be an acceptance of any work or materials. Before any progress payment or the final payment is made, the Contractor may be required to submit satisfactory evidence that he is not delinquent in payments to his employees, subcontractors, suppliers or other creditors for labor and materials incorporated into the work.

#### **G9.10 PAYMENT OF WITHHELD FUNDS**

Pursuant to Public Contract Code Section 22300, the Contractor may request to deposit securities in escrow equivalent to the amount of funds withheld from progress payments by the Owner as described in Section G9.09, with the Owner or a bank acceptable to the Owner as a substitution for funds withheld by the Owner. Alternatively, the Contractor may request to have the District make payment of the funds withheld from progress payments as described in Section G9.09 directly to an escrow agent and direct the investment of such funds into securities. The Contractor shall be the beneficial owner of any securities and shall receive interest thereon. Upon satisfactory completion of the contract, the Contractor shall receive all securities, interest and payments. The Contractor may make this request only upon the following conditions:

- (a) the request to substitute securities or to have payments made directly to an escrow agent shall be at the sole expense of the Contractor;
- (b) securities eligible for investment shall include securities pursuant to California Government Code Section 16430, bank or savings and loan certificates of deposit, interest bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed upon by the Owner and Contractor;
- (c) the Contractor shall enter into an escrow agreement which shall be substantially similar to the agreement form provided in Public Contract Code Section 22300;
- (d) the Contractor shall obtain the written consent of the surety to such agreement; and
- (e) the Contractor who elects to receive interest on funds withheld by the Owner shall, at the request of any subcontractor performing more than five percent (5%) of the Contractor's total bid, make the option available to the subcontractor to receive interest on any funds withheld in retention by the Contractor from the subcontractor. The subcontractor shall receive interest in accordance with Public Contract Code Section 22300(d)(1). Alternatively, the Contractor who elects to substitute securities in lieu of retention by the Owner, shall by mutual consent between the Contractor and subcontractor, allow any subcontractor performing more than five percent (5%) of the Contractor's total bid to substitute securities in lieu of funds withheld by the Contractor.

#### **G9.11 PROMPT PAYMENT TO CONTRACTOR**

The District will make progress payments within 30 days after receipt of an undisputed and properly submitted progress payment invoice pursuant to Section 20104.50 of the Public Contract Code. No such payment will be made when, in the judgment of the Engineer, (a) the work is not proceeding in accordance with the provisions of the Contract; (b) the Contractor is not complying with the requirements of the Contract; or (c) when the total value of the work done as shown on the invoice does not exceed Three Hundred Dollars (\$300.00). No such invoice or payment will be construed to be an acceptance of any work or materials. Before any progress payment or the final payment is made, the Contractor may be required

to submit satisfactory evidence that he is not delinquent in payments to his employees, subcontractors, suppliers or other creditors for labor and materials incorporated into the work. Pursuant to Public Contract Code Section 20104.50, if the District fails to make a progress payment in a timely manner, it shall pay interest to the Contractor at the legal rate set forth in Section 685.010(a) of the California Code of Civil Procedure.

#### **G9.12 PROMPT PAYMENT TO SUBCONTRACTORS**

Pursuant to Public Contract Code Section 7107, the Contractor shall pay any subcontractors for work that has been satisfactorily performed no later than seven (7) days from the date of Contractor's receipt of payments by the District. The District may require Contractor to provide documentation satisfactory to the District of Contractor's compliance with this requirement as a condition of final payment and release of contract retention.

Within seven (7) days of receipt of retention by the original Contractor, Contractor shall release any applicable retention payments withheld to the subcontractor.

In the event Contractor does not make progress payments or release retention to the subcontractors in accordance with the time periods in this section, Contractor may be subject to a charge of two percent (2%) per month on the untimely or improperly withheld payment.

#### **G9.13 FINAL PAYMENT AND CLAIMS**

After the work has been accepted by the Owner, as provided in Section G7.26, "Acceptance of Work," payment will be made to the Contractor in accordance with the provisions of this Section. Upon acceptance, the Owner will record a Notice of Completion covering the project.

Within thirty-five (35) days after acceptance by the Owner, the Contractor shall prepare and submit a proposed final invoice in writing, prepared in a form acceptable to the Engineer/Architect. The proposed final invoice will show the proposed total amount of compensation payable to the Contractor, including an itemization of that amount segregated as to Contract item quantities, extra work and other bases for payment. The proposed final invoice will also show all deductions made or to be made for prior payments and amounts to be kept or retained under the Contract.

The Contractor shall also submit, at the same time as the proposed final invoice is submitted, a statement of all claims he has submitted in accordance with G9.15. No claim for which the requirements of 9.15 have been satisfied will be considered unless the Contractor has fully complied with the notice or protest requirements in said section.

Claims filed by the Contractor shall be in sufficient detail to enable the Engineer/Architect to ascertain the basis and amount of the claims. The Engineer/Architect will consider and determine the Contractor's claims and it will be the responsibility of the Contractor to furnish within a reasonable time such further information and details as may be required by the Engineer/Architect to determine the facts or contentions involved in the claims. Failure to submit such information and details will be sufficient cause for denying the claims.

The Engineer/Architect will review the proposed final invoice and claims and will submit his recommendation to the Owner as to the final estimate of the amount due the Contractor and the

disposition of all claims. All prior invoices and payments are subject to correction in connection with review of the proposed final invoice.

The Owner will submit any changes or corrections to the proposed final invoice to the Contractor for his consideration. Within ten (10) days thereafter, the Contractor shall submit a final invoice, in a form acceptable to the Engineer/Architect, incorporating any changes or corrections made by the Owner, together with any additional claims resulting therefrom. Upon approval by the Owner, this will become the approved final invoice. The Contractor shall submit with the final invoice, certificates of any insurance required to be maintained after acceptance of the work.

If the Contractor files no claims within thirty (30) days after acceptance of the work by the Owner, and agreement is reached on all questions regarding the final invoice, the Owner will pay the entire sum found due upon the final invoice, except that the Owner will withhold sums sufficient to pay all unsettled claims for which stop notices have been filed pursuant to Section 3179 et seq. of the California Civil Code, together with the costs of administering such claims.

If the Contractor does file claims within thirty (30) days after acceptance of the work by the Owner, then upon final determination of all the Contractor's claims, the Owner will pay the entire sum found due upon the final invoice, including the amount, if any, allowed on claims, except that the Owner will withhold sums sufficient to pay all unsettled claims for which stop notices have been filed pursuant to Section 3179 et seq. of the California Civil Code, together with the costs of administering such claims.

Before final payment can be made, the Contractor shall furnish the Engineer/Architect with the following:

- (f) All drawings, catalogues, instruction sheets and information as required by the Contract;
- (g) One signed copy of the Release as discussed below in this Section and on a form furnished by the Owner; and
- (h) Guarantee Bond, if not already incorporated in the Performance Bond.

Final payment will be made within thirty (30) days after receipt of an approved final invoice and other required submittals referenced above and determination of all Contractor's claims, or sixty (60) days after acceptance of the work by the Owner, whichever is later. However, if an approved final invoice has not been submitted within sixty (60) days after acceptance of the work by the Owner, the Owner may elect to make payment of sums not in dispute without prejudice to the right of either the Owner or the Contractor in connection with such disputed sums.

The acceptance by the Contractor of final payment shall constitute a waiver and release of all claims by the Contractor against the Owner related to the work, except for claims previously made in writing and identified as unsettled by the Contractor at the time of submission of the final invoice. The making of final payment, however, shall not operate to release the Contractor or his sureties from obligations arising under this Contract, the Contract bonds and warranties as provided. Specifically, the making of final payment shall not constitute a waiver and release of claims by the Owner arising from (a) unsettled or future liens, (b) failure of the work to comply with the requirements of the Contract Documents, (c) the terms of any warranties required by or contained in the Contract Documents, (d) the right to any insurance proceeds or the right to make any insurance or bond claims, (e) any claims with respect to Contractor's obligation of indemnity provided for in the Contract Documents, or (f) any latent defects or fraud.

## **G9.14 CLAIMS PROCEDURES**

The Contractor shall not be entitled to the payment of any additional compensation for any cause, including any act, or failure to act, by the Engineer/Architect (including the failure or refusal to issue a Change Order), or the happening of any event, thing or occurrence, unless he shall have given the Engineer/Architect due written notice of the claim as specified below. However, compliance with this Section shall not be a prerequisite as to matters within the scope of the Contract Change Order protest provisions in Section G4.08, "Protest Procedure," or the notice provisions in Section G8.11, "Delays and Extension of Time."

The written claim shall set forth the reasons for which the Contractor believes additional compensation will or may be due, the nature of the costs involved and, insofar as possible, the amount of the claim.

It is the intention of this Section that differences between the parties arising under and by virtue of the Contract shall be brought to the attention of the Engineer/Architect at the earliest possible time in order that such matters may be settled if possible, or other appropriate action promptly taken. The Contractor hereby agrees that he shall have no right to additional compensation for any claim that may be based on any such act, failure to act, event, thing or occurrence for which a written claim as required was not timely filed.

Compliance with all change order procedures is a prerequisite to filing a Public Contract Code Claim pursuant to this Section. Claims must be submitted no later than (a) 30 days after the submission of a written protest under Section 4.09 or (b) 30 days after the occurrence of the event giving rise to the claim.

In accordance with the procedures set forth in Public Contract Code Sections 9204 and 20104-20104.6, a Contractor may submit a claim by registered or certified mail with return receipt requested, for one or more of the following: (a) a time extension, including, without limitation, for relief from damages or penalties for delay assessed by the District; (b) payment by the District of money or damages arising from work done by, or on behalf of, the Contractor pursuant to this contract and payment for which is not otherwise expressly provided or to which the Contractor is not otherwise entitled; or (c) payment of an amount that is disputed by the District.

The Contractor shall furnish reasonable documentation to support the claim, including but not limited to: 1) a clear, concise recital of the basis upon which the claim is asserted, including a designation of the provisions of the Contract upon which the claim is based, 2) a statement as to the amount of time and/or compensation sought pursuant to the claim; 3) whether the Contractor's claim arises from an ongoing occurrence, and if so a description of the specific Work activities affected by the claim, 4) a time impact analysis in the event that Contractor requests a time extension, 5) full and complete cost records supporting the amount of any claim for additional compensation, and 6) a notarized certification by the Contractor as follows: "Under the penalty of law for perjury or falsification and with specific reference to the California False Claims Act, Government Code Section 12650 et seq., the undersigned hereby certifies that the information contained herein is a true, accurate and complete statement of all features relating to the claim asserted." Failure by the Contractor to provide sufficient documentation will result in denial of the claim. The District reserves the right to request additional documentation, or clarification of the documentation provided.

Upon receipt of a claim, the District will conduct a reasonable review and provide a written statement to the Contractor identifying what portion of the claim is disputed and what portion is undisputed within 45

days of receipt of the claim. The District and Contractor may, by mutual agreement, extend the 45 day time period. For any undisputed portion of a claim, the District must make payment within 60 days of its issuance of the written statement.

If the Contractor disputes the District's written statement, or if the District fails to respond, the Contractor may demand an informal conference to meet and confer for settlement of the issues in dispute. The District will then schedule the meet and confer conference within 30 days of the demand. Within 10 business days following the meet and confer conference, the District will provide a written statement identifying the portion of the claim that remain in dispute. Any payment due on an undisputed portion of the claim will be made within 60 days of the meet and confer conference.

After the meet and confer conference, any disputed portion of the claim shall be submitted to non-binding mediation. Alternatively, upon receipt of a claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable. If mediation is unsuccessful, the parts of the claim that remain in dispute shall be subject to applicable procedures set forth below.

Failure of a public entity to respond to a claim within the time periods described above shall result in the claim being deemed rejected in its entirety. Additionally, amounts not paid in a timely manner shall bear interest at 7 percent per year.

In the event that the mediation is unsuccessful, Contractor must file a government claim pursuant to Government Code Sections 910 et seq. in order to initiate a civil action.

In any civil action filed to resolve claims, the court shall submit the matter to nonbinding mediation within 60 days following the filing or responsive pleading, provided that the parties have not already participated in mediation of the claim as outlined above. If the matter remains in dispute after nonbinding mediation, the court shall submit the matter to judicial arbitration pursuant to Code of Civil Procedure Section 1141.10 et seq. If the matter remains in dispute after judicial arbitration, the District or the Contractor may request a trial de novo.

# **TECHNICAL SPECIFICATIONS**

## **DEKOVEN TANKS REPLACEMENT**





**MID-PENINSULA WATER DISTRICT  
DEKOVEN TANKS REPLACEMENT  
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## **SECTION 01 11 00 - SUMMARY OF WORK**

### **PART 1 GENERAL**

#### **1.01 DESCRIPTION OF THE WORK**

- A. The project consists of furnishing all labor, materials and equipment for the **Mid-Peninsula Water District's "Dekoven Tanks Replacement."**
- B. The project consists of replacing two existing steel tanks of 1.0 and 0.76 MG capacity and replacing in-kind with two seismically reinforced A36 welded steel tanks with appurtenances at the Dekoven Tank Site located between 2518 and 2424 Dekoven Avenue in the City of Belmont.
- C. The project consists of replacing two existing steel tanks of 1.0 and 0.76 MG capacity and replacing with two seismically reinforced 0.98 and 0.82 MG welded steel tanks with appurtenances. The project also consists of concrete foundations, installation of 8" and 12" isolation valves, 12" ductile iron pipe (DIP) water main improvements, chemical feed system and building shed, pneumatic tank seismic upgrades, two seismic inlet/outlet tank assemblies, two interior mixing units, tank level copper transducer lines, digital tank level, cathodic protection, and site improvements consisting of a fire hydrant retaining wall, concrete and asphalt vertical curb, minor concrete (curb and gutter, driveway approach), asphalt replacement, site grading, storm drain inlet structures and gate valve replacements.
- D. One tank must stay in operation at all times.

#### **1.02 LOCATION AND OWNER**

- A. The project is located in the City of Belmont, California in San Mateo County.
- B. The work will be done for the **Mid-Peninsula Water District** (i.e., the "District").

#### **1.03 CONTRACT**

- A. The work will be bid under one (1) contract.
- B. The District reserves the right to delete items from the Bid Schedule included in the Proposal, and to change quantities shown on the Bid Schedule, in order to meet project funding limitations, once the contract is awarded.

#### **1.04 REFERENCES TO STANDARD SPECIFICATIONS**

- A. Wherever reference is made to "Standard Specifications" it shall be interpreted to mean the current version of Standard Specifications, State of California Business and Transportation Agency, Department of Transportation, obtainable from Caltrans, 6002 Folsom Blvd., Sacramento, CA 95819, and the following shall apply:
  - 1. In case of conflict between the Standard Specifications and these specifications, these specifications shall govern.

2. Where the term "Engineer" is used in the Standard Specifications it shall be understood to mean "the person or persons designated by the District to act as its duly authorized agent or agents."
3. Where the term "Special Provisions" is used in the Standard Specifications it shall be understood to mean these specifications.
4. Where the term "State" is used in the Standard Specifications it shall be understood to mean "District".
5. Any provisions for measurement and payment specified in the Standard Specifications shall be disregarded and the provisions of these specifications shall govern.

**1.05 DRAWINGS**

A. The following drawings shall be part of the Contract Documents:

<b>Plan No.</b>	<b>Sheet No.</b>	<b>Title</b>
G1.1	1	Title Sheet, Survey Notes, Sheet Index, Vicinity and Location Maps, Basis of Bearings, Benchmark
G1.2	2	Notes, Abbreviations, Legend
C1.1	3	East and West Tank Elevations
C1.2	4	Water Tank Construction Details
C1.3	5	Water Tank Construction Details
C1.4	6	Water Tank Construction Details
C1.5	7	Water Tank Construction Details
C1.6	8	Construction Details
C1.7	9	Construction Details
C1.8	10	Construction Details
C2.1	11	Environmental, Fire Protection, and Storm Drain Pollution
C3.1	12	Demolition Plan and Site Conditions
C3.2	13	Demolition Plan Cross Sections
C4.1	14	Coordination and Phasing Plan
C4.2	15	Coordination and Phasing Plan
C4.3	16	Coordination and Phasing Plan
C4.4	17	Coordination and Phasing Plan
C5.1	18	Horizontal Control Site Plan
C5.2	19	West Tank Plan View
C5.3	20	East Tank Plan View
C5.4	21	Chemical Feed Building and Tank Connections
C6.1	22	Water Main Improvements
C6.2	23	West Tank Storm Drain Improvements
C6.3	24	East Tank Storm Drain Improvements
C7.1	25	Grading and Site Plan Improvements



Plan No.	Sheet No.	Title
S1.1	26	Structural Notes and Abbreviations
S1.2	27	Tank Foundation Plans
S1.3	28	Tank Roof Plans
S1.4	29	Tank Sections and Details
S1.5	30	Tank Sections and Details
S1.6	31	Tank Sections and Details
S1.7	32	Tank Center Support Structure
S1.8	33	Tank Bridge Connection Tank Roofs

**1.06 INQUIRIES DURING BID PERIOD**

- A. Questions pertaining to the contract documents, which may arise during the bidding period shall be directed to the District’s Engineer:

Pakpour Consulting Group, Inc.  
5776 Stoneridge Mall Road, Suite 320  
Pleasanton, CA 94588  
Attn: Victor Fung  
(925) 224-7717, Fax (925) 224-7726

**1.07 TIME OF COMPLETION AND LIQUIDATED DAMAGES**

- A. Time of Completion: **Three-Hundred-Seventy-Five (375)** from Notice to Proceed.
- B. The Contractor(s) shall pay to the District the sum of **\$1,750.00 per day**, for each and every calendar day delay in finishing the work in excess of the number of working days prescribed above.
- C. Designated legal holidays are as follows:
1. January 1<sup>st</sup>- New Year’s Day
  2. Third Monday in January – Martin Luther King Jr
  3. Third Monday in February – President’s Day
  4. Last Monday in May - Memorial Day
  5. July 4<sup>th</sup> - Independence Day
  6. First Monday in September - Labor Day
  7. Second Monday on October - Columbus Day
  8. November 11<sup>th</sup> - Veteran’s Day – When November 11<sup>th</sup> falls on a Saturday, the preceding Friday shall be a designated legal holiday.
  9. Fourth Thursday on November - Thanksgiving Day
  10. Friday following Thanksgiving Day

11. December 24<sup>th</sup> –Christmas Day Eve
12. December 25<sup>th</sup> - Christmas Day
13. December 31<sup>st</sup> - New Year’s Eve

When a designated legal holiday falls on a Sunday, the following Monday shall be the designated legal holiday.

- D. Attention is also directed to the provisions of Section 8 of the General Conditions.

**1.08 WORK SCHEDULE AND REQUIREMENTS**

- A. Construction activities are only allowed between 8:00 a.m. and 5:00 p.m. Monday through Friday, unless stated otherwise. No work shall be performed on weekends or holidays.
- B. Should temporary road closures be necessary during the construction, it shall follow the process required by City of Belmont as the road’s owner. Road closures and detour plans shall be submitted and approved by the City’s Council. No road closure will be allowed with City’s approval.
- C. All scheduling conditions included in permits issued by affected agencies shall be followed.
- D. The Contractor shall coordinate all work with the **Mid-Peninsula Water District** at **(650) 591-8941**.
- E. The water system is to remain in service throughout the project. Interruptions to service shall be minimized and shall be coordinated with the District.

**1.09 CONDITIONS OF USE**

- A. City of Belmont
  1. The Contractor need not obtain a separate encroachment permit from the City, however the Contractor shall obtain a business license from the City prior to the commencement of work. The Contractor shall provide written notification to property owners, adjacent to the project area.
- B. Mid-Peninsula Water District
  1. The contractor shall hand carry written notification to property owners, adjacent to the project area per **Section 01 52 00 – Traffic Control Plan** of these Technical Specifications.
  2. The District will require the following of the Contractor in addition to the requirements shown and described elsewhere in these technical specifications:
    - a. The Contractor shall not operate District valves at any time.
    - b. The Contractor shall be notified the District at least 48 hours (working days) in advance of any scheduled tie-ins and shutdowns.
    - c. No tie-ins, or shutdowns, will be allowed on Fridays or the day preceding a holiday.

- d. No shutdown shall exceed 6 hours in duration.
  - e. No more than one shut downs per week will be allowed or as directed by the District.
  - f. The Contractor shall designate a person to contact should trench maintenance or other problems arise during non-working hours or days. The District shall be given that person's name, phone number and/or pager number.
- C. Other Utilities
- 1. The Contractor shall call USA at least 48 hours before excavating to have PG&E, Comcast, AT&T, the City of Belmont (sewer and storm drain), and any other utility's facilities located.
  - 2. San Mateo County Fire Department
    - a. The Contractor shall notify the San Mateo County Fire Department at (650) 573-3846 in advance of any road closures, water main shutdowns and fire hydrant removal/replacement work during the course of the work.
- D. California Department of Transportation
- 1. Not Applicable.
- E. County of San Mateo
- 1. Not Applicable.
- F. General
- 1. The Contractor shall assume full responsibility for the protection and safekeeping of products stored on premises. Any stored products that interfere with District operations shall be moved by the Contractor at their expense. The Contractor shall obtain and pay for use of any additional storage or work area for operations.

**1.10 CONTRACTOR'S RESPONSIBILITIES**

- A. The Contractor shall be responsible for supplying and maintaining all construction safety signs, lighted barricades, cones, trench plates and other related safety measure to assure site is safe for workers.
- B. The Contractor shall notify the City, local fire department and Belmont Police Department, at least 72 hours in advance whenever lane closures are planned. Such notification shall include the details and location of such closure, its anticipated duration and traffic control and signing to be used during such closure.
- C. Unless noted otherwise the Contractor shall provide and pay for:
  - 1. Labor, materials and equipment.

2. Tools, construction equipment and machinery.

**3. Jobsite safety per Section G-7.13 of the General Provisions.**

4. Utilities required for construction (i.e., water may be obtained from the system at no charge to the Contractor to the extent that is available and does not result in a shortage to customers). The District shall furnish water to the Contractor (1) for compaction of backfill, as required, (2) for flushing, filling and disinfecting mains and tanks and (3) for cleanup and road maintenance activities during construction, subject to availability.

If the quality of the water fails the safety requirements and the water has to be disposed of, the contractor will be charged to re-filling of the tanks.

5. All other facilities and services necessary for proper execution and completion of work.

6. Pay all required sales, consumer and use taxes.

7. Conform to the requirements of all permits.

8. Secure and pay for, as necessary for proper execution and completion of the work, applicable permits and licenses.

a. Give required notices.

b. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities, which bear on performance of the work.

c. Promptly submit written notice to District's Representative of observed variance of Contract Documents from legal requirements.

**1.11 CULTURAL RESOURCES**

A. **BMP-4: Cultural and Cultural Tribal Resources.** The District and/or its contractor shall implement the following Best Management Practices during project construction to avoid potential impacts on unanticipated and previously unknown cultural resources:

1. In the event that any archaeological resources are encountered at any time during construction, it will be the responsibility of the construction project manager to stop work within 50 feet of any discovery and contact a qualified archaeologist who meets the Secretary of the Interior's Standards for Archaeology. Work in the area shall be suspended until the archaeologist prepares a plan for the evaluation of the resource and the plan is submitted to the District for approval. If the finds are suspected to be Native American in origin, the Native American Heritage Commission (NAHC) will be contacted and Native American monitoring will be initiated as directed by the NAHC.

2. Pursuant to Section 7050.5 of the Health and Safety Code and Section 5097.94 of the Public Resources Code of the State of California, in the event of the discovery of human remains during construction, the construction manager shall stop work and notify the San Mateo County Coroner. If the Coroner determines that the remains are not subject to his/her

authority, he/she shall notify the NAHC who shall attempt to identify the Most Likely descendant (MLD) of the deceased.

3. In the event of any work stoppage as a result of cultural resources that may have been discovered, the contractor shall be entitled to a non-compensable time extension for the duration of the delay.

## 1.12 BEST MANAGEMENT PRACTICES

Best Management Practices (BMPs) are incorporated into the project to minimize and avoid impacts to resources during project construction. The project would include the following BMPs in the project plans and specifications.

### A. Air Quality

1. **BMP-1: Air Quality and Dust Controls.** The Contractor shall implement the following Basic Construction Measures identified by the BAAQMD:
  1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day, or as needed.
  2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
  3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day, or as needed. The use of dry power sweeping is prohibited.
  4. All vehicle speeds on unpaved roads shall be limited to 15 mph.
  5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
  6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the *California Airborne Toxics Control Measure*, Title 13 § 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
  7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specification. All equipment shall be checked by a certified visible emissions evaluator at the beginning of construction.
  8. Post a publicly visible sign with the telephone number and person to contact regarding dust complaints. The designated contact shall respond and take corrective action within 48 hours. The publicly visible sign shall also include the contact phone number for the BAAQMD to ensure compliance with applicable regulations.

### 1.13 BIOLOGICAL RESOURCES

- A. **BMP-2: Pre-construction Nesting Bird Surveys.** Project construction shall occur outside of the bird nesting season if possible (defined as the time between September 1st and January 31st). If construction starts during the bird nesting season between February 1st and August 31st, a qualified biologist shall perform a pre-construction survey to identify active bird nests on or near the site. The pre-construction survey shall take place no more than 14 days prior to the start of construction, and if more than 14 days pass with no construction activities, another pre-construction survey shall be required. The survey shall include all trees and shrubs on the site, and all trees and shrubs within a 250-foot radius of the site. If an active, native bird nest is found during the survey, the biologist shall designate a construction-free buffer zone (typically 500 feet for raptors and 250 feet for other birds, but this sometimes can be reduced in urban areas) around the nest to remain in place until the young have fledged. The qualified biologist shall be contacted immediately if a bird nest is discovered during project construction.
- B. **BMP-3: Tree Protection.** The project shall comply with standard tree protection measures that may be required as conditions of approval consistent with the City of Belmont Tree Ordinance (Municipal Code Chapter 25). Examples may include, but are not limited to, wrapping existing trees with wooden stakes or surrounding them with orange plastic fencing as needed to protect them from construction equipment and activities. Project landscaping shall be performed using hand tools to avoid impacting the roots of existing trees during installation of screening features and/or new landscape vegetation. If tree trimming is required, it must be performed consistent with the guidelines of American National Standards Institute (ANSI) A300 (Part 1) 2017 Pruning entitled *Tree, Shrub, and Other Woody Plant Maintenance—Standard Practices (Pruning)*, or *Best Management Practices—Tree Pruning* (Second Addition) published by the International Society of Arboriculture (ISA) as a companion publication to the ANSI A300 pruning standards (Belmont Municipal Code Section 25-4).

### 1.14 GEOLOGY AND SOILS

The design of the new tanks proposed by this project would be based on a geotechnical investigation to address site specific geologic and soil conditions, and seismic safety.

- A. **BMP-5: Geotechnical Report.** All recommendations identified in the site-specific project geotechnical report (Geotechnical Design Report – Mid-Peninsula Water District Dekoven Water Tanks Replacement Project 15-89, CE&G, June 24, 2020) shall be incorporated into the project design and construction.
- B. **BMP-6: Paleontological Resources.** In the event that any paleontological resources are encountered at any time during construction, it will be the responsibility of the construction project manager to stop work within 50 feet of any discovery and contact a qualified paleontologist who meets the Society of Vertebrate Paleontology’s qualifications. Work in the area shall be suspended until the paleontologist prepares a plan for the evaluation of the resource and the plan is submitted to the District for approval.

In the event of any work stoppage as a result of paleontological resources that may have been discovered, the contractor shall be entitled to a non-compensable time extension for the duration of the delay.

### 1.15 HAZARDOUS MATERIALS

- A. **BMP-7: Hazardous Materials.** The plans and specifications shall include provisions to conduct hazardous materials testing prior to demolition of the existing water tanks for lead based paint, asbestos containing materials, and soil testing. Based on the testing results, the contractor or the contractor's appointee shall prepare remediation plans to ensure all lead-based paint, asbestos containing materials, and contaminated soil materials are removed, handled, and disposed of according to relevant laws and regulations.

### 1.16 NOISE

- A. **BMP-8: Construction Noise Hours.** As a good neighbor, the District and its contractors shall adhere to the construction hours permitted by the Belmont Municipal Code. All construction and related activities (not including grading) shall be permitted only during the hours of 8:00 AM to 5:00 PM, Monday through Friday. Grading may occur between the hours of 8:00 a.m. and 5:00 p.m. Monday through Friday. No construction activity (including grading) or related activities is permitted on Saturdays or Sundays and Holidays.

### 1.17 TRANSPORTATION AND TRAFFIC

A short-term increase in traffic during the construction period would occur from construction workers and equipment accessing the site. Heavy equipment entering and exiting the site could potentially have limited lines of sight or create hazardous traffic conditions for passenger vehicles and pedestrians.

- A. **BMP-9: Construction Logistics Plan.** The District, in consultation with the construction contractor(s) and the City of Belmont, shall develop a logistics plan which shall include, at a minimum the following:
  1. 1) Specific criteria to coordinate construction deliveries at the site during construction. Deliveries shall not be delivered outside of designated construction times.
  2. 2) Specific criteria for construction equipment to operate at the site. Construction fencing and flag men shall be used as necessary to provide safety along Dekoven Avenue.

### 1.18 TESTS

- A. All compaction testing will be done by the District, performed in accordance with the most recent version of ASTM D-1557. The Contractor shall cooperate with the District in making such tests.

### 1.19 LAYOUT OF THE WORK

- A. The District will stake the center of the tank, and mark the general alignment of the new watermain.
- B. The Contractor shall lay out the work by accurately measuring from these controls to set all additional controls he may require. All work improperly located due to Contactor's errors or omissions shall be corrected by him at no additional expense to the District.

- C. The Contractor shall preserve controls thus established. Controls originally set by the District that are destroyed by the Contractor will be replaced by the District, with the cost of replacement deducted from Contractor's final payment.
- D. Locations and elevations indicated on the drawings are subject to final field adjustment by the District prior to construction. The Contractor shall immediately notify the District of apparent errors discovered on the drawings or in the initial stakeout. If changes in stakeout are required, the Contractor shall cooperate with the District in prompt establishment of the field control for altered or adjusted work.
- E. All monumental benchmarks, land corners, and triangulation points, established by other surveys, existing within the construction area shall be preserved. If existing monuments interfere with the work, secure written permission before removing them.

#### **1.20 CONSTRUCTION SEQUENCING AND SPECIAL CONSIDERATIONS**

- A. Order of Work
  - 1. East Tank Construction shall be the first order of work.
  - 2. West Tank Demolition shall follow after the East Tank is in service. Refer to drawings C4.1 thru C4.4 for coordination items.
  - 3. Prior the construction of the West Tank the following work must be completed:
    - a. Remove the wood shed and the south chain link fence. Grade area for the chemical feed foundation pad.
    - b. Construct the wood south fence before the chemical feed foundation pad.
    - c. Perform the positive locations (pot holes) to layout the water main and the necessary storm drain improvements. Refer to Drawings C6's.
    - d. Complete the water main installation per Drawing C6.1.
    - e. Complete the chemical feed foundation pad.
  - 4. Construct the West Tank after the chemical feed building, watermain, and underground improvements are complete.

**END OF SECTION**



## **SECTION 01 20 10 - DEFINITION OF BID ITEMS**

### **PART 1 GENERAL**

#### **1.01 GENERAL**

- A. Work to be performed under this Contract shall be per **Section 01 11 00** Summary of Work, 1.01 Description of Work.

#### **1.02 CONDITIONS OF BID ITEMS**

- A. The following work items listed below shall be considered as included in the various bid items involved with the demolition, installation, and coating of the new welded steel water tanks with appurtenances; the coating of the existing pneumatic tank improvements; the installation of a water main, gate valves, with appurtenances including but not limited to fittings, valves, combination air release valve; the site improvements including perimeter fences, gates; Removal of a wood shed and installation of a chemical feed system and building enclosure; and storm drain improvements and no additional compensation will be made therefore:
  - 1. Safety and the wellbeing of workers, staff, and residents is number one priority. The fire season is a concern. The District has zero tolerance when it comes to the safety and wellbeing of the community. It is imperative that Contractor takes all the necessary precaution to maintain the site safe and free of potential fire throughout the duration of the project.
  - 2. All work shall include full compensation for all the labor, supervision, administration, materials, tools, equipment and incidentals to complete each task.
  - 3. All work shall be coordinated with the District.
  - 4. Saw-cutting operation to install the water main/appurtenance and second saw-cutting operation (T-Cut) to restore asphalt concrete (AC) on Dekoven Avenue.
  - 5. Trench excavation: Cutting and removing of tree roots 4-inches of diameter or less and rock/boulders encountered during excavation and off-hauling and disposing of all material.
  - 6. Dewatering and proper disposal of water if encountered.
  - 7. Installation of the water main/appurtenances with 36-inches minimum cover or as shown on the plans and backfilling and compacting with specified materials
  - 8. Install two-sack slurry between utilities when required and requested by the District.
  - 9. Disinfection, pressure testing, and flushing of water mains and appurtenances.
  - 10. The excavation, disposal, and backfill of all abandonments; temporary pavements, final roadway and surface restoration including asphalt concrete, shoulders, AC berms, and landscaping.
  - 11. Protection of all existing facilities, landscape, and improvements.
  - 12. Pre-construction documentation, reporting, and preservation; all required permit acquisitions

13. Implementing safety equipment, materials, and measures to include but not limited to cut-back, lighted barricades, cones, caution tape, night-lights, project safety signs, and trench plates to keep the jobsite safe during demolition and construction.
14. Daily general housekeeping and clean up.
15. Planning, administration, designing, engineering, preparation of project submittals.
16. Providing, furnishing, and installing all temporary sheeting, shoring and bracing of excavations for excavations greater than 5 feet or as required but not limited to the provisions of any permits, in accordance with OSHA, the Construction Safety Orders of the State of California.
17. Concrete restoration of curb/gutter will be paid for as a separate bid item.
18. All trench excavation, bedding and backfill shall be in accordance with **Sections 31 80 00 and 32 10 00**, with the details shown on the drawings and with the specific requirements shown on applicable plan and profile sheets.
19. Class 350 ductile iron pipe shall be used in all locations except inside the tank. All pipe, fittings, and valves shall be polyethylene-wrapped per **Section 33 14 13**.
20. Pipe joint restraints shall be provided at all joints. Thrust blocks are required in locations noted on the drawings. No additional payment will be made for this work.
21. Utility locations and clearances are approximate. The Contractor shall pothole for utilities sufficiently in advance of construction to adjust the grade of the water main to maintain desired clearances. No additional payment will be made for grade adjustments of less than 24-inches unless extra materials are required.
22. Tie-ins are diagrammatic. The contractor shall not be entitled to extra payment if additional pipe, couplings, valves and/or fittings, or other appurtenances are required to complete a tie-in. Tie-ins shall be constructed entirely of restrained ductile iron pipe and fittings.
23. Restore road, street, and other surfaces in accordance with **Sections 01 11 00, 32 10 00, Cast in Place Concrete 03 31 00** and with the specific requirements shown on applicable plan sheets. This work shall include any required temporary paving and plating of trenches and pits.
24. Access must be maintained to residents along all affected streets during construction at all times.
25. First order of submittals shall be delivered at the pre-construction meeting:
  - a. Project Schedule
  - b. Storm Water Pollution Prevention Plan (SWPPP) tailored to this project
  - c. Safety Plan
  - d. Demolition plan

e. Sample Notification Letter

26. All pipes in storage area, staging area, or left overnight prior to installation shall have the ends of the pipes covered with plastic (visqueen) and secured with tape to keep the pipe free of debris and dirt.
27. After review and comments have been transmitted to the Contractor, the first item of work on the first day of the Notice to Proceed shall be to install all BMP's in place at all affected drainage inlet in the project and on Buckland Avenue and Shelford Avenue prior to any other work.
28. Prior to any flushing, Contractor shall inspect and secure all existing BMP's.
29. Stainless Steel 316 hardware shall apply as applicable per **Sections 33 14 13 and 33 14 20**.
30. Equipment with metal tracks will not be allowed to be used on this project.
31. Removal of Underground Service Alert (USA) markings shall be paid in the various bid items.
32. Contractor shall make all arrangements to obtain a staging or storage area for equipment, tools, and materials. No equipment and materials may be stored overnight within the public right-of-way without written approval of the City and District.
33. Contractor shall conduct his operations and schedule cleanup so as to cause the least possible obstruction and inconvenience to traffic, pedestrians, bicyclists, and adjacent owners. All work areas shall be swept clean and debris removed at the end of the day's work and at other times when directed by the District.
34. Dust control measures such as temporary perforated screen shall be installed 10 to 20 feet around the tank site using the existing trees as an anchor. Use nylon rope to fasten the screen. Not metal cable or nails shall be used.
35. Contractor shall not block emergency access to fire hydrants.
36. Contractor shall be responsible for supplying and maintaining all construction safety signs, lighted barricades, cones, trench plates and other related safety measure to assure site is safe for workers.
37. When working in public street areas and when it is not possible to provide minimum 10-foot-wide traffic lanes in both directions, (1) one 10-foot traffic lane must be provided during operations with traffic control personnel, delays shall be limited to 10 minutes.
38. Contractor shall notify the affected property owners of the construction work in accordance with these specifications.
39. Spillage during the course of the project from equipment along or across any public traveled way shall be removed immediately by the contractor at their expense.
40. Contractor shall maintain access to all driveways, except when actually doing construction within the driveway boundaries, at which time, partial access will be maintained unless alternate arrangements can be made with the property owners or tenants in advance. Access must be maintained to the residents on Dekoven Avenue at all times during the course of the

project. Contractor shall coordinate work to minimize disruption to these homeowners during the course of the project

41. The Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including safety of all persons and property.
42. The Contractor shall provide 2-week look-ahead schedule weekly to the District to give the homeowners updates.
43. Contractor shall provide the District haul routes for review and approval by the City.
44. Dehumidification equipment and operations shall be provided in accordance with **Section 09 01 00** requirements. The Contractor shall provide and pay for all necessary labor, equipment, fuel, and utilities required for this operation including a sound enclosure for the equipment.
45. Contractor shall submit a sound proof structure plan for generators/dehumidification plan per **Section 01 50 00 Temporary Facilities and Controls** of these specifications
46. Contractor must off-haul excavated material on a daily basis due to the site constrains. No exception. Demolition material may not be stored on public right-of-way unless written approval is obtained from the City of Belmont and District.
47. Contractor shall provide a designated area to clean and wash concrete from equipment during any concrete work on this project. Area shall be lined to prevent any run-off to the storm drain system. Concrete residual shall be disposed properly.
48. Before any flushing of the main during disinfection, Contractor shall make sure every BMP's are installed and in working condition.
49. Before and after every rainfall, Contractor shall inspect and replace any damaged BMP's. Any replacement of BMP's shall be paid in various bid items. Work shall include cleaning and properly disposing debris from the inlet. Every inlet needs to be free from obstruction and sediments
50. Contractor shall include coordinating with utility companies, garbage collection company, District and residents, implementing safety equipment, materials, and measures to include but not limited to cut-back, lighted barricades, cones, caution tape, night-lights, project safety signs, and trench plates to keep the jobsite safe during demolition. General housekeeping at the end of each day, sweeping with a regenerated air street sweeper on haul routes and adjacent streets as directed by the District, install Storm Water Pollution Prevention (SWPP) preventive measures (fiber rolls, silt fence and filter fabric), and Best Management Practices (BMP's) shall be included at no additional cost and as directed by the District.
51. At all times during the operations, Contractor shall prevent the formation of an airborne dust nuisance by watering and/or treating the work site in such a matter that will confine dust particles to the immediate work area. Collection of dust shall be removed from site on a daily basis.
52. No compensation will be made for additional material needed to complete the backfilling of the trench, wall, footings, foundation, for depths not shown on the plans.

53. Project administration of submittals, shop drawings, structural design, warranty, operations and maintenance manuals, commissioning of equipment, and close-out is included in the project and no compensation will be made.

### **1.03 DEFINITION OF BID ITEMS**

#### **Bid Item 1 – Mobilization**

The contract lump sum (LS) unit price paid for the project mobilization shall include the necessary temporary facilities and utilities, every day housekeeping, temporary construction fence, silt-fence and screens, temporarily utilities, Best Management Practices (BMP's) and Storm Water Pollution Prevent Plan (SWPPP) installation, site safety at the end of each day and during construction, COVID-19 personal prevention equipment (PPE), de-mobilization after the completion of the project.

This work also includes any necessary administration and coordination with utility companies, the District, residents, adjacent jurisdictions, police and fire departments.

In addition, the work shall also include:

- Provide "As-Built" drawings at the end of the project.
- Mobilization payment shall be paid in four installments as follows: a) 30% on the first progress payment after the initial of SWPP/BMP's set-up, b) 30% after the completion of the East Tank, c) 30% after the completion of the water main connection on Dekoven Avenue, and 10% at the completion of the project.

#### **Bid Item 2 – Construction Funding Signs and Traffic Control**

The contract lump sum (LS) unit price paid for the construction funding signs and traffic control implementation shall include the purchase, installation and maintenance of the project funding signs and the implementation of traffic control plan during delivery of tank materials and water main construction on Dekoven Avenue.

The route to Dekoven Avenue is narrowed with low overhead lines and with limited parking. The contractor shall take great care to protect motorists, pedestrian and bicyclists.

This work also includes implementing of traffic control measures throughout the project vicinity not limited to lighted barricade, t-top stacker weighted orange cones and the personnel required to direct traffic when performing positive location (pot hole) on Dekoven Avenue. Contractor will assume all responsibility when directing traffic.

Three installments payment shall be as follows: a) 30% on the first progress payment after the delivery of material for the East Tank, b) 40% after the water main installation on Dekoven Avenue, and 30% and c) towards the end of the project.

In addition, the work shall also include:

- All signage and traffic control plans must meet the current MUTCD specifications for traffic signage and traffic control plans.

- All traffic control plans shall be designed by a registered Civil Engineer in the State of California and bear their stamp and signature. Submit for review and approval.
- Coordination with the District to install the signs.
- Maintaining and replacing damage signs and cones as needed.
- Excavation and securing post signs.
- Minor clearing, grubbing and trimming vegetation in the area adjacent to the construction signs to maximize visibility.
- Two designated flag personnel with hand held radio when lane closure is required at both ends of the Dekoven Avenue during the mobilization, delivery, off-haul of material, demobilization activities, positive locations and connections of new water main or any activity that interrupts the flow traffic.

### **Bid Item 3 – Water Trailer and Fire Protection**

The contract lump sum (LS) unit price paid for the water trailer and fire protection measures shall include supplying and maintaining an industrial, commercial, a standard 1,000 gallons capacity water trailer (Water Buffalo) equipped with a pressure pump and hose connections to be used during demolition and construction of the tank or any activity that will generate a fire hazard environment deemed dangerous to the neighborhood. Two installments will be paid at the end of demolition for each of the tanks.

In addition, the work shall also include:

- Provide "Fire Watch" competent personnel whose sole responsibility during a full work day is to wet the site near the area of any torching, cutting, grinding, welding or any activity during the demolition or installation of the tank that can potentially become a fire hazard. The water trailer must be "On" and ready in the any event that may occur. Three (3) 20lb fire extinguishers needs to be located around the site.
- Personnel will be responsible to fill the water tank during the day and at the end of each work day.
- Fuel for the pump shall be on site and ready.
- Provide multiple hoses that can reach the entire circumference of the tanks one in which is a 2.5" hose for fire protection.
- Per the plans, install temporary sprinklers lines around the site to help keep the site area saturated around the tanks.
- Sprinklers shall be turned liberally to keep the site saturated during work hours on days that fire hazard work is occurring.
- Contractor to get a water meter from the District to draw water from the hydrant to fill the water trailer.

### **Bid Item 4 – Street Sweeper**

The contract unit price paid per day (DAY) for a street sweeper shall include furnishing an industrial, commercial, re-generated sweeper to clean Dekoven Avenue and surrounding streets as a need basis or as requested by the District or by City. A minimum of 4 hours duration shall be dedicated to the site and the delivery route of material and equipment.

### **Bid Item 5 – Site Demolition**

The contract lump sum (LS) unit price paid for the site demolition shall include removing and disposing of the asphalt concrete (AC) berm and pavement, concrete curb (Dekoven Avenue), concrete driveway, ground utility boxes, wood shed and concrete foundation, south property line wood retaining wall section and posts as shown on the plans.

In addition, the work shall also include:

- Remove and bury the existing utility box in front of the wood shed.
- Remove concrete steps in front of the site.
- Remove portion of the wood fence at the T-Mobile equipment pad.

### **Bid Item 6 – Landscape Clearing**

The contract lump sum (LS) unit price paid for the landscape clearing all perimeter ground vegetation, branches, wood, and vine roots and branches on horizontal and vertical surfaces, loose roots, foliage, vegetation, pine needles, dirt, garbage, and anything above the finish ground surface. Contractor shall use care and protect driveway at 2524 Dekoven Avenue with plywood.

In addition, the work shall also include:

- The existing irrigation needs to be located and protected. Contractor shall use caution when clearing begins. Coordinate with the District to locate the exact location of the irrigation.
- When working on the driveway, use plywood to protect the integrity of the driveway.

### **Bid Item 7 – Site Grading**

The contract lump sum (LS) unit price paid for the site grading shall include excavating and removing approximately 2,450-SF area (1' to 3' deep) from the site beginning at the wood shed on the south of the property and continuing west and around towards the corner property to the entrance. The gradings is for the chemical feed building foundation (south portion of the property) and for the new metal fence (frontage) on Dekoven Avenue. Sub-grade shall be compacted for the new pad foundation. Subgrade at the new metal fence shall be compacted per project specifications.

Contractor shall use care and protect the temporary antenna structure (Team-Mobil) at the south-west corner of the property.

### **Bid Item 8 – East Tank Demolition**

The contract lump sum (LS) unit price paid for the demolition of the East Tank shall include removing and disposing the concrete foundation beam, vertical curb, concrete “mote” structure , conduits (antenna and copper line), metal covers, bollards, chain fence, inlet/outlet piping, storm drain inlet structure, possible “oil pipe system” under the tank, tank foundation (dirt, sand/oil, gravel), tanks structure (roof, shell, floor, center columns) as shown on the plans.

In addition, the work shall also include:

- Abandoning the East Tank level sensing copper line by installing an end cap of the copper line. No crimping will be allowed.
- Proper disposal of the sand/oil mix underneath the tank in encountered in accordance to local disposal facility.

### **Bid Item 9 – West Tank Demolition**

The contract lump sum (LS) unit price paid for the demolition of the West Tank shall include removing and disposing of the concrete foundation beam, vertical curb, concrete “mote” structure, conduits (antenna and copper line), metal covers, bollards, chain fence, inlet/outlet piping, storm drain inlet structure, found “oil pipe system” under the tank, tank foundation (dirt, sand/oil, gravel), tanks structure (roof, shell, floor), tank structure (roof, shell, floor, center columns) as shown on the plans.

In addition, the work shall also include:

- Proper disposal of the existing sand/oil mix underneath the tank. A stand pipe is located on the north end of the tank.

### **Bid Item 10 – Phase 2 – Positive Locations #1 thru #3**

The contract lump sum (LS) unit price paid for the positive locations (pot holing) shall include excavating, locating, and verifying the location, material and connection type, depths, alignment, connections types of the water main to help determined the grade and alignment of the new 12” water main as shown on Plan C4.1, Phase 2.

Contractor shall use care and protect the existing water main as they still serve the distribution systems. Temporary backfill with aggregate base on tie-in areas or set trench plate(s) as needed.

### **Bid Item 11 – Phase 3 – East Tank Connection Feed**

The contract lump sum (LS) unit price paid for the East Tank connection feed shall include connecting a temporary 6” PVC line from the West Tank to the new 6” valve at the inlet/outlet tee of the East Tank to load the tank for testing. Provide a double check valve within the connection. All connections shall be disinfected to the satisfaction of the District prior to introducing water to the tank. Provide and temporary install a blind flange at the inlet of the tee to fill the tank. Allow a minimum of 5 days or more to fill the East Tank.

### **Bid Item 12 – Phase 4 – East Tank, Pump Station and Z3 Connection**

The contract lump sum (LS) unit price paid for the East Tank, pump station, and Z3 tie-in connections shall include the trench saw-cutting wider to completely remove the existing 8” pipe and install the new 12” water main connections at 1) the pump station, 2) the East Tank as shown on the plans, and also 3) the new 8” water Z3 tie-in connection.

Contractor shall pre-excavate all tie-in connections prior to the scheduled shut down with information attained on Bid Item 10.

This work also includes removing the existing tees, thrust blocks, gate valves, and any appurtenances necessary for tie-in. All three tie-ins shall be completed on one shut-down. Install a blind flange with a 4” outlet pipe for flushing purpose.



All connections shall be disinfected and swiped with chlorine. The work associated with the installation of the 12" or 8" water main, fittings, valves, air release valves, reducers, sleeves and appurtenances will be paid under the separate bid items.

#### **Bid Item 13 – Phase 5 – Positive Locations #4 thru #6**

The contract lump sum (LS) unit price paid for the positive locations (pot hole) shall include excavating, finding, and verifying the location, material and connection type, depths, alignment, connections type of the exiting water main and storm drain laterals to help determined the grade, alignment and connection of the new water 12" main as shown on Plan C4.2, Phase 5.

Contractor shall use care and protect the existing water main as they still serve the distribution systems. Temporary backfill with aggregate base on tie-in areas or set trench plate(s) as needed on Dekoven Avenue.

Traffic control plan required on Dekoven Avenue to excavate 10" PVC.

#### **Bid Item 14 – Phase 7 –12" Water Main Connections**

The contract lump sum (LS) unit price paid for the 12" water main connections at Dekoven Avenue and pump station shall include saw-cutting the trench wider to completely remove the 10" pipe to install the new 12" water main connections on Dekoven Avenue. At the pump station, remove the temporary 12x10 reducer and fitting(s) to complete the 12" water main. Contractor shall pre-excavate all tie-in connections prior to the scheduled shut down.

This work also includes removing the existing tee fitting, thrust blocks, gate valves, and any appurtenances necessary for tie-in. All two tie-ins shall be completed on one shut-down. All connections shall be disinfected and swab with chlorine.

The work associated with the installation of the 12" or 8" water main, fittings, reducers, sleeves and appurtenances will be paid under the separate bid items.

#### **Bid Item 15 – Phase 8 –West Tank Connection**

The contract lump sum (LS) unit price paid for the West Tank connection shall include saw-cutting the existing paving to install the new 12" water main to the West Tank from the 12x12 cross. This work also includes removing the temporary blind flange and 4" outlet pipe. All connections shall be disinfected and swab with chlorine.

The work associated with the installation of the 12" water main, fittings, valves, air release valves, reducers, sleeves and appurtenances will be paid under the separate bid items.

### **Bid Item 16 – East Tank Foundation**

The contract lump sum (LS) unit price paid for the East Tank foundation shall include excavating and removing material not limited to rock boulders, asphalt concrete, sand, roots encountered when setting the sub-grade to the elevation of the tank. This work also includes compacting and installing the sand/oil, grout, and aggregate base, as shown on the project plans.

### **Bid Item 17 – East Tank Concrete Ring**

The contract lump sum (LS) unit price paid for the East Tank concrete ring foundation shall include excavating and removing material not limited to rock boulders, asphalt concrete, sand, roots encountered when setting the sub-grade to the elevation of the tank.

This work also includes providing and setting the form work, rebars, structural steel, weep holes, and Class II concrete as shown on the project plans.

### **Bid Item 18 – 0.80 MG Welded Steel Water Tank (East Tank) and Appurtenances**

The contract lump sum (LS) unit price paid for the fabricating and erecting the 0.80 MG capacity welded steel tank shall include the installation of all the appurtenances as shown on the plans per AWWA D100-11 which includes: access manways (manholes), inlet/outlet penetration, sampling station, water level indicator, hose bib, inside and outside ladders, cage, overflow, flush clean-out, roof hatches, roof vents, antenna pole, tool pulley, safety eye bolts, roof hatches, handrails, self-closing gate, pulley, mechanical and digital tank level indicator (Rosemount 3051), cathodic protection (CP), unit struts and appurtenances. Provide insulation bushings at all dissimilar metal connections.

In addition, the work shall also include:

- X-ray weld test and vacuum test
- Tank cleanup and disinfection
- Harness equipment

### **Bid Item 19 – East Tank Coating**

The contract lump sum (LS) unit price paid for the East Tank coating shall include painting the interior, exterior, floor, roof, tank appurtenances, inlet/outlet, components, stainless steel pipe, as shown on the project plans.

In addition, the work shall also include:

- Providing paint schedule.
- Building a sound barrier containment for the dehumidification unit or any unit that is left overnight.
- Tank containment of the tank for coating.

### **Bid Item 20 – East Tank Concrete Swale and Apron**

The contract unit price paid per linear foot (LF) the concrete swale and apron shall include excavating and installing the form work for the 24" wide swale, rebars, storm drain apron, and pouring and placing the concrete swale around the perimeter of the tank as shown on the plans. Grade can be adjusted to maintain proper drainage. Final grade shall be approved by the District.

### **Bid Item 21 – West Tank Foundation**

The contract lump sum (LS) unit price paid for the West Tank foundation shall include excavating and removing material not limited to rock boulders, asphalt concrete, sand, roots encountered when setting the sub-grade to the elevation of the tank.

This work also includes compacting and installing the sand/oil, grout, and aggregate base, as shown on the project plans.

### **Bid Item 22 – West Tank Concrete Ring**

The contract lump sum (LS) unit price paid for the West Tank concrete ring shall include excavating and removing material not limited to rock boulders, asphalt concrete, sand, roots encountered when setting the sub-grade to the elevation of the tank.

This work also includes providing and setting the form work, rebars, structural steel, weep holes, and Class II concrete as shown on the project plans.

### **Bid Item 23 – 0.95 MG Welded Steel Water Tank (West Tank) and Appurtenances**

The contract lump sum (LS) unit price paid for the fabricating and erecting the 0.95 MG capacity welded steel tank shall include the installation of all the appurtenances as shown on the plans per AWWA D100-11 which includes: access manways (manholes), inlet/outlet penetration, sampling station, water level indicator, hose bib, inside and outside ladders, cage, overflow, flush clean-out, roof hatches, roof vents, antenna pole, tool pulley, safety eye bolts, roof hatches, handrails, self-closing gate, pulley, mechanical and digital tank level indicator (Rosemount 3051), cathodic protection (CP), unit struts and appurtenances. Provide insulation bushings at all dissimilar metal connections.

In addition, the work shall also include:

- X-ray weld test and vacuum test
- Tank cleanup and disinfection
- Harness equipment

### **Bid Item 24 – West Tank Coating**

The contract lump sum (LS) unit price paid for the West Tank coating shall include painting the interior, exterior, floor, roof, tank appurtenances, inlet/outlet, components, stainless steel pipe, as shown on the project plans.

In addition, the work shall also include:

- Provide paint schedule.
- Sound barrier containment plan for dehumidification unit or any unit left overnight.
- Tank containment of the tank for coating.

### **Bid Item 25 – West Tank Concrete Swale and Apron**

The contract unit price paid per linear foot (LF) for the concrete swale and concrete work shall include excavating and installing the form work for the 24" wide swale, rebars, concrete work apron around the drop inlets, and pouring and placing the concrete swale around the perimeter of the tank as shown on the project plans. Grade can be adjusted to maintain proper drainage. Final grade shall be approved by the District.

### **Bid Item 26 – East and West Tanks 12-inch Inlet/Outlet Flex-Tend Assembly**

The contract unit price paid for each (EA) 12-inch inlet/outlet EBBA Flex-Tend Force Balance connection for each of the tanks shall include supplying and installing the unit to the tank's inlet/outlet flange tee as shown on the plans. This work also includes the vertical 12" DIP (length to be determined in the field), above ground 90 bends (vertical and horizontal), 12" butterfly valve, 12x6 tee, 6" butterfly valve, 6" bend, 6" spool, stand, gaskets, concrete support.

All connections shall be disinfected and swab with chlorine.

### **Bid Item 27 –Tank Mixing Units**

The contract unit price paid for each (EA) mixing unit provide for each tank shall include supplying and installing the units with the necessary conduits (underground from the chemical building), and electrical line (from the chemical line, the side of to the tank and to the roof hatch) complete in place.

In addition, the work shall also include:

- Coordinated with the District the new location and alignment of new conduits.
- Run lines along the side of the tanks.
- Install flex conduit connection for seismic movement.
- Seal exposed conduit opening with caulk.

### **Bid Item 28 –Tank Level Copper Sensor Line**

The contract lump sum (LS) unit price paid for the tank's level sensor copper line shall include excavating a trench for the copper line 18" below grade from each of the tank to the pump station. The work also include a traffic rated junction box, compression tee connection, and fittings. The line shall be tested, flushed and disinfected. Backfill the trench with quarry fines and Class II base.

In addition, the work shall also include:

- Alignment and H-20 rated box location as will be coordinated with the District in the field.
- Provide isolation connection for dissimilar metals (copper and steel) as needed at the tank.
- Align the copper next to the tank to allow flexing movement.
- Provide a conduit to separate the copper from concrete. Seal exposed conduit opening with caulk.
- Copper line shall be one complete piece. No compression coupling will be allowed.
- Wrap the copper line with 8-mil tape.

### **Bid Item 29 – Tanks Cathodic Protection**

The contract lump sum (LS) unit price for the tanks cathodic protection shall include excavating a trench and installing conduit 18" below grade from the pump station to each of the tanks. This work also includes removing and replacing each of the boxes and lines inside the pump station.

In addition, the work shall also include:

- Coordinated with the District of new location and alignment of new conduits.
- Run lines along the side of the tanks.
- Install flex conduit connection for seismic movement.
- Seal exposed conduit opening with caulk.
- Remove existing cathodic protection lines.
- Provide necessary fitting to connect to the existing power source in the pump station.
- Location of the CP boxes in the pump station shall be coordinated with the District.

### **Bid Item 30 –Chemical Feed Mixing System / Building Enclosure / Foundation**

The contract lump sum (LS) unit price paid for the chemical feed mixing system, building enclosure, and foundation shall include furnishing and installing the mixing equipment unit (Monoclor Residual Control System), enclosure, grading and excavating to set the foundation, trench excavation to set the conduits to the tanks, installation of the chemical feed lines along the side of the tanks to the tank's roof hatch and setting the telemetry and mixing components interface. Work also include form work, rebar, concrete pour of the foundation. Anchor the pre-fabricated building enclosure to the foundation.

Contact Ethan Brooks, Regional Sales Manager & Senior Product Manager, UGSI Solutions at 917-501-7358 to purchase the mixing unit and building enclosure.

In addition, the work shall also include:

- Layout alignment of the chemical feed conduit lines with the mixing components at foundation.
- Layout and alignment of the electrical feed line from the chemical feed building to the tanks
- Secure the vertical lines along the tanks.

- Water proof penetration of chemical and power lines at the side opening of the roof hatch.
- Commissioning and calibrating the unit.
- Operation Manual (two hard copy and a digital copy).
- On site demonstration on the units.
- Refer to Appendix A2 for the building enclosure and A3 schematic layout.
- Provide the necessary chemical components necessary to start the system for the tank of this capacity. This includes the course salt crystals and enough ammonia sulfate or other solution to start the system and last of three months.

### **Bid Item 31 –Electrical Line Feed and Connection**

The contract lump sum (LS) unit price paid for the electrical line feed and connection from the pump station to the chemical feed building shall include excavating a trench to install the main electrical feed from the pump station to chemical building. The work includes coordinating with the chemical feed supplier to determine the available load for the chemical building and providing the necessary electrical breakers and switches to provide power. Provide three (3) 2” conduit with rigid galvanized at ground level with pull cord and conductor.

In addition, the work shall also include:

- Contract with a licensed electrician for the installation of electrical feed line and determined the size of the conductor. See Appendix A4 for load schedule and requirements.
- Circuit breaker at the chemical feed building as required with local agency.
- The District will do the final connection to the pump station from the circuit breaker.

### **Bid Item 32 – Phase 9 and Pneumatic Tank 6” Seismic Retrofit**

The contract lump sum (LS) unit price paid for the positive location (pothole) of the 8” PVC water main and the installation a 6-inch EBBA Flex-Tend Force Balance and isolation valve assembly shall include removing and excavating the existing 6” valve, 45° bend, vertical pipe section, tee, thrust block, AC and installing 6” butterfly valve, EBBA Flex-Tend, and 90° bends, tee (vertical), thrust block, fitting (if needed), spools, sleeves needed to connect to the existing water main complete in place as shown on the plans.

In addition, the work shall also include:

- Remove the concrete steps next to the pump station to locate the existing water main if needed.
- Coordinate temporary shut-down with the District.
- Refer to Pneumatic Tank Seismic Retrofit Detail 6/ Dwg C1.2.
- Backfill and surface restoration per trench Detail 1/ Dwg C1.6.
- Abandon the existing line with 2-sack slurry and patch the concrete foundation.
- Patch and paint any exterior damage to the pump station. Coordinate the color selection with the District.

### **Bid Item 33 –Dehumidification Equipment – As Directed by the Coating Consulting**

The contract weekly (WK) unit price paid to furnish dehumidification equipment to maintain the appropriate relative humidity during surface preparation and coating work shall include full compensation for furnishing all labor, supervision, materials, tools, attachments, equipment, fuel, and the set-up work involved operation of the dehumidifier or as directed by the District.

The coating consultant shall determine the procedures, equipment, and materials to be used. The Contractor shall use a generator with noise reduction means to operate the dehumidifiers overnight as needed.

In addition, the work shall also include:

- Providing sound proof structure for any equipment needed used overnight not limited to generators and dehumidification equipment. Contractor shall submit a drawing of the structure for review.
- Containment plan for the dust and debris during surface preparation (interior and exterior) operations. Contractor shall submit a plan for review.
- Maintaining and removing sound proof structure at the end of the project from site.
- Mobilization and demobilization of equipment and material.

### **Bid Item 34 –Pneumatic Tank Coating**

The contract lump sum (LS) unit price paid for the pneumatic tank coating shall include preparing the surface and painting the exterior of the pneumatic tank and appurtenances, inlet/outlet, gate valve, and pipe.

In addition, the work shall also include:

- Provide full tank containment for blasting and paint overspray from leaving the site.
- Use same color as the tanks.

### **Bid Item 35 – 12” Ductile Iron Pipe (DIP)**

The contract unit price paid per linear foot (LF) of 12” Class 350 DIP water main shall include saw-cutting existing pavement, trench excavating to install the water main and the necessary fittings (tees, cross, vertical and horizontal bends, reducers), gaskets, mechanical restraints, pipe bonding, pipe wrap, pipe wrapping tape, warning tape, tracer wire, thrust block and necessary temporary facilities not limited to trench plates, temporary blow-offs and tie-ins connections (sleeves) to existing water mains, as shown on the plans.

In addition, the work shall also include:

- Trench backfill and pavement restoration per **Sections 31 80 00 and 32 10 00**.
- Removal of existing water main to replace new pipe line shall be paid separate bid item.
- Pressure testing and disinfection per **Section 33 14 13**.
- Trench safety measures (plates, cones, and lighted barricades) and shoring if needed.
- Trench pavement replacement width 4’.

### **Bid Item 36 – 10” Ductile Iron Pipe (DIP)**

The contract unit price paid per linear foot (LF) of 10” Class 350 DIP water main installation shall include saw-cutting existing pavement, trench excavating to install the water main and the necessary fittings (vertical and horizontal bends), gaskets, mechanical restraints, pipe bonding, pipe wrap, pipe wrapping tape, warning tape, tracer wire, thrust block and necessary temporary facilities not limited to trench plates, and tie-ins connections (sleeves) to existing water mains, as shown on the plans.

In addition, the work shall also include:

- Trench backfill and pavement restoration per **Sections 31 80 00** and **32 10 00**.
- Removal of existing water main to replace new pipe line shall be paid separate bid item.
- Pressure testing and disinfection per **Section 33 14 13**.
- Trench safety measures (plates, cones, and barricades) and shoring if needed.

### **Bid Item 37 – 8” Ductile Iron Pipe (DIP)**

The contract unit price paid per linear foot (LF) of 8” Class 350 DIP water main installation at the pump station and Z3 water main connections shall include saw-cutting existing pavement, trench excavating to install the water main and the necessary fittings (vertical and horizontal bends), gaskets, mechanical restraints, pipe bonding, pipe wrap, pipe wrapping tape, warning tape, tracer wire, thrust block and necessary temporary facilities not limited to trench plates, and tie-ins connections (sleeves) to existing water mains, as shown on the plans.

In addition, the work shall also include:

- Trench backfill and pavement restoration per **Sections 31 80 00** and **32 10 00**.
- Removal of existing water main to replace new pipe line shall be paid separate bid item.
- Pressure testing and disinfection per **Section 33 14 13**.
- Trench safety measures (plates, cones, and barricades) and shoring if needed.

### **Bid Item 38 – 12” Gate Valves**

The contract unit price paid for each (EA) 12” gate valve installation shall include furnishing and installing the gate valve, continuous 8-inch PVC riser, valve box and lid, concrete collar, with stainless steel hardware, gaskets, mechanical restraints, pipe bonding, pipe wrap, pipe wrapping tape, warning tape, tracer wire as shown on the plans.

In addition, the work shall also include:

- Valve repair retouch kit to be repair any nicks during the installation.



### **Bid Item 39 – 8” Gate Valves**

The contract unit price paid for each (EA) 8” gate valve installation shall include furnishing and installing the gate valve, continuous 8-inch PVC riser, valve box and lid, concrete collar, with stainless steel hardware, gaskets, mechanical restraints, pipe bonding, pipe wrap, pipe wrapping tape, warning tape, tracer wire as shown on the plans.

In addition, the work shall also include:

- Valve repair retouch kit to be repair any nicks during the installation.

### **Bid Item 40– 2” Combination Air Valve Assembly**

The contract unit price paid for each (EA) 2” combination air valve assembly installation shall include saw-cutting, trench excavating, and installing saddle, corporation valve, fittings, copper, meter valve, brass pipe, air combination valve, concrete pad and enclosure, traffic valve box, and necessary appurtenances complete in place as shown on the plans.

In addition, the work shall also include:

- Coordinate final location of the valve.
- Trench backfill and pavement restoration per **Sections 31 80 00** and **32 10 00**.
- Pressure testing and disinfection per **Section 33 14 13**.

### **Bid Item 41 – 3x2 Drop Inlet Structures**

The contract unit price paid for each (EA) 3x2 drop inlet structure installation shall include excavating and setting 3x2 drop inlet structure (frame/cover, extension/rise, and box) next to the tank’s inlet/outlet as show on the plans.

In addition, the work shall also include:

- Storm drain connection to the area drain shall be included.
- Grout and secure the storm drain line in the box.
- Dowel structure to the concrete foundation.
- Adjust invert elevations as need to drain away from the tanks respectively.

### **Bid Item 42 – 2x2 Area Drain/ Drop Inlet Structures**

The contract unit price paid for each (EA) 2x2 area drain/ drop inlet structure installation shall include excavating and setting 2x2 drop inlet structure (frame/cover, extension/riser and box) next to the tank’s inlet/outlet as show on the plans.

In addition, the work shall also include:

- Storm drain connection to the area drain shall be included.
- Grout and secure the storm drain line in the box.
- Adjust invert elevations as need to drain away from the tanks respectively.

### **Bid Item 43 – 2x2 Drop Inlet Replacement Covers**

The contract unit price paid for each (EA) 2x2 drop inlet replacement cover installation shall include excavating around the existing drop inlet and saw-cutting /hammering to expose the existing frame/cover to be removed and replaced with new cover. This work also includes the necessary means to secure the new frame/cover to the desire grade for proper drainage.

In addition, the work shall also include:

- Contractor shall verify and match the size of the frame/cover.
- Protect the box structure to remain.
- Provide preventing measure to prevent construction debris from entering the drain.
- Remove and un-clogged the drain after replacing the frame/cover.
- Use aggregate base to backfill the drop inlet.
- Connect and grout new cover to the structure.

### **Bid Item 44 – 8” Schedule 40 PVC Storm Drain**

The contract unit price paid per linear foot (LF) the 8” Schedule 40 PVC storm drain shall include saw-cutting existing pavement, trench excavating to install solid piece of storm drain from and to the drop inlets to area drain. This work also includes installation of a tracer wire.

In addition, the work shall also include:

- Trench backfill and pavement restoration per **Sections 31 80 00** and **32 10 00**.
- Trench safety measures (plates, cones, and barricades) and shoring if needed.

### **Bid Item 45 – Removable Bollards**

The contract unit price paid for each (EA) removable bollards installation shall include supplying and setting the bollards as shown on the plan. This work also includes drilling a hole with an auger to the required depths, setting the sleeve in concrete, painting and adding the reflective tape. Bollards shall be a continuous steel pipe with a dome top.

In addition, the work shall also include:

- Coordinate with the District the exact location of the bollards in the field.

### **Bid Item 46 – 6” Asphalt Concrete (AC) Berm**

The contract unit price paid per linear foot (LF) of AC berm installation shall include excavating, grading, and compacting the subgrade where the berm will be installed as shown on the plans. This work also includes backfilling and compaction of base rock to make the necessary grade for proper drainage.

### **Bid Item 47 – 6” Concrete Berm**

The contract unit price paid per linear foot (LF) of concrete berm installation shall include excavating, grading, and compacting the subgrade where the berm will be installed monolithically with the driveway and curb and gutter at the entrance of the site. This work also includes setting the form work, rebar, concrete next to the driveway. Adjust grade to maintain proper drainage away from the site. Final grade shall be approved by the District.

### **Bid Item 48 – 4” Asphalt Concrete (AC) Paving Replacement**

The contract unit price paid per square foot (SF) of 4” AC pavement shall include saw-cutting the transition surface between the new and existing surface to remain, compacting the subgrade, filling the low spots with aggregate base needed, removing excavated material, providing asphalt binder, placing 0.75” max-medium grade AC, protecting utility boxes, storm drain BMP’S, and cleaning AC material from the site as shown on the plans.

In addition, the work shall also include:

- Protect and clean immediately asphalt from adhering to valve or utility box covers.
- Additional AC pavement replacement required on Dekoven Avenue outside the 4’ wide water main trench.

### **Bid Item 49 – Wood Retaining Wall**

The contract unit price paid for each (EA) wood retaining wall installation shall include hand-digging of the post to the specified depth and 12” below grade and installing the new wall as shown on the plans. This work also includes disposing excavated material, providing pressure treated lumber, fasteners, concrete, and restoring the surrounding area. Contactor shall use caution of existing utilities in the area as shown on Plan C1.6, Detail 5.

### **Bid Item 50 –Type E Concrete Curb and Gutter (Dekoven Avenue)**

The contract unit price paid per linear foot (LF) of Type E curb and gutter (City of Belmont SI-100 Standard Detail) installation shall include removing and disposing the existing curb, saw-cutting the limits of replacement curb replacement and AC to set the form work as shown on the plans. This work also includes the replacing and compacting the sub-grade with aggregate base as needed to establish the grade, placing the concrete, setting dowels, and finishing the surface.

In addition, the work shall also include:

- Temporary paving as needed to maintain a safe walking and driving surface.
- Replace temporary paving with permanent AC.
- Sand seal the joints.
- Paint the curb and gutter “No Parking” red as directed by the District.

### **Bid Item 51 –Type A Curb and Gutter (On Site)**

The contract unit price paid per linear foot (LF) of Type A curb and gutter (City of Belmont SI-100 Standard Detail) installation shall include removing and disposing the existing curb, saw-cutting the limits of replacement curb replacement and AC to set the form work as shown on the plans. This work also includes the replacing and compacting the sub-grade with aggregate base as needed to establish the grade, placing monolithically the concrete with the driveway and vertical curb, setting dowels, and finishing the surface.

In addition, the work shall also include:

- Protect the existing inlet structures and provide BMP's and inlet covers.
- Form the gutter and provide an apron around the two existing drop inlets.
- Neatly saw-cut a section of the existing AC curb and terminate new concrete curb.
- Terminate the concrete apron at the end transition of AC curb.

### **Bid Item 52 – Concrete Driveway and Approach**

The contract unit price paid per square foot (SF) of concrete driveway and approach installation shall include excavating, grading, and compacting the subgrade at the site entrance. This work also includes setting the form work, rebar, and monolithically pour with the vertical curb and curb and gutter. Adjust grade to maintain proper drainage away from the site. Final grade shall be approved by the District.

### **Bid Item 53 –Aluminum Step**

The contract lump sum (LS) price paid for supplying and installing an aluminum step at the entrance of the pump station if the concrete steps is removed at the pump station on Bid Item No. 32. Size of the steps shall be the same size of the concrete steps. Secure the steps to the ground.

### **Bid Item 54 – 1" Service and Backflow Preventer**

The contract lump sum (LS) price for installing a 1" service and backflow preventer to the chemical feed building shall include full compensation for furnishing all labor, supervision, materials, tools, equipment, and incidentals and for doing all work involved in the Detail 3, Plan C1.7 and Detail 4, Plan C1.8 complete in place, to include service saddle, corporation stop, up to 1" copper pipe, angle meter valve, brass fittings, ball valve, drain rock, and service box; and incidentals to install backflow preventor and to the chemical building. Also included are the necessary fittings to connect to the water softener in the chemical feed building. Location of the meter and backflow will be decided in the field by the District.

**Bid Item 55 – Aluminum Bridge Crossing**

The contract lump sum (LS) unit price paid for the fabricating and erecting the aluminum bridge crossing shall include the installation of all the appurtenances as shown on Plan S1.8 which include: shop drawing submittal, calculations, fabrication and installation with all the necessary hardware.

**Bid Item 56 – Weathering Steel Tanks (A588) and Appurtenances Substitution – District Authorization Required**

The contract lump sum (LS) price paid for Weathering Steel (A588) Substitution shall include full compensation and credits for furnishing all labor, material, tools, equipment and incidentals in work involved with substituting A36 steel with A588 steel for the construction of the two tanks and appurtenances, including material cost differences, credit for exterior containment and painting and coating of exterior appurtenances that cannot be fabricated in A588 such as overflow and hand railing. These items shall be primed and coated to closely match the weathering steel unless noted differently. This bid item may be a net credit. Section G4.08 of the project general provisions are hereby waved for this bid item and the District reserves the right to utilize this bid item without recourse. A decision will be made prior to the pre-construction meeting.

**END OF SECTION**

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## **SECTION 01 33 00 - SUBMITTALS**

### **PART 1 GENERAL**

#### **1.01 SCOPE OF WORK**

- A. Work included in this section consists of furnishing various submittal items as listed herein, as required for the work.

#### **1.02 SUBMITTAL PROCEDURE**

- A. The Contractor shall deliver all applicable submittals listed in the schedule included in this section a minimum of 21 calendar days before the anticipated start of construction. This time limit shall not apply to those items to be furnished during the course of the work or near or at the conclusion of the work such as test reports and record drawings. Two (2) hard copies or electronic files in PDF format of all submittal materials shall be furnished. Prior to installation of materials, the Contractor shall submit two (2) hard copies or electronic files in PDF format of corrected final submittal material. Installation shall not commence until submittal material has been reviewed by the District and final submittals have been delivered.
- B. The following procedure shall be used by the Contractor in submitting and processing submittals for review by the District:
  - 1. Each submittal item shall be forwarded to the District with an individual transmittal letter or form. The letter or form shall include the following items:
    - a. Project name.
    - b. Submittal number.
    - c. Description of submittal item.
    - d. Specification section and drawing references.
    - e. Certification by the Contractor's representative that the submittal is complete and correct.
    - f. When required in a specific specification section, a "Letter of Compliance" shall be furnished stating that material and/or equipment furnished complies with the specifications.

- C. The District reserves the right to require submittals in addition to those called for herein.

#### **1.03 SHOP DRAWINGS**

- A. The term "shop drawings" includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, furnished by Contractor to explain in detail specific portions of the work required by the contract.

- B. The Contractor shall coordinate all such drawings, and review them for legibility, accuracy, completeness and compliance with contract requirements and shall so indicate that such coordination and review has been done by signing the transmittal letters. Shop drawings submitted to the District without evidence of Contractor's review will be returned for resubmission.
- C. Review by the District shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with requirements of this contract. If shop drawings show variations from contract requirements, Contractor shall describe such variations in writing, separate from the drawings, at time of submission. All such variations must be approved by the District.
- D. In these Standard Specifications, whenever the trade name of a product or the name of a manufacturer appears, it shall be understood to specify the product so identified and no equivalent is allowed. If the District Standards Specifications allow for use of an equivalent data may be submitted by the Contractor for a period of fifteen (15) days from receipt of the Notice to Proceed to substantiate a request for substitution as an equivalent item.
- E. Wherever in these Standard Specifications, or in any orders that may be given by the District pursuant to or supplementing the specifications, it is provided that the Contractor shall furnish materials for which no detailed specifications are set forth, the materials shall conform to accepted quality standards for materials of the kind required, with due consideration for the use to which they are to be put.

#### **1.04 SAMPLES AND TESTS**

- A. The source supply of each material furnished shall be approved by the District, unless the District advises the Contractor to the contrary at least ten (10) calendar days prior to the time when delivery is started, of any of the material used in the work. Representative preliminary samples of the character and quality prescribed and the manufacturer's test certificates pertaining thereto shall be submitted by the Contractor for all materials to be used in the work, as required by these Standard Specifications or as requested by the District.
- B. All tests of materials will be made in accordance with commonly recognized standards of national organizations, and such special methods and tests as are prescribed in these project specifications. The approval of any material on the basis of sample tests and/or certificates will be considered as general approval only, and will not constitute a waiver of the District's right to demand full compliance with the Contract requirements. After delivery of materials to the job, the District will make such check tests as deemed necessary in each instance, and may reject materials, equipment, or accessories which fail to meet the check tests, even though such materials have previously been given general approval.
- C. Laboratory test reports shall cite the contract requirements, the test of analysis procedures used, the actual test results, and includes a statement that the item tested or analyzed conforms or fails to conform to specification requirements. All test reports shall be signed by a representative of the testing laboratory authorized to sign certified test reports.
- D. The cost of all testing will be borne by the District, except for the following situations: (1) The Contractor shall assume all costs of retesting materials which fails to meet Contract requirements; (2) The Contractor shall assume all costs of testing materials offered in substitution of those found



to be deficient; (3) The Contractor shall assume all costs of testing materials offered in lieu of specified materials, to prove their quality equivalence.

#### **1.05 CERTIFICATES**

- A. For those items called for in individual sections of these Standard Specifications or shown on project drawings, furnish certificates from manufacturers, suppliers, or other certifying that materials or equipment being furnished under the contract comply with the requirements of these Standard Specifications.

#### **1.06 PROGRESS SCHEDULES**

- A. The Contractor shall submit a schedule (CPM format) at the preconstruction meeting for the project showing the estimated startup and completion date for each element of the work, in conformance with the requirements of the Standard Specifications.

#### **1.07 TRAFFIC CONTROL PLAN**

- A. Traffic Control Plan submittal shall be per Section 01 52 00 - Traffic Control Plan, of these Standard Specifications.
- B. The Contractor shall notify the City of Belmont Public Works Department, the City of Belmont Fire Department, The City of Belmont Police Department, the City of San Carlos Public Works Department, City of San Carlos Fire Department, County of San Mateo Fire Protection Services, County of San Mateo Public Works or/and County of San Mateo Sheriff's Office (if applicable) at least 72 hours in advance whenever lane closures are planned. Such notification shall include the details and location of such closure, its anticipated duration and traffic control and signing to be used during such closure.

#### **1.08 RECORD DRAWINGS**

- A. Using colored ink, each Contractor shall make changes on a set of clean prints. Indicate all changes and revisions to the original design that affect the permanent structures and will exist in the completed work. Reference underground utilities to semi-permanent or permanent physical objects. Reference water, sewer, telephone, storm drain, gas, and electric lines to corners of buildings and survey markers.
- B. The record drawings shall be kept current. Project record drawings are the property of the District. The original hard copies of the record drawings shall be delivered to the District before project closeout.

## 1.09 SUBMITTAL SCHEDULE

- A. The list below is a *preliminary* representation of the list materials to be used on the project. The Contractor is responsible for reviewing each individual specification sections for specific a complete list of items and requirements to ensure all material information is submitted and reviewed.

The District may request additional items not listed below.

<u>Section No.</u>	<u>Item</u>
G7.17	Safety Program per the General Provisions
01 50 00	Staging Plan
01 52 00	Traffic Control Plan
01 57 23	Storm Water Pollution Control Plan
01 70 00	Tests Certificates and Guarantees Record Drawings
03 30 00	Concrete Mix
06 40 13	Landscape
09 96 56	High Performance Coatings
10 50 00	FRP Shed
13 47 13	Galvanic Anode Cathodic Protection System (pipe)
22 14 00	Storm Drain Structures Storm PVC Pipe
31 80 00	Subgrade Material Bedding Material Aggregate Base Written Shoring Safety Plan prepared by a registered Civil Engineer
13 47 13	Catalog Data on Anodes Test Boxes Shunts Thermite Welds Weld Coating
32 10 00	Aggregate Base Aggregate Surfacing Asphaltic Concrete Bonding Coat and Crack Seal Temporary Paving Controlled Density Fill Type II Slurry Seal
33 14 13	Ductile Iron Pipe PVC Pipe Thrust-Resistant Restraint for Ductile Iron Pipe and/or PVC Pipe Thrust Blocks Hardware Tubing and Fittings V-Bio Polyethylene Encasement and tape Marker Tape for Buried Piping

33 14 13 (Cont)	Tracer Wire
	Disinfection Plans
33 14 20	Disposal of Chlorine Water
	Gate Valves – Resilient Wedge
	Combination Air Valve
	Wye Strainers
	Pressure Gauges
	Blow Off
	Meter Fittings and Valves
	Flow Meter
	Air Combination Valve
	Valve and Meter Boxes
43 41 13	Hydrants
	Welded Steel Water Storage
	Shop Drawings
	Tank Calculations
	Warranty
46 33 00	Residual Control System

**PART 2 MATERIALS - NONE**

**PART 3 EXECUTION - NONE**

**END OF SECTION**

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## **SECTION 01 45 00 - QUALITY CONTROL**

### **PART 1 GENERAL**

#### **1.01 SCOPE OF WORK**

- A. Work included under this section consists of performing or conforming to quality control procedures and requirements as listed herein and in the various technical specification sections that comprise these Standard Specifications.

#### **1.02 GENERAL QUALITY**

- A. All material shall be new and of a quality equivalent to that specified.
- B. The work shall be executed in conformity with the best accepted standard practice of the trade so as to contribute to maximum efficiency of operation, accessibility and appearance, and minimum cost of maintenance and construction of future alterations and additions.

#### **1.03 QUALITY IN ABSENCE OF DETAILED SPECIFICATIONS**

- A. Whenever the Contractor shall furnish materials or manufactured articles or shall do work for which no detailed specifications are set forth, the materials or manufactured articles shall be of the normal commercial grade in quality and workmanship obtained from firms normally furnishing such materials or equipment or, if not ordinarily carried in stock, shall conform to the usual standards for first-class materials or articles of the kind required with due consideration of the use to which they are to be put. In general, the work performed shall be in conformity with the intent to secure the normal commercial standard of construction and equipment of the work as a whole or in part.

#### **1.04 DEFECTIVE MATERIALS**

- A. All materials not conforming to these Standard Specifications shall be considered defective; and all such materials, whether in place or not will be rejected, and shall be immediately removed from the site of the work, unless otherwise permitted to remain by the District. Rejected materials, the defects of which have been subsequently corrected, shall not be used until approval in writing has been obtained from the District. Upon failure of the Contractor to comply with any order of the District made under the Standard Specifications of this article, the District shall have the authority to remove and replace defective materials and to deduct the cost of same from any monies due or to become due the Contractor.

#### **1.05 GUARANTEE**

- A. All materials, and workmanship shall be guaranteed by the Contractor for a period of two (2) years from the substantial completion date of the entire project, against all defects that might render the work unsatisfactory for the intended purpose. Defective materials and workmanship occurring during the guarantee period shall be replaced by the Contractor at his expense, together with the repair or replacement of any adjacent work which may be damaged or displaced in the process.

- B. In addition to the above guarantee, the Contractor shall assign to the District all material guarantees issued by manufacturers or subcontractors which guarantees extend beyond the two (2) year period stipulated.

**PART 2 MATERIALS - NONE**

**PART 3 EXECUTION - NONE**

**END OF SECTION**

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

### **PART 1 GENERAL**

#### **1.01 SCOPE OF WORK**

- A. Work required under this section consists of providing temporary facilities or conforming to control procedures and requirements as listed herein and in the various technical specification sections that comprise these Standard Specifications.

#### **1.02 SUBMITTALS**

- A. The Contractor shall submit a detailed staging plan and how he intends to comply with the requirements of this section.

#### **1.03 TEMPORARY FACILITIES**

- A. Construction Utilities/Facilities
  1. Water - The District will furnish water required for water main and tank disinfection/flushing purposes, subject to availability. All other water required for construction related items shall be provided by the Contractor. Water may be obtained from a sole location designated by the District. The District will provide a 2" hydrant meter to be installed on the hydrant. It shall be the Contractor's responsibility to provide certified backflow preventer hoses and/or piping to convey water to the construction site. In no case shall the Contractor use and obtain water from a hydrant without a backflow preventer and hydrant meter. Quantities and delivery schedules shall be subject to availability from the local system as approved by the District. The District will not be responsible for transporting water to the job site for use by the Contractor.
  2. Sanitary Facilities - The Contractor shall provide adequate toilet facilities for all workers and representatives of the District employed on the job. Facilities shall be immediately adjacent to the work area and subject to the approval of the District as to location and type. The Contractor shall maintain them in sanitary condition from the beginning of the work until completion and shall then remove the facilities and disinfect the premises. All portions of the work shall be maintained at all times in a sanitary condition.
- B. Storage Facilities / Staging Area
  1. It is the Contractor's responsibility to find a staging area for equipment and material for the project duration. Absolutely no material or equipment may be stored on Dekoven Avenue or arterial streets near the project.
  2. All materials and equipment shall be stored at the Contractor's staging area.
  3. The staging area shall be limited to no more than 7,000 SF with the minimum 6 ft high fencing materials and boundaries subject to District approval.
  4. All coordination with neighbors near the staging area is the Contractor's responsibility.

5. The staging area shall have a construction entrance to prevent dirt and mud from leaving the area. In the event material is tracked onto pavement, it shall be swept and cleaned immediately.

C. Hauling

1. All trucks transporting soil, sand, backfill and excavated materials, or other loose materials off the project site shall be covered.

**1.04 TEMPORARY CONTROLS**

A. Housekeeping

1. Keep the project neat, orderly, and in a safe condition at all times. Immediately remove all hazardous rubbish. Do not allow rubbish to accumulate. Provide on-site containers for collection of rubbish or dispose of it at frequent intervals during progress of work. Dry material and rubbish shall be wet-down to prevent blowing dust. Keep volatile wastes in covered containers.
2. The Contractor shall properly dispose of all litter, trash, garbage which may accumulate on the project site on a daily basis.

B. Environmental Protection Requirements

1. Provide environmental protective measures as required to control pollution that develops during normal construction practice, and as required to correct conditions that develop during the construction of permanent or temporary features associated with the project. Comply with all federal, state, and local regulations pertaining to water, air, and noise pollution. Prior to the commencement of the work, meet with the District to develop a mutual understanding relative to details of environmental protection, including measures for protecting natural resources and measures to be taken should the Contractor fail to provide adequate protection in an adequate and timely manner.
2. Water containment barriers must be on site for accidental discharge of chlorinated water.

C. Protection of Trees and Other Vegetation

1. Except in areas indicated to be cleared, do not remove, cut, deface, injure, or destroy trees, shrubs or other vegetation without authorization from the District. Do not fasten or attach ropes, cables, or guys to any existing nearby trees for anchorages unless specifically authorized. Where such special emergency use is authorized, the Contractor shall be responsible for any resultant damage. Protect existing trees to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations.
2. Restore to their original condition landscape features scarred or damaged by the equipment or operations. Obtain approval of the restoration from the District prior to installation.

D. Air, Soil, and Water Pollution Control Measures

1. Take all necessary reasonable measures to reduce air, soil, and water pollution by any material or equipment used during construction.



2. No burning will be permitted.
3. Minimize idling time of diesel-powered construction equipment to 5 minutes and post signs reminding workers of this idling restriction at access points and equipment staging areas during construction of the proposed project.
4. Do not dispose of volatile wastes or oils or allow waste materials to be wash into storm or sanitary drains, nor allow such materials to reach watercourses.
5. Maintain and properly tune all construction equipment in accordance with manufacturer's specifications and have a CARB-certified visible emissions evaluator check equipment prior to use at the site.
6. All construction equipment shall be well-maintained and kept in good working order so no vehicle fluids are leaked or dripped on-site.
7. Construction equipment shall be re-fueled and maintained away from creeks, roadside drainages and unpaved areas.
8. The contractor shall have on hand at all times sufficient quantities of absorbent materials to clean up the largest possible spill of construction fuels or fluids.
9. The contractor shall use fiber rolls, sand bags/filter covers for drains, plastic over stock piles, and track out control for the construction yard to prevent erosion and sedimentation.
10. Should a rain event occur during construction storm water runoff will be directed away from open trenches and around stockpiles of soil materials. Stockpiles of soil materials shall be covered to prevent erosion during a storm event.
11. Post a publicly visible sign with the name and telephone number of the construction contractor and District Inspector to contact regarding dust complaints. This person shall respond and take corrective action within 48 hours. The publicly visible sign shall also include the contact phone number for the Bay Area Air Quality Management District to ensure compliance with applicable regulations.
12. Contractor shall provide a designated area to clean and wash concrete from equipment during any concrete work on this project. Area shall be lined to prevent any run-off. Concrete residual shall be properly disposed.
13. After every rainfall, Contractor shall inspect and replace any damaged BMP's. Work shall include cleaning and properly disposing debris from the inlets. Every inlet needs to be free from obstruction and sediments.

E. Handling and Disposal of Waste Materials

1. Dispose of all waste materials legally.
2. Store chemical waste in corrosion resistant containers labeled to identify type of waste and date filled. Remove containers from the project site, and dispose of chemical waste in accordance with federal, state, and local regulations. For oil and hazardous material spills

which may be large enough to violate federal, state, and local regulations, notify the District immediately.

3. Conduct fueling and lubricating of equipment and motor vehicles in a manner that affords the maximum protection against spills and evaporation. Dispose of lubricants to be discarded and excess oil in accordance with approved procedures meeting federal, state, and local regulations.
4. Take special measures to prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water. Surround all temporary fuel oil, petroleum, or liquid chemical storage tanks with a temporary earth berm of sufficient size and strength to contain the contents of the tanks in the event of content leakage or spillage. For oil and hazardous material spills which may be large enough to violate federal, state, and local regulations, notify the District immediately.

F. Erosion Protection

1. All earthwork brought to final grade shall be immediately finished as indicated or specified in the Standard Specifications or on the drawings. Immediately protect slopes upon completion of rough grading. Plan and conduct all earthwork in such a manner as to minimize the duration of exposure of unprotected soils.

G. Dust Control

1. Keep dust down at all times, including non-working hours, weekends, and holidays. Sprinkle or treat soil at the site, and other areas disturbed by operations, with a dust suppressor. No dry power brooming is permitted.
2. Air blowing is permitted only for cleaning non-particulate debris, such as steel reinforcing bars.
3. No sandblasting is permitted unless dust is confined.
4. Only wet cutting of concrete and asphalt is permitted. No unnecessary shaking of bags is permitted where bagged cement, concrete mortar, and plaster is used.
5. During the course of construction, the Contractor shall sweep the project site on haul routes and areas directly affected by constructing operations as requested by the District with a regenerative air type street sweeper.

H. Sound Control Requirements

1. The noise level from the Contractor's operations, between the hours of 8:00 a.m. and 5:00 p.m. shall not exceed 75dbA at a distance of 50 feet from the project site. This requirement in no way relieves the Contractor from responsibility for complying with local ordinances relating to noise.
2. Noise level requirement shall apply to all equipment on the job or related to the job, including but not limited to trucks, or transient equipment that may or may not be owned by the Contractor. The use of load sound signals shall be avoided in favor of light warnings except those required by safety laws for the protection of personnel.

I. Preservation and Cleaning

1. The Contractor shall keep roads free from mud and other debris. If mud or debris is tracked onto the road, it shall be immediately cleared. The Contractor shall clean the roadways at the end of each day.

J. Cleanup and Removal of Temporary Facilities

1. Obliterate all signs of temporary construction facilities including work areas, staging area, structures, stockpiles of excess or waste materials, and all other vestiges of construction. Temporary parking areas and similar temporary use areas shall be graded in conformance with surrounding areas.
2. Sweep paved surfaces; rake other surfaces or grounds. Remove all tools, equipment, surplus materials, trash, garbage, and rubbish. At the time of final inspection, the project shall be thoroughly clean and ready for use.

K. Mechanical/Vacuum Roadway Sweeper

1. During the course of construction, the Contractor shall sweep the project site on haul routes and as requested by the District with a regenerative air type street sweeper.

**PART 2 MATERIALS - NONE**

**PART 3 EXECUTION - NONE**

**END OF SECTION**

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## **SECTION 01 52 00 - TRAFFIC CONTROL PLAN**

### **PART 1 GENERAL**

#### **1.01 SCOPE OF WORK**

- A. Work required under this section consists of furnishing all labor, materials, tools, and equipment incidentals to comply and provide traffic control plan. Traffic control is the sole responsibility of the Contractor.

#### **1.02 SUBMITTALS**

- A. The Contractor shall submit details on how he intends to comply with the requirements of this section.
- B. The Contractor shall submit the traffic control plans prepared and stamped by a registered professional engineer at the pre-construction meeting. Delay in submittal of traffic control plan shall not be a basis for any time extensions. Work shall not begin until the City/County has reviewed and approved the traffic control plan.
- C. In an event of sidewalk closure, a pedestrian detour plan meeting ADA requirement must be submitted for review and approval.

### **PART 2 MATERIALS**

#### **2.01 TRAFFIC CONTROL MATERIALS**

- A. All materials used as part of the traffic control plan shall conform to the latest requirements of Caltrans Standard Specifications and the most current version of the California Manual of Uniform Traffic Devices, and the requirements of any necessary encroachment permits. In addition, the traffic control plan shall be in full compliance with said encroachment permits.

### **PART 3 EXECUTION**

#### **3.01 TRAFFIC CONTROL PLAN**

- A. The Contractor shall notify the City of Belmont, the Fire Department, the County Sheriff's Department, at least 72 hours in advance whenever lane closures are planned. Such notification shall include the details and location of such closure, its anticipated duration and traffic control and signing to be used during such closure. For business, a 2-week notice is required.
- B. Access must be maintained to residents and businesses at all times along all affected streets during construction.
- C. Personal vehicles of the Contractor's employees shall not be parked on the traveled way or paved shoulder area, including any section closed to public traffic.
- D. The Contractor shall notify residents around the project at least **5 days** before work is begun that impacts public access. The Contractor shall cooperate with local authorities relative to handling traffic through the area and shall make all arrangements relative to keeping the working area clear of parked vehicles

If the Contractor is not working at the site for more than 7 calendar days or more due the holidays, unforeseen conditions, or other project commitment, the contractor shall renotify the residents **3 days** before resuming work.

- E. A minimum of one paved traffic lane, not less than 10 feet wide, shall be open for use by public traffic in each direction of travel at all times. The full width of roadway used during construction shall be open for use by public traffic on Saturdays, Sundays and designated legal holidays, after 3:00 p.m. on Fridays and the day preceding designated legal holidays, and when construction operations are not actively in progress.
- F. Contractor shall maintain access to all driveways, except when actually doing construction within the driveway boundaries, at which time, partial access will be maintained unless alternate arrangements can be made with the property owners or tenants in advance. Contractor shall coordinate work to minimize disruption to these homeowners during the course of the project. Ingress and egress for residents during construction must be provided during construction at all times.
- G. Minor deviations from the requirements of this section concerning hours of work which do not significantly change the cost of the work may be permitted upon the written request of the Contractor if, in the opinion of the District, public traffic will be better served and the work expedited. These deviations shall not be adopted by the Contractor until the District has approved them in writing.

### **3.02 CONSTRUCTION AREA SIGNS AND SYSTEM**

- A. Construction area signs shall be furnished, installed, maintained, and removed when no longer required in conformance with the Standard Specifications in Section 12 - Temporary Traffic Control, of the latest requirements of Caltrans Standard Specifications and these Standard Specifications.
- B. The Contractor shall notify in writing the residences, District, Town/County and any other pertinent local agencies at least two (2) working days prior to commencing installation for construction area signs posts.
- C. Excavation required to install construction area signs shall be performed by hand methods without the use of power equipment, except that power equipment may be used if it determined there are no utility facilities in the area of the proposed post holes.
- D. Sign substrates for stationary mounted construction signs may be fabricated from fiberglass reinforced plastic under "Pre-qualified and Tested Signing and Delineation Materials" of the latest requirements of Caltrans Standard Specifications.
- E. The Contractor shall furnish and maintain a minimum of two construction funding signs per project site, 4'x4' in dimension, per the latest requirements of Caltrans Standard Specifications. The Contractor shall place signs in conjunction with the construction area signs at locations designated by the inspector. The exact language of the signs will be furnished to the Contractor by the District during the pre-construction meeting. At a minimum these signs shall contain the logo and address of the District and Contractor, project duration and funding information. These signs shall be maintained by the contractor throughout the project's constructions. Damaged construction funding signs shall be replaced by the Contractor at their expense.

- F. The Contractor may be required to cover certain signs during the progress of the work. Signs that are no longer required or that convey inaccurate information to the public shall be immediately covered or removed or the information shall be corrected. Covers for construction signs shall be of sufficient size and density to completely block out the complete face of the signs. The retro-reflective face of the covered signs shall not be visible either during the day or at night. Covers shall be fastened securely so that the signs remain covered during inclement weather. Covers shall be replaced when they no longer properly cover the signs.
- G. When using trench plates at the end of the day, the Contractor shall place customized “Trench Plates Ahead” and “Uneven Pavement” signs on a working, lighted, barricade in each direction of traffic. Contractor shall also place “Trench Plates Ahead” signs at areas where trench plates are temporarily placed in the right-of-way during construction. Sand bags shall be used on each barricade to provide stability. The existing wind conditions and weather will determine the number of sand bags to be used.
- H. Letters of customized signs shall be black in color, 4-inch high, on orange background on non-running paint or color. Signs shall be maintained through the course of the project and shall be weather resistant. No paper signs are allowed.

### **3.03 MAINTAINING TRAFFIC**

- A. Attention is directed to Sections 7-1.03 - Public Convenience, 7-1.04 - Public Safety, and 12 - Temporary Traffic Control, of the latest requirements of Caltrans Standard Specifications and these Standard Specifications.
- B. The Contractor must provide a “Notice to Customers” written notification to impacted Customers at least 1 week in advance prior the beginning of any operation which will impact properties, limit resident or business access to their driveways or potentially impact utility services. The Contractor shall obtain the District’s written approval of the Notice to Residents prior to distribution and the beginning of any operations.
  1. The notice must clearly state the time, date, and duration of the contractor’s planned operation, the impacts to the residents, the purpose of the project, and the prohibition of on-street parking. The notice shall also include the District’s phone number and the Contractor’s day and emergency phone numbers.
  2. Each notice shall be hand delivered or securely attached to the door in the event that no one is home. A Friday that occurs prior to a Holiday (three day) weekend shall not be considered as a working day for the purpose of this section.
- C. If needed, three (3) working days, prior to the day which will require the Contractor to remove parked cars, the Contractor shall furnish and erect “No Parking” signs. These shall be attached to portable barricades and shall state the dates and time that parking will be restricted. The exact date and time signs are posted shall also be noted on the signs.
- D. Emergency vehicles shall be permitted to pass through the work area without delay at all times.
- E. Contractor shall not block emergency access to fire hydrants.

- F. Noncompliance with the requirements of this section shall be cause for the District to stop the work. Delays caused by failure to meet these requirements shall not be considered a valid basis for an extension of time for the purpose of calculating liquidating damages.

**3.04 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE**

- A. A traffic control system shall consist of closing traffic lanes in conformance with the Standard Specifications in Section 12 - Temporary Traffic Control, of the latest requirements of Caltrans Standard Specifications and these Standard Specifications. The provisions in this section will not relieve the Contractor of responsibility for providing additional devices or taking measures as may be necessary to comply with said requirements.

**END OF SECTION**



## **SECTION 01 57 23 – STORM WATER POLLUTION CONTROL PLAN / EROSION CONTROL**

### **PART 1 GENERAL**

#### **1.01 SCOPE OF WORK**

- A. Work required under this section consists of furnishing all labor, materials, tools, and equipment incidentals to provide and comply with a storm water pollution control plan.
- B. General Background
  - 1. The National Pollution Discharge Elimination System (NPDES) General Permit for Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities (Construction General Permit) issued and regulated by the State Water Resources Control Board (SWRCB) is in effect for construction sites. The Construction General Permit requires owners or operators of construction sites, regardless of project size, to implement Best Management Practice (BMP) measures to prevent contamination of storm water runoff from leaving the construction site.
  - 2. In addition to this general requirement, owners and operators of construction sites, including underground and aboveground water main installation projects, that result in land disturbance of one acre or more shall obtain coverage under the Construction General Permit prior to starting construction. Coverage under the Construction General Permit requires:
    - a. Electronically file all Permit Registration Documents (PRDs) to the State Water Board's Storm Water Multi-Application and Report Tracking System (SMARTS) website, which includes a Notice of Intent (NOI) notifying the SWRCB of the project, Risk Assessment, Site Map, signed Certification Statement, Storm Water Pollution Prevention Plan (SWPPP), changes of information, annual reporting and other compliance documents, and Notice of Termination (NOT).
    - b. Preparation of site-specific Storm Water Pollution Prevention Plan (SWPPP) identifying the potential sources of storm water runoff contamination and BMP measures that will be implemented and maintained on the project site to minimize storm water pollution.
    - c. Mailing Annual Permit Fee to SWRCB.
    - d. Obtaining Waste Discharger Identification (WDID) number.
- C. For All Traditional and/or Linear Underground/Overhead Project Sites Greater Than One Acre
  - 1. The District in accordance with the Town/County Grading Ordinance will require all project applicants obtain coverage under and comply with the Construction General Permit regulations. Since installing new services or mains on development sites typically involves land surface disturbance, the District will not provide work or inspection services on construction sites without current PRDs, an approved and current SWPPP document prepared by a Qualified SWPPP Developer (QSD), site-specific BMP measures in place and functioning and monitored by a Qualified SWPPP Practitioner (QSP) throughout the duration of the project.

- D. For Traditional and/or Linear Underground/Overhead Project Sites less than One Acre and Part of a Larger Common Plan of Development or Sale of One or more Acres of Disturbed Land Surface
1. The District in accordance with the Town/County Grading Ordinance will require all project applicants obtain coverage under and comply with the Construction General Permit regulations, where these regulations specifically state that construction activities that results in land surface disturbance of less than one acre is subject to the regulations if the construction activity is part of a larger common plan of development or sale of one or more acres of disturbed land surface.
  2. Since installing new services or mains on development sites typically involves land surface disturbance, the District will not provide work or inspection services on sites without current PRDs, an approved and current SWPPP document prepared by a Qualified SWPPP Developer (QSD), site-specific BMP measures in place and functioning and monitored by a Qualified SWPPP Practitioner (QSP) throughout the duration of the project.
- E. For Traditional and/or Linear Underground/Overhead Project Sites less than One Acre
1. The District in accordance with the Town/County Grading Ordinance will require all project applicants obtain approval of all improvement plans, including a project site-specific Storm Water Pollution Control Plan, from all lead agencies, where projects disturb less than one acre of land surface and is not part of a larger common plan of development or sale of one or more acres of disturbed land surface. Per the current Construction General Permit these construction activities do not require filing of PRDs to obtain coverage under the permit. However, the District reserves the right to require a project site-specific Storm Water Pollution Control Plan prepared in accordance with the California Storm Water Quality Association (CASQA) Storm Water Program requirements and approved by the lead agency on a case-by-case basis. The project site-specific Storm Water Pollution Control Plan shall identify BMP measures necessary to protect the project site throughout all phases of construction during both the rainy-season (October 15<sup>th</sup> through April 15<sup>th</sup>) and dry-season. All project construction site BMP measures shall be in place, maintained and functioning before the wet-season (before September 15<sup>th</sup>).
  2. Since installing new services or mains on development sites typically involves land surface disturbance, the District will not provide work or inspection services on sites without a reviewed and current site-specific Storm Water Pollution Control Plan and BMP measures in place, functioning and monitored contractor in accordance with industry standards.
- F. Related Documents:
1. State of California, Department of Transportation (Caltrans), Caltrans Standard Specifications, Section 13 – Water Pollution Control.
  2. State Water Resource Control Board (SWRCB) General Permit for Storm Water Discharges Associated with Construction Activity.  
[http://www.waterboards.ca.gov/water\\_issues/programs/storm\\_water/](http://www.waterboards.ca.gov/water_issues/programs/storm_water/)
  3. SWRCB General Permit for Storm Water Discharges Associated with Construction Activities from Small Linear Underground/Overhead Projects (State).  
[http://www.waterboards.ca.gov/water\\_issues/programs/storm\\_water/](http://www.waterboards.ca.gov/water_issues/programs/storm_water/)

4. California Stormwater Quality Association (CASQA) Storm Water Program.  
<https://www.casqa.org/>
5. California Department of Transportation (Caltrans) Storm water Quality Program.  
[http://www.dot.ca.gov/hq/construc/storm water/](http://www.dot.ca.gov/hq/construc/storm%20water/)
6. Blueprint for a Clean Bay.
7. California Storm Water Best Management Practice Handbook.
8. Fish and Game Code.

#### **1.02 SUBMITTALS**

- A. The Contractor shall submit details on how he intends to comply with the requirements of this section.

#### **PART 2 MATERIALS**

- A. All materials used as part of the storm water pollution control plan shall conform to the requirements of the SWRCB Construction General Permit and latest edition of the California “Storm Water Best Management Practice Handbook: Construction” prepared by CASQA.

#### **PART 3 EXECUTION**

- A. Storm water pollution control work shall conform to the requirements in Section III “Discharge Prohibitions,” Section IV “Standard Specifications,” Section V “Effluent Standards,” Section VI “Receiving Water Limitations,” and Attachment A “Linear Underground/Overhead Requirements” of the Construction General Permit, and these Standard Specifications.
- B. Storm water pollution control work shall conform to the requirements in the SWRCB Construction General Permit and the “Storm Water Best Management Practice Handbook: Construction” prepared by CASQA, and addenda thereto issued up to and including the date of advertisement of the project, hereafter referred to as the “Handbooks.”
- C. The Contractor shall become fully informed of, and comply with applicable Standard Specifications of the Handbook and Federal, State and local regulations that govern the Contractor’s operations and storm water discharges from both the project site and areas of disturbance outside the project limits during construction.
- D. The Contractor shall incorporate appropriate Best Management Practices (BMPs) measures at all locations such as gutters, drainage inlets, etc., that may be affected by any operation, including saw cutting, grinding and paving, that may deposit pollutants in those facilities. Monitoring of the BMPs shall be done throughout the project and any upgrades or adjustments shall be made as directed by the project applicant’s QSP. Any spillage into gutters or drainage inlets shall be cleaned immediately.
- E. The District and/or Town/County may order the suspension of construction operations which create water pollution if the Contractor fails to conform to the requirements of this section - Storm Water Pollution Control, as determined by the District. No extension of time and no delay charges shall result from such suspension by the District and/or Town/County.

- F. If the District and/or City/County identify a deficiency in the deployment or functioning of an identified control measure, the deficiency shall be corrected by the Contractor immediately, or by a later date and time if requested by the Contractor and approved by the District and/or City/County in writing, but not later than the onset of subsequent precipitation events. The correction of deficiencies shall be at no additional cost to the District.
- G. Contractor will be responsible for paying any fines that be levied by the Water Board (or other agency) as results of the Contractor's work.
- H. Nothing in the terms of the Contract nor in the Standard Specifications in this Section shall relieve the Contractor of the responsibility for compliance with Section 5650 and 12015 of the Fish and Game Code, or other applicable statutes relating to prevention or abatement of water pollution.
- I. Contractor shall provide a designated area to clean and wash concrete from equipment during any concrete work on this project. Area shall be lined to prevent any run-off. Concrete residual shall be properly disposed.
- J. After every rainfall, Contractor shall inspect and replace any damaged BMP's. Any replacement of BMP's shall be paid in various bid items. Work shall include cleaning and properly disposing debris from the inlets. Every inlet needs to be free from obstruction and sediments.
- K. Conformance with the requirements of this section - Storm Water Pollution Control, shall not relieve the applicant and their Contractor from the responsibilities, as provided in Sections 5-1.36 - Property and Facility Preservation, 7-1.05 - Indemnification, and 7-1.06 - Insurance, of the Standard Specifications.

**END OF SECTION**

## **SECTION 01 70 00 - PROJECT CLOSEOUT**

### **PART 1 GENERAL**

#### **1.01 SCOPE OF WORK**

- A. Work included under this section consists of conforming to the job completion-related requirements of other Standard Specifications Sections and of furnishing various materials needed to complete the project.

#### **1.02 SUBMITTALS**

- A. Tests
  - 1. Submit any test results done during the course of the work and not previously submitted in accordance with applicable sections of these Standard Specifications.
- B. Certificates and Guarantees
  - 1. Furnish all certificates and/or guarantees as required by individual Standard Specifications Sections and in accordance with applicable sections of these Standard Specifications.
- C. Record Drawings
  - 1. Furnish record drawings.
  - 2. Operation Manual
- D. Hardware
  - 1. Provide one (1) extra manway gasket and one (1) extra flush-clean out gasket per tank.

#### **1.03 INSPECTION**

- A. Final Inspection
  - 1. Submit written certification that project, or designated portion of project, is substantially complete, and request, in writing, a final inspection. The District will make an inspection within ten (10) days of receipt of the request.
  - 2. Should the District determine that the work is substantially complete, the District will prepare a punch list of deficiencies that do not preclude operation and use of the facility; however, final payment will be withheld until all deficiencies are corrected and all close-out requirements of the encroachment permits are met.
  - 3. Prior to the District accepting the project, the Contractor shall perform a final sweep using a regenerating air type street sweeper along the project limits 14 days after the paving and striping operations. Work shall be coordinated with the District inspector.
  - 4. Until receipt of a letter of final acceptance, the Contractor shall be responsible for the work.
- B. Post Construction Inspection

1. Prior to expiration of the performance bond, and approximately 23 months from date of final acceptance, the District will inspect project to determine whether corrective work is needed. The Contractor will be notified in writing of any deficiencies. The Contractor must begin corrective work on the noted deficiencies within 10 days after receipt of notification.

**PART 2 MATERIALS - NONE**

**PART 3 EXECUTION**

**3.01 CLEANING**

- A. Cleanup and cleaning shall be done in accordance with applicable sections of these Standard Specifications.

**END OF SECTION**

## **SECTION 02 41 00 - DEMOLITION**

### **PART 1 GENERAL**

#### **1.01 SUMMARY**

- A. Work shall consist of the demolition and removal of the existing water tank structures and appurtenances and objectionable material from the area designated to be excavated for the new water tanks as specified in the drawings and as directed by the District.
- B. Clearing and grubbing shall be performed in accordance with Sections 16-1.02, 16-1.03, and 16-1.04 of the Caltrans Specifications.

#### **1.02 SCOPE**

Contractor shall furnish all labor, materials, equipment, facilities and services to complete the work of clearing, demolition and related work as shown on the plans and as specified herein. The general extent of the clearing, demolition and removal is shown on the drawings and includes, but not necessarily limited to, the demolition and removal of the followings:

- A. Tree, grass and brushes including all roots
- B. Asphalt Concrete (AC)
- C. Concrete
  - 1. Beam
  - 2. Gutter
  - 3. Steps at the pump station
- D. Catch basin
- E. Chain link fence
- F. Wood fence
- G. Two (2) existing 0.1 MG tanks (North and South Tanks)
- H. Water main connections

#### **1.03 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with pertinent provisions of Section 01400.

#### **1.04 TANK AND CHEMICAL SHED PLAN**

- A. Contractor shall submit a tank demolition plan for review to include a full time "fire watch" personnel. Individual sole responsibility is to monitor possible flares during the demolition and will be equipped with fire hose and fire extinguisher. Water tank trailer must be in operation while the torching or welding is going on.

- B. Site clearing should include removal of deleterious materials, debris, obstructions that are designated for removal. Depressions, voids and holes that extend below proposed finish grade should be cleaned and backfilled with engineered fill compacted to the recommendations in this report.

Excavations for this project will include excavation to remove existing underground facilities designated for removal, general cuts to achieve design grades, sub-excavation of soft and disturbed soil under the areas of the existing tanks, trenching for underground utilities, and foundation excavations.

## **PART 2 PRODUCTS**

### **2.01 SOIL MATERIALS**

- A. Fill and backfill materials:
  - 1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2-3/8" in their greatest dimension.
- B. Fill material is subject to the approval of the construction soil District. Material removed from excavations or imported from off-site borrow areas that is to be used as fill material shall be predominantly granular non-expansive soils, free from roots and other deleterious matter.
- C. Fill material shall not have rocks having a dimension greater than 1" in the upper 12" of fill or embankment.
- D. Cohesionless material used for structural backfill: Provide sand free from organic material and other foreign matter, and as approved by the construction soil engineer.

### **2.02 WEED KILLER**

- A. Provide a dry, free-flowing, dust-free chemical compound, soluble in water, capable of inhibiting growth of vegetation, and approved for use on this Work by governmental agencies having jurisdiction.

### **2.03 TOPSOIL**

- A. Where and if shown on the Drawings or otherwise required, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and reasonably free from subsoils, roots, heavy or stiff clay, stones larger than 1" in greatest dimension, noxious weeds, sticks, brush, litter and other deleterious matter.
- B. Obtain topsoil from sources within the project limits, or provide imported topsoil obtained from sources outside the project limits, or from both sources.

## **PART 3 PART 3 – EXECUTION**

### **3.01 SURFACE CONDITIONS**



- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

### **3.02 PROCEDURES**

#### **A. Utilities:**

1. Unless shown to be removed, protect active utility line shown on the Drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost at the Owner.
4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the District and secure instructions.
5. Do not proceed with permanent relocation of utilities until written instructions are received from the District.

#### **B. Protection of persons and property:**

1. Barricade open holes and depressions occurring as part of this work, and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.
4. Contractor shall use care protecting the pump station while removing the concrete steps.
5. Any damage sustain during the removal of the concrete steps shall be repaired to the satisfaction of the District and shall be included in this bid item.
6. Contractor shall use care in protecting the North Tank during demolition of the South Tank.

#### **C. Dewatering:**

1. Remove all water, including rain water, encountered during trench and substructure work to an approved location by pumps, drains, and other approved methods.
2. Keep excavations and site construction area free from water.

- D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and other work being performed on or near the site.

- E. Maintain access to adjacent areas at all times.

### **3.03 EXCAVATING**

- A. Perform excavating of every type of material encountered within the limits of the work to the lines, grades, and elevations indicated and specified herein.
- B. Satisfactory excavated materials:
- C. Transport to, and place in, fill or embankment areas within the limits of the work.
- D. Unsatisfactory excavated materials:
  - 1. Excavate to a distance below grade as directed by the construction soil engineer, and replace with satisfactory materials.
  - 2. Include excavation of unsatisfactory materials, and replacement by satisfactory materials, as parts of the work of the Section.
- E. Surplus materials:
  - 1. Dispose of unsatisfactory excavated materials and surplus satisfactory excavated materials away from the site at disposal areas arranged and paid for by the Contractor.
  - 2. Excavation of rock:

Where rocks, boulders, granite, or similar material is encountered, and where such material cannot be removed or excavated by conventional earth moving or ripping equipment, take required steps to proceed with the general grading operations of the work, and remove or excavate such material by means which will neither cause additional cost to the City nor endanger buildings or structures whether on or off the site.
  - 3. Do not use explosives without written permission from the District.
- F. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.
- G. Ditches and gutters:
  - 1. Cut accurately to the cross sections, grades, and elevations shown.
  - 2. Maintain excavations free from detrimental quantities of leaves, sticks, trash and other debris until completion of the work.
  - 3. Dispose of excavated materials as shown on the Drawings or directed by the construction soil engineer; except do not, in any case, deposit materials less than 3'-0" from the edge of a ditch.
- H. Unauthorized excavation:
  - 1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from the District or the construction soil engineer.
  - 2. Under footings, foundations, or retaining walls:

3. Fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering the required top elevation.
  4. When acceptable to the construction soil engineer, lean concrete fill may be used to bring bottom elevations to proper position.
  5. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the construction soil engineer.
- I. Stability of excavations:
1. Slope sides of excavations to 1:1 or flatter, unless otherwise directed by construction soil engineer.
  2. Shore and brace where sloping is not possible because of space restriction for stability of the materials being excavated.
  3. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- J. Shoring and bracing:
1. Provide materials for shoring and bracing as may be necessary for safety of personnel, protection of work, and compliance with requirements of governmental agencies having jurisdiction.
  2. Maintain shoring and bracing in excavations regardless of the time period excavations will be open.
  3. Carry shoring and bracing down as excavation progresses.

### **3.04 FILLING AND BACKFILLING**

- A. Backfill excavations as promptly as progress of the work permits, but not until:
1. Acceptance of construction below finish grade;
  2. Inspecting, testing, approving, and recording locations of underground utilities;
  3. Concrete formwork is removed;
  4. Shoring and bracing are removed, and voids have been backfilled with satisfactory materials;
  5. Trash and debris have been removed; and
  6. Horizontal bracing is in place on horizontally supported walls.
- B. Ground surface preparations:
1. Remove vegetation, debris, unsatisfactory soil materials, obstructions and deleterious materials from the ground surface prior to placement of fills.
  2. Plow, strip, or break up surfaces steeper than one vertical to four horizontal, so that fill material will bond with existing surface.

3. When the existing ground surface has a density less than that specified under "Compacting", break up the ground surface, pulverize, moisture condition to the optimum moisture content, and compact to required depth and percentage of maximum dry density.
4. At exposed soils in areas to be paved, scarify to minimum depth of 6" and re-compact at a moisture content slightly above optimum that will permit proper compaction as specified for fill.

C. Placing and compacting:

1. Place backfill and fill materials in layers not more than 8" in loose depth.
2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
3. Compact each layer to required percentage of maximum dry density for the area.
4. Do not place backfill or fill material on surfaces that are muddy, frozen or containing frost or ice.
5. Place backfill and fill materials evenly adjacent to structures until the required elevations is achieved.
6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structures to approximately the same elevation in each lift.

### **3.05 GRADING**

A. General:

1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
2. Smooth the finished surfaces within specified tolerance.
3. Compact with uniform levels or slopes between points where elevations are shown on the Drawings, or between such points and existing grades.
4. Where a change of slope is indicated on the Drawings, construct a rolled transition section having a minimum radius of approximately 8'-0", unless adjacent construction will not permit such a transition, or if such a transition defeats positive control of drainage.

- B. Grading outside building lines:
  - 1. Grade areas adjacent to buildings to achieve drainage away from the structures, and to prevent pounding.
  - 2. Finish the surfaces to be free from irregular surface changes, and:

Shape the surfaces of areas scheduled to be under walks to line, grade, and cross-section, with finished surface not more than 0.10 ft above or below the required sub-grade elevation.

Shape the surface of areas scheduled to be under pavement to line, grade and cross-section with surface not more than 0.05ft above or below the required sub-grade elevation.

### **3.06 COMPACTING**

- A. Control soil compaction during construction to provide the required percentage of density specified for each area as determined according to ASTM D1557.
- B. Provide not less than the following maximum dry density of soil material compacted at optimum moisture content for the actual density of each layer of soil material in place, and as approved by the construction soil engineer.

- 1. Structures:

- 1. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum dry density.
- 2. Lawn and unpaved areas:
- 3. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% maximum dry density.
- 4. Compact the upper 12" of filled areas and natural soils exposed by excavating, at 85% of maximum dry density.

- 5. Walks:

Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum dry density.

- 6. Pavement:

Compact the top 8" of subgrade and each layer of fill material or backfill material at 95% of maximum dry density.

## 7. Tank

Engineered fill should be placed on soil subgrades that are prepared as recommended in this report. Engineered fill should be placed in horizontal lifts each not exceeding 8" thickness and mechanically compacted to the recommendations below at the recommended moisture content. Relative compaction or compaction is defined as the in-place dry density of the compacted soil divided by the laboratory maximum dry density as determined by ASTM Test Method D1557, latest edition, expressed as a percentage.

Moisture conditioning of soils should consist of adding water to the soils if they are too dry and allowing the soils to dry if they are too wet. Engineered fills consisting of on-site soils and imported soils should be compacted to a minimum of 90 percent relative compaction with moisture content between about 1 and 3 percent above the laboratory optimum value. In pavement areas, the upper 12" of subgrade soil and the full section of aggregate base should be compacted to a minimum of 95 percent relative compaction with moisture content slightly above the optimum value. Aggregate base in vehicle pavement areas should be compacted at slightly above the optimum moisture content to a minimum of 95 percent relative compaction.

## 8. Foundations

The replacement tanks be supported by reinforced concrete ring foundations bearing directly on competent, undisturbed Franciscan bedrock, which was encountered in our borings between approximately 4.7 and 5.5 feet below the existing ground surface. With this depth, the ring foundation may be designed to impose an allowable bearing pressure of 9,000 pounds per square foot. This value may be increased by 1/3 when designing for transient loads, such as wind and seismic loading. The ring footings should be embedded at least 5 feet below pad grade or lowest adjacent grade, whichever provides a deeper embedment. We recommend using Site Class C (Very dense soil and soft rock).

Ring walls should be reinforced to resist hoop stresses within the foundations. Hoop stresses may be calculated by assuming an outward lateral pressure equal to one-half the vertical pressure acting on the adjacent subgrade inside the ring wall.

Concrete should be placed only in excavations that are clean and free of loose soil and debris. All foundation excavations should be observed by a member of our staff to verify that adequate foundation bearing soils have been reached.

Soil resistance to lateral loads for the foundation will be provided by a combination of frictional resistance between the bottom of the footing and underlying soils and by passive pressures acting against the embedded sides of the footing. For frictional resistance, an ultimate coefficient of friction of 0.40 may be used for design. In addition, an ultimate passive lateral bearing pressure equal to an equivalent fluid pressure of 400 pcf may be used, provided the footings are poured tight against undisturbed competent bedrock. These values may be used in combination without reduction. The passive pressure can be assumed to act from the top of the lowest adjacent grade if the ring foundation is surrounded by pavements or concrete or at a depth of 1 foot below grade in unpaved areas. Total post-construction settlement of the tank foundation is expected to be less than 1/2".

Ring foundations should be constructed and backfilled in consideration of the tank manufacturer's specifications.

C. Moisture control:

Where subgrade or fill material must be moisture-conditioned before compacting, uniformly apply water to surface of soil material to prevent free water appearing on surface during or subsequent to compacting operations.

Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.

Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the construction soil engineer.

### **3.07 FIELD QUALITY CONTROL**

- A. Secure the construction soil engineer's inspection and approval of subgrades and fill layers before subsequent construction is permitted thereon.
- B. Provide at least the following tests to the approval of the construction soil District:
  - 1. At paved areas, at least one field density test for every 2000 sq ft of paved area, but not less than the three tests;
  - 2. In each compacted fill layer, one field density test for every 2000 sq ft of overlaying paved area, but not less than three tests.
- C. If reports from the testing laboratory indicate that subgrade or fills have been placed below specified density, provide additional compacting and testing under the provisions of Section 01010 - Sub Section 1.08.

### **3.08 MAINTENANCE**

- A. Protection of newly graded areas:
  - 1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds;
  - 2. Repair and reestablish grades in settled, eroded, and rutted areas to the specified tolerances.
- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.

### **3.09 CERTIFICATION**

- A. Upon completion of this portion of the work, and as condition of its acceptance, delivery to the Engineer a written report from the construction soil engineer certifying that the compaction

requirements have been obtained. State in the report the area of fill placement, the compaction density and moisture content obtained, and the type of classification of fill material placed.

**END OF SECTION**



## **SECTION 02 41 13 - ABANDONMENT OF EXISTING WATER MAIN AND FACILITIES**

### **PART 1 GENERAL**

#### **1.01 SCOPE OF WORK**

- A. Work included under this section consists of furnishing all necessary labor, materials, tools, equipment, and services necessary to abandon existing water main facilities as specified herein.
- B. Where indicated on the plans, existing water mains and valves shall be abandoned after completion and acceptance of the work.

### **PART 2 MATERIALS**

#### **2.01 AGGREGATE BASE**

- A. Aggregate base shall be as specified in Section 31 80 00 - Trench Excavation, Bedding and Backfill".

#### **2.02 PAVEMENT REPLACEMENT**

- A. Paving replacement materials and methods shall be as specified in Section 32 10 00 - Paving, Restoration and Resurfacing Work.

### **PART 3 EXECUTION**

#### **3.01 ABANDONMENT OF EXISTING WATER MAIN & FACILITIES**

- A. The procedure described herein shall apply, as applicable, to all water mains and appurtenances designated for abandonment.
  - 1. This work shall not be done until the new water main has been successfully tested and is in operation. All work shall be coordinated with the District.
  - 2. Remove existing fire hydrants by cutting 18-inches below grade and concrete cap the pipe as shown on the plans after new hydrant assemblies have been installed and tested. Deliver the removed hydrants to the District's corporation yard. Stand pipes shall become the property of the Contractor. Remove any hydrant marker posts for abandoned hydrants.
  - 3. Remove valve boxes (but not extensions of those boxes) and covers on valves located on mains, and fire hydrant runs, to be abandoned. Remove any valve marker posts for abandoned valves.
  - 4. Remove existing meters and their respective boxes. Meters are to be delivered to the District's corporation yard. The abandonment and removal of the existing meter box shall include removal of the angle meter stop and crimping the copper line within 2-feet of the meter box.
  - 5. Services on live water mains shall be abandoned at the water main by installing a Smith-Blair stainless steel clamp as directed by District.
  - 6. At the discretion of the District, the existing meter boxes, angle meter stops, and copper segments shall be salvaged and delivered to the District's yard.

7. The new meter box for the service and/or PRV shall be installed after the abandonment and removal of the existing copper line and angle meter stop.
  8. At the discretion of the District, the existing meter boxes, angle meter stops, and copper segments shall be salvaged and delivered to the District's yard.
  9. All other appurtenances within the box such as the angle meter stop and copper piping after abandonment shall be delivered to the District's yard at the same time as the salvaged meter boxes.
  10. Cut, drain, and plug both ends of all existing mains and tees that are to be abandoned. The existing water main shall be drained until no water is visible within the pipe. Mains shall be plugged or capped with fittings approved by District.
  11. Backfill shall be in accordance with Section 31 80 00 - Trench Excavation, Bedding and Backfill.
  12. Restore paved surface as specified in Section 32 10 00 - Paving, Restoration and Resurfacing Work.
  13. All abandoned facilities shall be water-tight.
  14. Contractor shall use due care when working with asbestos cement pipe and shall comply with all applicable laws and regulations regarding such work. When cutting asbestos cement pipe, Contractor shall ensure that adequate means are used to protect its workers and the environment against asbestos exposure. Asbestos cement pipe shall not be cut with a saw or comparable dust-generating tool, unless adequate encapsulation is provided. Asbestos cement pipe removed by the Contractor's operations shall become his property and be properly bagged and disposed of in an approved manner as required by federal, state, and local regulations.
- B. The procedure described herein shall apply to tank abandonment.
1. Contractor shall have a full time fire watch during any torching or welding of the tank.
- C. The procedure described herein shall apply, as applicable, to all water mains and appurtenances designated for abandonment.

**END OF SECTION**

## **SECTION 03 11 00 – CONCRETE FORM WORK**

### **PART 1 GENERAL**

#### **1.01 APPLICABLE SECTION**

- A. The requirements/provisions of the General and Supplementary Conditions and Division 1 Specification Section shall apply to this section.

#### **1.02 DESCRIPTION OF WORK**

- A. The work included under this section consists of furnishing all material, supplies, equipment, tools, transportation, and facilities, and performing all labor and services necessary for, required in connection with or properly incidental to furnishing, installing, and removing form work as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom, except as hereinafter specifically excluded.
- B. Work Included:
  - 1. Design of Formwork, Shoring and Falsework
  - 2. Construction and removal of all forms.
  - 3. Installation of items furnished under other sections but indicated therein to be installed under this section.
  - 4. Accuracy of installation is responsibility of section furnishing item.
- C. Related Work Specified Elsewhere:
  - 1. Structure Excavation and Backfill; Section 02220
  - 2. Concrete Reinforcement; Section 03200
  - 3. Cast-in-Place concrete; Section 03300

#### **1.03 REFERENCE STANDARDS**

- A. The following is a list of Reference Standards referred to in this portion of the Specification:
  - 1. W.C.L.I.B.; "Standard Grading and Dressing Rules No. 17"
  - 2. American Concrete Institute Standard ACI 347 "Guide to Formwork for Concrete" and ACI 318 "Building Code Requirements for Reinforced Concrete", Latest edition.
  - 3. California Building Code, current governing edition.
  - 4. American Plywood Association, "U.S. Product Standard PS1-07"

#### **1.04 QUALITY ASSURANCE**

- A. Codes and Standards: Comply with all Federal, State and Local Codes and Safety Regulations. In addition, comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified.
  - 1. California Building Code, current governing edition.

2. ACI-347 "Guide to Formwork for Concrete", current edition.
3. State of California Department of Transportation Standard Specifications, current governing edition.

## **1.05 SUBMITTALS**

- A. General Requirements
  1. Submittals shall be made to the Engineer in accordance with the requirements of Division 1, General Requirements of these specifications.
  2. Construction, and fabrication or ordering of materials for formwork shall not begin until Contractor has received submittals reviewed by the Engineer governing all aspects of the intended work as required in these specifications.
- B. Shop Drawings:
  1. Formwork: Submit shop drawings for fabrication and erection of forms for portions of the concrete surfaces, as indicated below:
    - a. Show general construction of forms including size of members, bracing, jointing, special form joint or reveals, location and pattern of form tie placement, and other items that affect the structural integrity of formwork or exposed concrete visually.

## **1.06 SEQUENCING AND SCHEDULING**

- A. The Contractor shall obtain information and instructions from other trades and suppliers in ample time to schedule and coordinate the installation of items furnished by them to be embedded in concrete.

## **PART 2 PRODUCTS**

### **2.01 FORMS**

- A. Plywood shall be 5/8" Exterior "B.B." Plyform Class I. Each sheet shall be grade stamped with an APA stamp.
- B. Sheathing shall be Douglas Fir "Standard" grade per Grading Rules #17, W.C.L.I.B., Paragraph 118-c. 1x6 shiplap S4S.
- C. Hardboard shall be 1/8" tempered.

### **2.02 SPREADERS**

- D. Spreaders shall be of metal type that will give positive tying and accurate spreading.

### **2.03 STUDS, WALES AND SHORING**

- E. Studs, wales, and shoring shall be Douglas Fir "Construction" grade per Grading Rules #17, W.C.L.I.B. Paragraph 122-b or "No. 2" grade, Paragraph 123-c.

## **2.04 MANUFACTURED ASSEMBLIES**

- F. Manufactured assemblies may be used as forms provided that maximum loadings and deflections used on jacks, brackets, columns, joists and other manufacturer devices does not exceed the manufacturer's recommendations.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. Furnish and install all forms, clamps, accessories, etc., required for all poured-in-place concrete below grade and unexposed portions above grade. Where sides of excavations have been cut neat and accurate to size for pouring of concrete directly against the excavation, forms for footings will not be required.
- B. Furnish and install all forms, clamps, sealer, accessories, etc., required for all poured-in-place concrete above grade that will be exposed.
- C. Provide crack control and keyed cold joint forms.

### **3.02 DESIGN AND CONSTRUCTION OF FORMWORK**

- A. Forms shall be constructed of sound material, of the correct shape and dimension, mortar tight, and of sufficient strength, and so braced and tied together that the movement of equipment, men, materials, or placing and vibrating the concrete will not throw them out of line or position. Construct so that they may be easily removed without damage to the concrete. Any movement or bulging of forms during construction shall be considered just cause for their removal and, in addition, the concrete work so affected. All formed joints on concrete surfaces to be exposed shall be taped and shall align so joints will not be apparent on the concrete surfaces. All dirt, chips, sawdust and other foreign matter shall be completely removed before concrete is placed.
- B. Before concrete is placed in forms, all inside surfaces of the forms shall be thoroughly coated with an approved form sealer. The form sealer shall be of high penetrating quality leaving no film on the surface of the forms that can be absorbed by the concrete.
- C. Form supports shall be placed on adequate foundations and have sufficient strength and bracing to prevent settlement or distortion from the weight of the concrete or other cause. Support shall rest on double wedged shim, or other approved means, so that the forms will be maintained at the proper grade.
- D. Form Ties: Bolts, rods, or other approved devices shall be used for internal form ties and shall be of sufficient quantities to prevent spreading of the forms. The ties shall be placed at least 1 inch away from the finished surface of the concrete. The use of ties consisting of twisted wire loop will not be permitted. Bolts and rods that are to be completely withdrawn shall be coated with grease.

- E. The use of concrete slabs-on-grade are anticipated for exterior walkways, driveways, pavements, chemical feed pad etc. Soil subgrade should be maintained in a moist condition prior to pouring the concrete slab.

To reduce the potential for cracking of the concrete slabs, we recommend that the slabs be a minimum of 5 inches thick. The slabs should include minimum reinforcement of #3 bars in both directions at 12-inch centers or #4 bars in both directions at 18-inch centers. The steel should be placed in the middle of the slab and should be held in place by dobie blocks or other suitable means. Actual dimensions and reinforcement should be determined by the project Structural Engineer. Even with the steel reinforcement and base rock, it should be recognized that some cracking and differential movement of the slabs will likely occur and should be expected. Exterior concrete slabs-on-grade should be cast free from adjacent footings or other nonheaving edge restraints. Construction and/or control joints should be provided in concrete slabs.

### **3.03 PLUMBING, LEVELING, REPAIRING AND MAINTAINING FORMS**

- A. Before concrete is placed in any form, the horizontal and vertical position of the form shall be carefully verified and all inaccuracies corrected. All wedging and bracing shall be completed in advance of placing of concrete.
- B. Boards or other form materials that have been damaged, checked or warped prior to placing of concrete shall be removed from the forms and replaced with approved materials or otherwise corrected to the satisfaction of the District.
- C. Assign a sufficient number of men to keep watch on and maintain the forms during placing of concrete. Satisfactorily remedy any displacement or looseness of forms or reinforcement before placing of concrete. No form shall be moved or altered except as may be specifically directed.

### **3.04 FIELD QUALITY CONTROL**

- A. The Contractor shall verify accuracy of items, furnished under other sections of these specifications and installed under this section.

### **3.05 REMOVAL OF FORMWORK, FALSEWORK AND SHORING**

- A. Formwork, falsework, and shoring shall not be removed until the concrete members have acquired sufficient strength to support their weight and the loads to be superimposed thereon safely.
- B. The contractor is solely responsible for the design, installation, and removal of temporary bracing and construction supports required to complete the project. No portion of the structure shall be considered to be self supporting until the entire vertical and lateral load resisting system is in place.
- C. Vertical forms shall remain on walls for at least seven (7) days.

- D. The Contractor shall request to have field cured compression test specimens taken for any concrete where it is planned to remove formwork, falsework, or shoring sooner than indicated above.
- E. In removing plywood forms, no metal pinch bars shall be used and special care to be taken in stripping. Start at top edge or vertical corner where it is possible to insert wooden wedges. Wedging shall be done gradually and shall be accompanied by light tapping of the plywood panels to crack them loose. Do not remove forms with a single jerk after it has been started at one end.
- F. Forms shall be left in place as long as possible to permit shrinkage away from concrete and plywood forms shall be left in place until all other forms around are stripped and until there is no danger of damaging the concrete due to other work in the vicinity.
- G. Nothing herein shall be construed as relieving the contractor of any responsibility of the safety of the structure.
- H. After stripping, properly protect all concrete to be exposed in the finish work from damage with boards and building paper to prevent staining, spoiled edges, chips, etc.
- I. Whenever the formwork is removed during the curing period, the exposed concrete shall be cured by one of the methods specified in Section 03300.

**3.06 CLEAN UP**

- A. Clean up shall be per special conditions. Failure to perform clean up within 24 hours notice by the District shall be considered adequate grounds for having the work done by others at the contractor's expense.

**END OF SECTION**

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## **SECTION 03 21 00 - REINFORCING STEEL**

### **PART 1 GENERAL**

#### **1.01 APPLICABLE SECTION**

- A. The requirements/provisions of the General and Supplementary Conditions and Division 1 Specification Section shall apply to this section.

#### **1.02 DESCRIPTION OF WORK**

- A. The work included under this section consists of furnishing all material, supplies, equipment, tools, transportation, and facilities, and performing all labor and services necessary for, required in connection with or properly incidental to furnishing and installing all reinforcing bars, ties, spacing devices, inserts, and all other material required to complete installation, as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom.
- B. Work Included:
  - 1. Fabricating and installing all reinforcing steel for cast in place concrete.
- C. Related Work Specified Elsewhere:
  - 1. Concrete Formwork; Section 03100
  - 2. Cast-in-Place Concrete; Section 03300

#### **1.03 REFERENCE STANDARDS**

- A. The following is a list of Reference Standards referred to in this portion of the specifications:
  - 1. ASTM A615, "Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement".
  - 2. ASTM A706, "Specification for Low Alloy Steel Deformed Bars for Concrete Reinforcement".

#### **1.04 QUALITY ASSURANCE**

- A. Codes and Standards: Comply with all applicable Federal, State and Local Code and Safety Regulations. In addition, comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
  - 1. ACI 315, "Details and Detailing of Concrete Reinforcement", latest edition.
  - 2. ACI 318, "Building Code Requirements of Reinforced Concrete", latest edition.
- B. Mill Certificates: The Contractor shall provide Mill Certificates for reinforcing steel in accordance with the requirements of Part 1.05, "Submittals" of this specification section. When Mill Certificates cannot be provided, laboratory test reports shall be provided in accordance with the requirements of Part 1.05, "Submittals" of this specification section.

C. Sampling, Testing, and Inspection:

1. General

- a. All materials and work shall be subject to inspection at the mill, the fabrication shop, and at the building site. Material or workmanship not complying fully with the drawings, and/or specifications will be rejected.
- b. If the District's agent, through oversight or otherwise, has accepted material or work which is defective or contrary to specifications, this material or work, regardless of state of completion, may be rejected.

2. District: The District shall employ an independent testing laboratory or the Engineer as the District's agent to perform the sampling, testing and inspections shown on the contract drawings, and submit certified test results.

3. Contractor:

- c. The Contractor shall cooperate with and notify District's agent at least 48 hours in advance of inspections required and shall provide samples, test pieces, and facilities for inspection without extra charge.
- d. The Contractor shall identify each lot of fabricated reinforcing steel to be shipped to the site by assigning an individual lot number that identifies steel by heat number and shall be tagged in such a manner that each such lot can be accurately identified at the job site.
- e. The Contractor shall remove all unidentified reinforcing steel, anchorage assemblies and bar couplers received at the site.

**1.05 SUBMITTALS**

A. General Requirements:

1. Submittals shall be made to the District in accordance with the requirements of Division 1 and the, General Requirements of these specifications.
2. Construction, fabrication, or ordering of materials shall not begin until Contractor has received submittals reviewed by the District governing all aspects of the intended work.

B. Shop Drawings:

1. Shop Drawings shall be submitted that show diagrammatic elevations of all footings, slabs, etc., at a scale sufficiently large to show clearly the positions and erection marks of reinforcing bars, their dowels, and splices.
2. Use same bar marks on diagrammatic elevations as used on the bar schedule.
3. Shop drawings shall also show details for congested areas and connections.
4. Shop Drawings used in field must be reviewed copies.
5. Contract drawings shall not be reproduced in whole or in part. Contract drawings modified into shop drawings will be returned without review.

- C. Product Data: Manufacturer's catalog sheets including instructions for use and description of application shall be provided on each of the following items intended for use on project:
  - 1. Mechanical anchorage devices for butt splices.
- D. Mill Certificates:
  - 1. The Contractor shall provide Mill Certificates for each size of bar for each heat to be used on project.
  - 2. Mill Certificates shall include name of mill, date of rolling, date of shipping to fabricator and shall be signed by fabricator certifying that each material complies with or exceeds the specified requirements. A Mill Certificate shall be furnished with each lot of material delivered to the project and the lot shall be clearly identified in the Certificate.
  - 3. When Mill Certificates cannot be provided, the Contractor shall hire a professional testing laboratory to verify compliance and provide laboratory test reports. The Contractor shall pay for the cost of testing.
- E. Laboratory Test Reports:
  - 1. Laboratory test reports shall show the name of testing agency; date of testing, types of tests performed and shall be signed by a principal of the testing agency who is a registered Civil Engineer in the State of California.
  - 2. When required by other portions of these specifications, laboratory test reports shall be submitted for each size of bar tested for each heat to show compliance with appropriate ASTM Standards and these specifications.

#### **1.06 STORAGE OF MATERIALS**

- A. Store reinforcement during fabrication and at site to avoid excessive rusting or coating with grease, oil, dirt, or other objectionable materials.

#### **1.07 SEQUENCING AND SCHEDULING**

- A. Coordinate work with all trades so as not to interfere with the work of other trades. Bring interferences between trades to the District's attention and resolve before any concrete is placed.

### **PART 2 PRODUCTS**

#### **2.01 REINFORCING BARS**

- A. Bars for reinforcement not noted above shall be deformed, intermediate grade steel conforming to the requirements of ASTM A615, Grade 60 or ASTM A706, Grade 60.

#### **2.02 MECHANICAL COUPLING DEVICES**

- A. Mechanical coupling devices shall develop 125 percent of the minimum yield strength of the bars spliced.

## **2.03 OTHER MATERIALS**

- A. All other materials, not specifically described by these specifications but required for complete and proper placement of reinforcement shall be new, first quality of their respective kinds, and subject to the approval of the Structural Engineer.

## **PART 3 EXECUTION**

### **3.01 EXISTING CONDITIONS**

- A. Prior to all work of the section, carefully inspect the installed work of other trades and verify that all work is sufficiently complete to permit the start of work under this section and that the completed work of this section will be in complete accordance with the original design and the reviewed shop drawings. In the event of discrepancy, immediately notify the Engineer in writing.
- B. In the event conduits, pipes, inserts, sleeves, or any other items interfere with placing the reinforcement as indicated on the drawings or approved shop drawings, or as otherwise required, immediately notify the Engineer and obtain approval on procedure before placement of reinforcement is started.

### **3.02 BENDING**

- A. Bends for reinforcing steel shall be made in accordance with ACI 318 latest edition. Bend all bars cold. Do not field bend reinforcing steel in a manner that will injure material, cause the bars to be bent on too tight a radius, or that is not indicated as allowed on drawings or permitted by Engineer. Do not straighten bent or kinked bars for use on project without permission of Engineer. Replace bars with kinks or bends not shown on the drawings.

### **3.03 PLACING**

- A. All reinforcement shall be placed in strict conformity with the requirements of the engineering drawings, both as to location, position and spacing of members. It shall be supported and secured against displacement by the use of adequate and proper wire supporting and spacing devices, tie wires, etc. so that it will remain in its proper position in the finished structure.
- B. Preserve clear space between parallel bars of not less than 1 1/2 times the nominal diameter of round bars and in no case let the clear distance be less than 1 1/2 inches nor less than 1-1/3 times the maximum size of aggregate for concrete. Bars placed in shotcrete shall have a minimum clearance between bars of 2 1/2" for No. 5 and smaller and 6 bar diameters for bars larger than No. 5.
- C. Lap splices shall be contact lap splices in accordance with ACI 318 unless noted otherwise on the Contract Drawings. Bars shall be wired together at laps. Wherever possible, stagger splices in adjacent bars. Make all splices in wire fabric at least 1 1/2 meshes wide or 12", which ever is greater. When splicing in areas to receive shotcrete, lap splices shall be non-contact with at least 2" clearance between bars.
- D. Butt splices shall be accomplished by mechanical anchorage devices.
  - 1. No tie wire shall remain within 1.5 inches of the surface of the concrete.

**3.04 CLEANING REINFORCEMENT**

- A. Take all means necessary to ensure that steel reinforcement, at the time concrete is placed around it, is completely free from rust, dirt, loose mill scale, oil, paint and all coatings which will destroy or reduce the bond between steel and concrete.

**3.05 FIELD QUALITY CONTROL**

- A. Inspection: The District's agent will perform the inspections shown on the contract drawings.

**END OF SECTION**

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## **SECTION 03 30 00 – SITE CONCRETE**

### **PART 1 GENERAL**

#### **1.01 SCOPE**

- A. Furnish and install all concrete as shown and specified. This work includes, but is not necessarily limited to concrete bands, forms, reinforcing, and miscellaneous items.

#### **1.02 STANDARDS**

- A. Unless otherwise shown or specified, all materials and methods shall conform to the appropriate current sections of:
  1. The State of California, Department of Transportation Standard Specifications (DTSS) sections 40, 52, 73 and 90 except for measurement and payment requirements.
  2. Applicable ASTM Specifications as they reasonably apply to this work, except for measurement and payment requirements.
  3. American Concrete Institute (ACI), current standards.

#### **1.03 TOLERANCES**

- A. Tolerances for subgrade, subbase and finished grade shall be as specified by DTSS except that Contractor shall deliver the full aggregate base and concrete thickness shown. No combination of high and low tolerances that compromise the section will be permitted.
- B. Concrete Final Finishes: The Contractor shall demonstrate to the satisfaction of the District and the District that he, or his subcontractor, possesses sufficient skills and experience to perform the work. Photographs and/or site visits of past work may be required to supply this information. A 4 L.F. sample of the concrete band shall be poured and finished at the site for District prior to commencing concrete pouring. Once the samples have been reviewed, the Contractor shall meet or exceed that quality of finish in all subsequent work. Contractor shall be responsible for removal of the samples at the completion of the work.
- C. Submittals: The following shall be submitted by the Contractor to the Engineer in accordance with the applicable portions of the referenced specifications:
  1. The proposed mix design, giving the brand of cement, type, gradations and source of aggregates, water/cement ratio, mix proportions, and unit weight.
  2. Manufacturer's literature for admixtures, embedded items, liquid membrane-form curing compound and non-shrink grout.
  3. Certification that materials are in compliance with specification requirements.
  4. Method of transporting and placing concrete.

## **1.04 JOB CONDITIONS**

- A. Weather Limitations: Construct concrete surface course only when atmospheric temperature is above 40 degrees F., when the underlying base is dry, and when weather is not rainy.
- B. Grade Control: Establish and maintain the required lines and grades, including cross-slope during construction operations. All concrete shall slope to drain with no ponding of water.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Forms and Reinforcing: Per section 52.
- B. Concrete: All concrete structures shall conform to Sections 40 and 90 of the DTSS "Concrete Pavement" and "Concrete".
  - 1. Cement: Type II modified conforming to ASTM-C-150-02a.
  - 2. Aggregate: Shall not be less than 3/8" or more than 1 inch in size.
  - 3. Compression strength at 28 days to be a minimum 3,000 p.s.i.
- C. Color Admixture:
  - 1. For concrete band, add Hi-con black at a rate of 1/8 lb. per sack
- D. Expansion Joint Filler: Homex 300, 3/8" thick, fiber expansion joint filler. Available through Pacific Supply Co., (415) 258-1010, conforming to ASTM D1757. Maximum spacing of joints in concrete bands is fifteen feet unless noted otherwise.
- E. Cleaning Agents: As required.
- F. Aggregate Base: Class II per (DTSS Section 26-1.02B).

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Clear area to be paved of all debris and organic material. Recompact and regrade as necessary prior to placement of concrete. Verify that the subgrade and/or aggregate base is properly compacted and at suitable grade.
- B. Before beginning paving work and during construction, take all steps necessary for protection of existing improvements. As the concrete is being placed, extreme care shall be taken not to discolor or damage any improvements. If damage occurs, repair same, and if satisfactory repair cannot be made, remove and replace the section as directed.
- C. Formwork and Reinforcement:
  - 1. Assure that excavations and formwork are completed.
  - 2. Check that reinforcement is secured in place.



3. Verify that expansion joint material, anchors, and other embedded items are secured in position.

### **3.02 INSTALLATION**

#### **A. Finishes**

1. Broom Finish: Provide a light broom finish with strokes perpendicular to direction of travel along driveway.

- B. CLEAN UP: Upon completion of the work under this section, remove immediately all surplus materials, rubbish, and equipment associated with or used in the performance of this work.

**END OF SECTION**

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## **SECTION 03 31 00 - CAST-IN-PLACE CONCRETE**

### **PART 1 GENERAL**

#### **1.01 SCOPE OF WORK**

- A. Work included under this section consists of furnishing and installing all materials, supplies, equipment, tools, transportation, and facilities, and performing all labor and services necessary to construct steel reservoir footings and tank shed and required in connection with, or properly incidental to furnishing and installing cast-in-place concrete work as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom except as hereinafter specifically excluded.
- B. Defective Work
  - 1. Work considered to be defective may be ordered by the District to be replaced in which case the Contractor shall remove and replace the defective work at their expense.
- C. Applicable Standards
  - 1. All concrete shall be mixed, delivered, placed, finished, and cured in accordance with Sections 51 - Concrete Structures, and Section 90 - Concrete, of the latest requirements of Caltrans Standard Specifications, and with American Concrete Institute (ACI) 301-11 - Standard Specifications for Structural Concrete.

#### **1.02 SUBMITTALS**

- A. The Contractor shall make submittals for the following as required by Section 01 33 00 Submittals.
  - 1. Mix Designs in compliance with ACI and Caltrans procedures for each class of concrete on the project, and shall show names and brands of all materials, proportions, slump, strength, gradations of coarse and fine aggregates, and location to be used.
  - 2. Manufacturer's data including catalog cuts, drawings, and samples, and letters of compliance as appropriate for epoxies, grout, admixtures, curing compounds, chemical hardeners, moisture barriers, water stops and other items as referenced elsewhere.
  - 3. Shop Drawings and mill certificates for reinforcing steel that show diagrammatic elevations of all walls, footings, columns, beams, slabs, etc. at a scale sufficiently large enough to show clearly the positions and erection marks of reinforcing bars, their dowels, and splices. Shop drawings shall show details for congested areas and connections. Contract drawings shall not be reproduced in whole or in part. Contract drawings modified into shop drawings will be returned without review.
  - 4. Concrete placement schedule which shall show all proposed construction joint locations, limits of each placement sequence, order of placement, any type of joint at each joint location.
  - 5. Supplier of concrete and ready-mix grout.

6. Source of fine and coarse aggregate.
7. Concrete admixtures.
8. Curing Compound
9. Mill test for cement and pozzolan.

B. Approval of Testing Agencies and Reports

1. Any laboratory where testing of materials is to be performed shall receive prior approval from the District. Documentary evidence, satisfactory to the District, that the material has passed the required inspection and testing must be furnished prior to the incorporation of such materials in the work, and rejected materials must be promptly removed from the premises. Lab reports shall show the name of the testing agency, date of testing, types of tests performed, and shall be signed by a principal of the testing agency who is a licensed Civil Engineer in the State of California.

## **PART 2 MATERIALS**

### **2.01 FORMWORK**

- A. Plywood formwork shall be 5/8" plywood, Exterior Type, DFPA Grade "Concrete Form Exterior", or better.

### **2.02 PORTLAND CEMENT**

- A. Portland cement shall conform to ASTM C150 for Type II cement, or Type II-V modified for corrosive environments. Use one standard brand throughout all work.
  1. Fly ash shall conform to ASTM C618 for Class F fly ash. Fly ash percentages shall conform to the latest requirements of Caltrans Standard Specifications.

### **2.03 ADDITIVES**

- A. Water reducing additive shall conform to ASTM C-494 Type A
- B. Water reducing and retarding shall conform to ASTM C-494 Type D
- C. Retarding shall conform to ASTM C-494 Type B

### **2.04 CONCRETE AGGREGATES**

- A. Concrete aggregates shall conform to Section 90 - Concrete of the latest requirements of Caltrans Standard Specifications, dated 2010, for hardrock concrete aggregates.

### **2.05 WATER**

- A. Water shall be clean and free from deleterious amounts of acids, alkalies, or organic materials.

## **2.06 CONCRETE**

- A. All structures, minor structures, foundations, and slabs shall be constructed of concrete as specified in Section 51 - Concrete Structures, of the latest requirements of Caltrans Standard Specifications and shall develop a minimum compressive strength of 4,000 psi for the tank foundation at 28 days and 3,600 psi for other components. Thrust blocks and incidental concrete used for underground piping applications shall be Minor concrete. If backfill occurs same day, high early strength concrete shall be used.
  - 1. For the tank foundation, Contractor shall wait until the 5-day compression results before any kind of load is applied. A minimum of 85% of the 28<sup>th</sup> day design strength must be reached before any load is applied.
- B. The maximum water-cement ratio shall be 0.45. If a pozzolan is used in the concrete, the maximum water-cement plus pozzolan ratio shall be 0.45.
- C. The slump shall be 3-inches for tank foundation.

## **2.07 CONTROLLED DENSITY FILL**

- A. Controlled density fill shall consist of a fluid, workable mixture of aggregate, cement, and water. The aggregate cement and water shall be proportioned by weight. 188 pounds of cement (2-sack) shall be used for each cubic yard of material. The water content shall be sufficient to produce a fluid, workable mix that will flow and can be pumped without segregation of the aggregate while being placed.
- B. The 2-sack mix should have a 28-day compressive strength of no more than 300 psi. The aggregate (sand) should conform to ASTM C33 (for gradation), and should have a Sand Equivalent of no less than 75.

## **2.08 BARS**

- A. Bars for reinforcing shall be deformed, domestic steel bars conforming to ASTM A706, Grade 60, except that for Minor structures as defined in the latest requirements of Caltrans Standard Specifications, ASTM A615, Grade 60 may be used.

## **2.09 WIRE**

- A. Wire for tying reinforcement in place shall be No. 18 or heavier, AWG black annealed.

## **2.10 THRUST BLOCKS**

- A. Thrust blocks shall be constructed of 2,000 psi, high early strength, minor concrete, as defined in Section 90 – Concrete, of the latest requirements of Caltrans Standard Specifications with a minimum 505 pounds of cementations material per cubic yard.

## **PART 3 EXECUTION**

### **3.01 PLACEMENT OF CONCRETE**

- A. Place concrete so that a uniform appearance of surfaces will be obtained and the concrete will be free of all rock pockets, honeycombs, and voids.

**3.02 CURING**

- A. Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.

**3.03 CONSTRUCTION JOINTS**

- A. Joints not shown on the Drawings shall be so made and located as to least impair strength of the structure. A pour schedule for each structure showing all construction joints shall be submitted to the District for review.
- B. The surfaces of all concrete joints shall be thoroughly cleaned and all laitance removed by sandblasting. In preparation for the next pour, the joints shall be dampened. Where directed by the District, joints shall be intentionally roughed as described in the Standard Specifications to amplitude of ¼ inch.

**3.04 EXPANSION JOINTS**

- A. Pre-molded expansion joint material shall be installed where concrete walks abut buildings, walls, and curbs, where shown on the Drawings and at 20'-0" on centers maximum, where not specifically shown.

**3.05 EMBEDDED ITEMS**

- A. All sleeves, inserts, anchors, ladders, and other embedded items required for adjoining work or for its support shall be placed prior to concreting. Embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts, and anchor bolt slots shall be filled temporarily with a readily removable material to prevent entry of concrete into the voids.

**3.06 REPAIR OF SURFACE DEFECTS**

- A. All tie holes and all repairable defective areas shall be patched immediately after form removal in accordance with the applicable provisions of Section 51 - Concrete Structures, of the latest requirements of Caltrans Standard Specifications.

- B. Finishes

1. Schedule of Finishes

<u>Element</u>	<u>Finish</u>
Walls not exposed	Ordinary Surface Finish
Exposed walls	Class 1 Finish
Exposed slabs	Broom finish

2. Ordinary and Class 1 Surface Finishes

- a. Shall conform to latest Standard Specifications.
3. Broom Finish
- a. Concrete shall first be finished with power floats, then with power trowels, and final by hand trowels before it is given a coarse, scored texture by drawing a broom, or burlap belt, across the slab surface.

### **3.07 CONCRETE COMPRESSIVE STRENGTH TESTS**

- A. Concrete will be tested and inspected as work progresses. One compressive strength test shall be made for each pour and as described in the Standard Specifications. One complete test shall consist of making three (3) cylinders in accordance with ASTM C31, storing the cylinders for 24 hours at the pour site, delivering the cylinders to the testing laboratory, testing one cylinder at 7 days and the other two cylinders at 28 days in accordance with ASTM C39. Four copies of certified test results shall be forwarded to the District upon completion of the testing.

### **3.08 CONCRETE SLUMP TESTS**

- A. Each pour shall be tested for slump at the beginning of the pour, at the time the sample for the strength test is taken, and whenever the consistency of the concrete appears to vary. The test shall conform to ASTM C143.

**END OF SECTION**

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## **SECTION 09 96 56 – HIGH PERFORMANCE COATINGS**

### **PART 1 GENERAL**

#### **1.01 PURPOSE**

- A. The purpose of this specification is to establish the requirements for shop and field coatings work for the two new Dekoven welded steel potable water storage reservoirs for the Mid-Peninsula Water District. One Tank will have a capacity of 0.95MG and the other will have a capacity of 0.80MG.

#### **1.02 SCOPE OF WORK**

- A. Provide and pay for all labor, equipment, materials, machinery, facilities, and services necessary to complete the work in accordance with these specifications.
- B. Work to be accomplished includes the surface preparation and application of protective coatings to the interior and exterior surfaces of the tank structures, including all above ground piping, attachments, appurtenances, and accessories. An NSF 61 certified zinc/epoxy lining system shall be applied to the interior surfaces and a zinc/epoxy/urethane system shall be applied to the exterior surfaces.
- C. Prior to tank erection, all steel surfaces that will be made inaccessible after erection (except underside of bottom plates) shall be cleaned as specified herein and shall receive the complete coating system specified. This includes, but is not limited to metal-to-metal contact areas (e.g. bolted joints, circumferential stairway connections, underside of appurtenances, etc.) and all difficult to coat locations such as pipe interiors (e.g., overflow, drainpipe, etc.).

#### **1.03 REFERENCE SPECIFICATIONS AND STANDARDS**

- A. Without limiting the general aspects or other requirements of this specification, work and equipment shall conform to applicable requirements of municipal, state and federal codes, laws and ordinances governing the work, American Water Works Association, SSPC: The Society of Protective Coatings, and the coating manufacturer's printed instructions, subject to Engineer's approval.
- B. The Engineer's decision shall be final as to interpretation and/or conflict between any of the referenced codes, laws, ordinances, specifications and standards contained herein.
- C. The latest edition of standards and regulations herein form a part of this specification.
- D. American Society for Testing and Materials (ASTM)
  - 1. ASTM E337, Standard Test Method for Measuring Humidity with a Psychrometer
  - 2. ASTM D1186, Standard Test Method for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base
  - 3. ASTM D4138, Standard Test Method for Measurement of Dry Paint Thickness of Protective Coating Systems by Destructive Means

4. ASTM D4285, Standard Test Method for Indicating Oil or Water in Compressed Air
  5. ASTM D4414, Standard Practice for Measurement of Wet Film Thickness by Notch Gages
  6. ASTM D4417, Standard Test Methods for field Measurement of Surface Profile of Blast Cleaned Steel
  7. ASTM D5402, Standard Test Methods for assessing the Solvent Resistance of Organic Coatings Using Solvent Rubs
  8. ASTM D7091, Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals
  9. ASTM D7393, Indicating Oil in Abrasives
- E. American Water Works Association (AWWA)
1. AWWA C652-11, AWWA Standard for Disinfection of Water Storage Facilities
  2. AWWA D102-17, AWWA Standard for Coating Steel Water Storage Tanks
  3. AWWA D210-07, AWWA Standard for Liquid-Applied Epoxy Coating for the Interior and Exterior of Steel Water Pipelines
  4. AWWA M42, AWWA Manual of Water Supply Practices, Steel Water Storage Tanks
- F. International Standards Organization (ISO)
1. ISO 8502-3, Preparation of steel substrates before application of paints and related products- Tests for the assessment of surface cleanliness Part 3: Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method).
- G. NACE International (NACE)
1. NACE SP 0188-06, Standard Recommended Practice for Discontinuity (Holiday) Testing of Protective Coatings
  2. NACE SP 0178-89, Standard Recommended Practice for Fabrication Details, Surface Finish Requirements, and Proper Design Considerations for Tanks and Vessels to be Lined for Immersion Service.
- H. SSPC: Society for Protective Coatings (SSPC)
1. SSPC-SP 1, Solvent Cleaning
  2. SSPC-SP 2, Hand Tool Cleaning
  3. SSPC-SP 3, Power Tool Cleaning
  4. SSPC-SP 5, White Metal Blast Cleaning
  5. SSPC-SP 7, Brush Off Blast Cleaning

6. SSPC-SP 10, Near-White Metal Blast Cleaning
  7. SSPC-SP 11, Power Tool Cleaning to Bare Metal
  8. SSPC-PA1, Shop, Field, and Maintenance Painting of Steel
  9. SSPC-PA 2, Measurement of Dry Film Thicknesses
  10. SSPC-VIS 1, Visual Standard for Abrasive Blast Cleaned Steel
  11. SSPC-VIS 3, Visual Standard for Hand and Power Tool Cleaned Steel
  12. SSPC Publication No. 91-12, Coating and Lining Inspection Manual
  13. SPC Guide 12, Guide for Illumination of Industrial Painting
  14. SSPC Visual Comparison Manual
  15. SSPC's Publication 91-12 "Testing Recirculated Abrasives
- I. California Code of Regulations (CCR)
  - J. Code of Federal Regulations (CFR)
    1. 29 CFR 1910, Occupational Safety and Health Regulations for General Industry
    2. 29 CFR 1926, Occupational Safety and Health Regulations for the Construction Industry
    3. 29 CFR 1926.104, Safety Belts, Lifelines, and Lanyards
    4. 29 CFR 1926.451, Scaffolding
    5. H=health and Safety Code, Div. 20, Chapter 6.5, 6.67, 6.7, 6.95, Hazardous Waste Control Law, Health and Safety Code
  - K. General Industry Safety Orders (GISO)
  - L. Construction Safety Orders (CSO)
  - M. Equipment and Coating Manufacturers' Published Instructions

#### **1.04 SUBMITTALS**

- A. The successful Contractor must submit the following plans and programs for Engineer review and acceptance a minimum of 14 days prior to project start-up, and 7 days prior to the Pre-Job Conference.
- B. The Contractor shall submit at least Manufacturers' Product Data Sheets and (Material) Safety Data Sheets on all materials to be used including, but not limited to coatings and paints, thinners, solvents, and abrasive media. Contractor shall maintain copies of submittal data at jobsite at all times, and shall furnish a complete set of submittal data for use by the Inspector.

- C. Acceptance of the programs does not relieve the Contractor from the responsibility to conduct the work in strict accordance with the requirements of this Specification, or to adequately protect the health and safety of all workers involved in the project including any members of the public who may be affected by the project.

#### **1.05 CONTRACTOR**

- A. The coating contractor shall be a licensed Painting and Decorating Contractor in the State of California (C-33 Classification), and shall have a minimum of five (5) years practical experience and successful history in the application of specified products to surfaces of steel water storage tanks. Upon request, the Contractor shall substantiate this requirement by furnishing a written list of references.
- B. All coating and surface preparation work shall be performed by skilled personnel demonstrating experience, as listed above. Resumes of personnel shall be submitted to the Owner for approval. Continuity of personnel shall be maintained throughout the duration of the cleaning and coating work and any changes in key personnel shall be subject to the approval of the Owner.
- C. Application of coating is considered specialized work. Personnel performing this work shall be trained in proper methods of application.
- D. The Contractor shall provide 5 references, which show that they have previous successful experience with coating system applications on water storage tanks. Include the name, address, and the telephone number for the owner of each installation for which the contractor provided the coating.

#### **1.06 DEFINITIONS**

- A. "Paint" refers to protective materials used or applied on exterior surfaces.
- B. "Lining" refers to protective materials used or applied to interior surfaces.
- C. "Coating" refers to protective materials used or applied on exterior or interior surfaces, or any protective material in general.
- D. "Vapor Area" refers to the underside of the roof, including the roof support
- E. structure and upper 6 inches of the shell.
- F. "Immersion Area" refers to all surfaces below the vapor area.
- G. "Engineer" refers to the Owner or his designated representative.

### **1.07 HOURS OF WORK**

- A. Work areas will be available for performance of the contract work between 8:00 A.M. and 5:00 P.M. excluding Saturdays, Sundays and holidays. No work shall be accomplished during hours or on days other than specified above, unless approved in advance by the Owner.
- B. Inspections requested by or made necessary as a result of actions of the Contractor or Developer on Saturdays, Sundays or holidays must be scheduled and approved in writing by Engineer. The contractor shall bear all additional fees or expenses of Owner's personnel and Inspection services created by extraordinary work hours including standby time or overtime.

### **1.08 PRE-JOB CONFERENCE**

A Pre-Job Conference shall be scheduled prior to start of project. The Owner, Contractor and Engineer shall be present. A schedule of work to be accomplished and a list of labor, material and equipment rates for additional work will be established and maintained throughout the project. Contractor shall furnish a complete set of submittal data for use by Inspector. Resumes of personnel to be used on the project shall be also submitted.

### **1.09 QUALITY ASSURANCE**

- A. General: Quality assurance procedures and practices shall be used to monitor all phases of surface preparation, application and inspection throughout the duration of the project. Procedures or practices not specifically defined herein may be used provided they meet recognized and acceptable professional standards and are approved by the Engineer.
- B. All materials furnished and all work accomplished under the Contract shall be subject to inspection by the Engineer. The Contractor shall be held strictly to the true intent of the Specifications in regard to quality of materials, workmanship, and diligent execution of the Contract.
- C. Work accomplished in the absence of prescribed inspection may be required to be removed and replaced under the proper inspection. The entire cost of removal and replacement, including the cost of all materials which may be furnished by the Owner and used in the work thus removed, shall be borne by the Contractor regardless of whether the work removed is found to be defective or not. Work covered up without the authority of the Engineer, shall, upon order of the Engineer, be uncovered to the extent required. The Contractor shall similarly bear the entire cost of performing all the work and furnishing all the materials necessary for the removal of the covering and its subsequent replacement, as directed and approved by the Engineer. Except as otherwise provided herein, the Owner will pay the cost of inspection.
- D. The Engineer will make, or have made, such tests as deemed necessary to assure the work is being accomplished in accordance with the requirements of the Contract. Unless otherwise specified, the cost of such testing will be borne by the Owner. In the event such tests reveal noncompliance with the requirements of the Contract, the Contractor shall bear the cost of such corrective measures deemed necessary by the Engineer, as well as the cost of subsequent retesting. It is understood and agreed the making of tests shall not constitute an acceptance of any portion of the work, nor relieve the Contractor from compliance with the terms of the Contract.

- E. Warranty Inspection: Warranty inspection shall be conducted between the eleventh- and seventeenth-months following completion of all coating and painting work. All personnel present at the Pre-Job Conference should be present at this inspection. All defective work shall be repaired in strict accordance with this specification and to the satisfaction of the Engineer.
1. Notification: The Owner shall establish the date for the inspection and shall notify the Contractor at least 30 days in advance. The Owner will drain the tank and Contractor shall provide, at his own expense, suitable lighting and ventilation for the inspection. At the Owner's option, warranty inspection may be accomplished by diving operations.
  2. Inspection: the entire interior coating system(s) shall be visually inspected. All defective coatings, as well as damage or rusting spots of the tank, shall be satisfactorily repaired by and at the sole expense of the Contractor. Defective coating shall be any of those defined by SSPC's Visual Comparison Manual.
  3. Inspection Report: the Engineer shall prepare and deliver to the Contractor an inspection report covering the warranty inspection. The report shall set forth the number and type of failures observed, the percentage of the surface area where failure has occurred, and the names of the persons making the inspection.
  4. Schedule: upon completion of the inspection and receipt of Inspection Report as noted herein, Owner shall establish a date for Contractor to proceed with remedial work. Any delay on part of Contractor to meet schedule established by Owner shall constitute breach of this Contract and Owner may proceed to have defects remedied through other means, and these costs may be charged to the Contractor.
  5. Remedial Work: any location where coating or paint is defined as defective shall be considered to be a failure of the system at that location. The Contractor shall make repairs at all points where failures are observed by removing the deteriorated coating, cleaning the surface, and recoating or repainting with the same system specified herein. Any spot repairs to defective areas will require feathering at least 3 inches into sound adjacent coating. If an area of failure exceeds 25 percent of a specific coated surface, the entire coating system from that specific area may at the Owner's option be required to be removed and recoated in accordance with the original specification.
    9. Specific coated surfaces are defined as follows:
      - a. Roof - interior
      - b. Shell - interior
      - c. Floor - interior
      - d. Roof - exterior
      - e. Shell - exterior
      - f. Attachments, accessories and appurtenances
  6. Upon completion of remedial work, the Contractor shall disinfect the tank and piping as specified herein.

7. Costs: All noted costs for Contractor's inspection and all costs for repair shall be borne by the Contractor and in figuring his bid, the Contractor shall include an appropriate amount for testing and repair, including disinfection, as no additional allowance will be paid by the Owner for said inspection and repair.
8. Should any defined surfaces as noted in 5.a above require removal and replacement, the owner has the option to charge all costs associated with the owner appointed inspection of the rework to the Contractor.

#### **1.10 SAFETY AND HEALTH REQUIREMENTS**

- A. General: ventilation, electrical grounding, and care in handling coatings, paints, solvents and equipment are important safety precautions during coating and painting projects. Contractor shall conform with safety requirements set forth by regulatory agencies applicable to the construction industry and manufacturer's printed instructions and appropriate technical bulletins and manuals. The Contractor shall provide and require use of personal protective life saving equipment for all persons working in or about the project site.
- B. Access Facilities: all ladders, scaffolding and rigging shall be designed for their intended uses. Ladders and scaffolding shall be erected where requested by Engineer to facilitate inspection and be moved by the Contractor to locations requested by the Engineer.
- C. Ventilation: where ventilation is used to control hazardous exposure, all equipment shall be explosion-proof, of industrial design and shall be approved by the Engineer. Ventilation shall reduce the concentration of air contaminant to the degree a hazard does not exist by educting air, vapors, etc. from the confined space. Air circulation and exhausting of solvent vapors shall be continued until all coatings have fully cured. Forced air eduction during blast cleaning and coating application operations is mandatory. It is also mandatory during the curing phase. If dehumidification equipment is used, equipment must be operated on a continuous basis during all blasting and coating operations, including shifts during which no work is being accomplished.
  1. Ventilation system shall be furnished and installed by the Contractor in accordance with these specifications. The Contractor shall make modifications to the ventilation system as directed by the Engineer to insure a safe working environment and complete removal of all solvent vapors. Upon completion of the final curing period, as determined by the Engineer, the Contractor shall remove the ventilation system.
  2. The exhaust blower capacity shall be sufficient to maintain air changes within tank interiors in accordance with OSHA, the coating manufacturer's recommendations, and the Bay Area Air Quality Management District's (BAAQMD) regulations.
  3. If Contractor proposes to use dehumidification equipment, or any other alternative ventilation systems, Contractor must submit, in advance, for approval by the Engineer, a complete list of equipment and procedures for its use.
  4. Special attention shall be paid to assure that any field applied moisture-cured zinc primers have reached full cure prior to overcoating application of any field epoxies.

- D. Head and Face Protection and Respiratory Devices: equipment shall include protective helmets, which shall be worn by all persons while in the vicinity of the work. During abrasive blasting operations, nozzle-men shall wear U.S. Bureau of Mines approved air-supplied helmets and all other persons who are exposed to blasting dust shall wear approved filter-type respirators and safety goggles. When coatings are applied in confined areas all persons exposed to toxic vapors shall wear approved respiratory protection.
- E. Grounding: blasting, spray and air hoses shall be grounded to prevent accumulation of charges of static electricity.
- F. Illumination: spark proof artificial lighting shall be provided for all work in confined spaces. Light bulbs shall be guarded to prevent breakage. Lighting fixtures and flexible cords shall comply with the requirements of NFPA 70 "National Electric Code" for the atmosphere in which they will be used. Whenever required by the Engineer, the Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected. SSPC Guide 12 shall be used to determine the level of lighting required during production. The level of illumination for inspection purposes shall be determined by the Engineer using SSPC Guide 12 as a guideline.
- G. Toxicity and Explosiveness: the solvents used with specified protective coatings are explosive at low concentrations and are highly toxic. The maximum allowable concentration of vapor shall be kept below the maximum safe concentration for eight-hour exposure, plus Lower Explosive Limit must be strictly adhered to. If coatings or paints contain hazardous materials, all regulations related to safety of personnel and handling of such materials shall be strictly adhered to.
- H. Protective Clothing: coating and paint materials may be irritating to the skin and eyes. When handling and mixing coatings and paints workmen shall wear appropriate covering gloves and eye protection.
- I. Fire: during mixing and application of coatings and paints, all flames, welding and smoking shall be prohibited in the vicinity. Appropriate type fire extinguishers shall be provided by Contractor and kept at the jobsite during all operations.
- J. Sound Levels: whenever the occupational noise exposure exceeds the maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protective devices. General sound levels for project shall be those which will not affect routine facility or neighborhood activities. Whenever levels are objectionable, they shall be adjusted as directed by the Engineer.
- K. Compliance with California Code of Regulations: Contractor shall submit a notarized letter signed by a principal officer of the Corporation certifying the Contractor fully complies with California Code of Regulations pertaining to the work including, but not limited to, the following:
  - 1. Illness Injury Prevention Program CSO/GISO 1508/3203
  - 2. Confined Space Plan GISO 5156/5159
  - 3. Respiratory CSO/GISO 1531/5144
  - 4. Hazard Communication GISO 5194
  - 5. Rolling Scaffolds CSO 1646



6. Employee Safety Instruction CSO 1510
  7. Emergency Medical Service CSO 5112
  8. Dusts, Fumes, Mists, Vapors & Gases CSO 1528
- L. Protective Coverings, Containment, and Ventilation Materials/Equipment: The Contractor shall provide all protective coverings needed to protect those surfaces that are not designated to be prepared or coated. Provide all materials needed for the implementation of a containment/ventilation system around the operation to control emissions and exposures in accordance with the provisions of this specification. This includes, but is not limited to, rigging, scaffolding, planking, tarpaulins, dust collectors, and vacuums. Verify that all equipment and materials are free of lead, chromium, loose dust and debris when brought onto Owner's property and upon removal from the site.

## **PART 2 COATING AND DISINFECTION MATERIALS**

### **2.01 GENERAL**

- A. Materials specified are those which have been evaluated for the specific service. Products are listed to establish a standard of quality. Standard products of manufacturers other than those specified will be accepted when proven to the satisfaction of the Engineer they are equal in composition, durability, usefulness and convenience for the purpose intended. Substitutions will be considered provided the following minimum conditions are met:
1. The proposed coating or paint system shall have a dry film thickness equal to or greater than that of the specified system.
  2. The proposed coating or paint system shall employ an equal or greater number of separate coats.
  3. The proposed lining or paint system(s) shall employ coatings or paints of the same generic type.
  4. All requests for substitution shall carry full descriptive literature and directions for application, along with complete information on generic type, non-volatile content by volume and a list of 10 similar projects, all at least three years old, where the coatings or paints have been applied to similar exposure.
  5. Substitutions required as a result of new VOC regulations shall be endorsed in writing from the materials manufacturer that these substituted materials will provide equivalent performance as those specified.
  6. If the above-mentioned data appears to be in order, the Engineer may require that the Contractor provide certified laboratory data sheets showing the results of complete spectrographic and durability tests accomplished on the proposed substitute. An independent testing laboratory satisfactory to the Engineer shall accomplish tests and all costs incurred in the testing program shall be borne by the Contractor. In any case, the Engineer shall be sole and final judge of the acceptability of any proposed substitution. Requests for substitution must be approved in writing.

- B. All materials shall be brought to the jobsite in the original sealed containers. They shall not be opened or used until Engineer has physically inspected contents and obtained necessary data from information printed on containers or labels. Materials exceeding storage life recommended by the manufacturer shall be rejected.
- C. Flammability, toxicity, allergenic properties, and any other characteristic requiring field precautions shall be identified and specific safety practices shall be stipulated.
- D. All coating, paint and disinfection materials shall be stored in enclosed structures to protect them from weather and excessive heat or cold. Flammable coatings and paints must be stored to conform with local,  
County, State and Federal safety codes for flammable coating and paint materials. At all times coatings and paint shall be protected from freezing.
- E. Contractor shall use products of the same manufacturer for all coats.

## **2.02 INTERIOR COATING MATERIALS**

- A. Interior coating materials for immersed surfaces of the tank and piping must appear on the current National Sanitation Foundation (ANSI/NSF) Standard 61-1999. They shall conform to the regulations and applicable requirements of local, State and Federal air pollution and health regulatory agencies.
  - 1. Zinc primer coatings shall be similar or equal to AWWA Standard D102-17 Inside Coating System No. 5 (ICS-5). Materials have been listed herein as standards of quality.
  - 2. Vapor Area: Epoxy coatings shall be similar or equal to AWWA Standard D102-17 Inside Coating System No. 5 (ICS-5). Materials have been listed herein as standards of quality.
  - 3. Immersion Area: Epoxy coating shall be similar or equal to AWWA Standard D102-11 Inside Coating System No. 3 (ICS-3). Materials have been listed herein as standards of quality.
  - 4. Joint sealant shall be a flexible polyurethane or polysulfide product, similar or equal to Federal Specification TT-S-230. Materials listed herein as standards of quality.

## **2.03 EXTERIOR PAINT MATERIALS**

- A. Paint materials shall consist of an organic zinc-rich primer, epoxy intermediate, and urethane finish coat system and conform to the regulations and applicable requirements of applicable local, State and Federal air pollution regulatory agencies.
  - 1. Prime coat shall be similar or equal to that defined in AWWA Standard D102-17, Outside Coating No. 6. Materials listed here in as standards of quality.
  - 2. Intermediate coat shall be similar or equal to that defined in AWWA Standard D102-17, Outside Coating No. 6. Materials listed herein as standards of quality.
  - 3. Finish coat shall be equal or similar to that defined in AWWA Standard D102-17, Outside Paint System No. 6. Materials listed herein as standards of quality.

4. Joint sealant shall be a flexible polyurethane or polysulfide product, similar or equal to Federal Specification TT-S-00230C, Type II, Class A (non-sag). Materials listed herein as standards of quality.

#### **2.04 DISINFECTION MATERIALS**

- A. Disinfection materials shall conform to all requirements of AWWA Standard C652-11.

### **PART 3 EXECUTION**

#### **3.01 GENERAL**

- A. All surface preparation, coating, and paint application shall conform to applicable standards of SSPC and the manufacturer's printed instructions. Material applied prior to approval of the surface by the Engineer shall be removed and reapplied to the satisfaction of the Engineer at the expense of the Contractor.
- B. All work shall be performed by skilled craftsmen qualified to accomplish the required work in a manner comparable with the best standards of practice. Continuity of personnel shall be maintained, and transfer of key personnel shall be coordinated with the Engineer.
- C. The Contractor shall provide a supervisor to be at the work site during cleaning, application, and disinfection operations. The supervisor shall have the authority to sign and change orders, coordinate work and make other decisions pertaining to the fulfillment of their contract.
- D. Contractor shall provide approved sanitary facilities for all project personnel, as no existing facilities will be available to the Contractor. Facilities shall be maintained during the project to complete standards established by Owner, and shall be removed prior to Contractor's departure from the site at completion of the project.
- E. Dust, dirt, oil, grease or any foreign matter which will affect the adhesion or durability of the coating must be removed by washing with clean rags dipped in an approved commercial cleaning solvent, rinsed with clean water and wiped dry with clean rags.
- F. The Contractor's coating and painting equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Compressors shall have suitable traps and filters to remove water and oils from the air. Blotter test shall be accomplished at each start-up period and as deemed necessary by the Engineer. Contractor's equipment shall be subject to approval of the Engineer.
  1. Cleanliness of compressed air supply shall be verified daily, and as deemed necessary by Engineer, by directing a stream of air, without abrasive, from the blast nozzle onto a white blotter or cloth for twenty seconds in accordance with ASTM D4285. If air contamination is evident, change filters, clean traps, add moisture separators or filters, or make adjustments as necessary to achieve clean, dry air.
- G. Application of the first coat shall follow immediately after surface preparation and cleaning within an eight-hour working day. Any cleaned areas not receiving first coat within an eight-hour period shall be re-cleaned prior to application of first coat.

1. If dehumidification equipment is used, cleaned areas may have the first coat applied during the last shift of the week, provided dehumidification equipment has run continuously during the complete week and surface meets all requirements of the specification. The minimum requirement for dehumidification systems is specified herein.
- H. Because of the presence of moisture and possible contaminants in the working atmosphere, care shall be taken to ensure previously coated or painted surfaces are protected or recleaned prior to application of subsequent coat(s). Methods of protection and recleaning shall be approved by the Engineer.
1. The project is subject to intermittent shutdown if, in the opinion of the Engineer, cleaning, coating, and painting operations are creating a localized condition detrimental to ongoing facility activities, personnel, or adjacent property.
  2. In the event of emergency shutdown by the Engineer, Contractor shall immediately correct deficiencies. All additional costs created by shutdown shall be borne by Contractor.
- I. The Contractor shall provide, at his own expense, all necessary power for his operations under the contract.
- J. Off-Site Inspection: all surface preparation and priming operations performed off-site will be monitored 100% by an Owner-appointed quality assurance inspector. All additional costs incurred by off-site inspection shall be borne by the Contractor. These include, but are not limited to travel, lodging, food, auto rental (where applicable) and any other expenses directly related to the inspection.
- K. If shop work is not scheduled on a consecutive basis to facilitate scheduling of an off-site inspector, expenses incurred by multiple trips to shop will be borne by the Contractor. The Contractor shall notify the Engineer a minimum of 14 days in advance of start of shop cleaning and priming operations.
- L. Tank bottom plate surfaces shall receive no surface preparation or coating application in the shop. The underside of the tank bottom shall receive no surface preparation or coating application.
- M. When primed plates and structural steel are transported, spacers and other protection shall be used to separate plates and structural steel to eliminate primer being pulled off during unloading operations. If wood spacers are utilized, no splinters or wood particles will be allowed to remain in primed surface after separation.

### **3.02 SURFACE PREPARATION, GENERAL**

- A. The latest revision of the following surface preparation specifications of SSPC shall form a part of this specification. (Note: An element of surface area is defined as any given 9 square inches of surface).
1. Solvent Cleaning (SSPC-SP1): Removal of oil, grease, soil, and other contaminants by use of solvents, emulsions, cleaning compounds, steam cleaning or similar materials and methods, which involve a solvent or cleaning action.
  2. Brush-Off Blast Cleaning (SSPC-SP7): Blast cleaning to remove loose and other detrimental foreign matter present to the degree specified. Brush-Off Blast may also be used for proper

scarification of cured coatings provide that all surfaces have been impacted by abrasive and are visually uniform in color and gloss.

3. Near-White Blast Cleaning (SSPC-SP10): Blast cleaning to near-white metal cleanliness, until at least ninety-five percent of each element of surface area is free of all visible residues.
  4. Powertool Cleaning to Bare Metal (SSPC-SP11): Powertool cleaning until at all surface area is free of all visible residue with a 1 mil; minimum profile.
- B. All interior surfaces of the tank and piping shall be abrasively blast cleaned to "Near-White Blast Cleaning" in conformance to SSPC's - Surface Preparation Specification No. 10 (SSPC-SP10) and a surface profile or anchor pattern of 2 to 3 mils (0.002" - 0.003").
- C. All exterior surfaces of the tank and external, above grade piping shall be abrasively blast cleaned to "Near-White Blast Cleaning" in conformance to SSPC's Surface Preparation Specification No. 10 (SSPC-SP10) and a surface profile or anchor pattern of 2 to 3 mils (0.002" - 0.003").

### **3.03 TANK SURFACE PREPARATION, SHOP**

- A. No shop surface preparation shall be performed on floor plate surfaces.
- B. All interior surfaces to receive shop-applied primers shall be abrasively blast cleaned to "Near-White Blast Cleaning" in accordance with SSPC's Surface Preparation Specification No. 10 (SSPC-SP10).
- C. With the exception of the underside of the tank bottom, all exterior surfaces to receive shop-applied primers shall be abrasively blast cleaned to "Near-White Blast Cleaning" in conformance to SSPC's Surface Preparation Specification No. 10 (SSPC-SP10).
- D. Test on surfaces shall be performed to detect oil and other contaminants which might be deposited on surfaces as a result of fabrication, abrasive recycling, or other shop operations. This will include chemical tests or ultra-violet (black light) tests, as required.
- E. The operating mix of abrasive media shall be such that a sharp angular, not peened profile is produced. Any recycled abrasive shall be designed for that use (i.e. steel grit) and be free of grease, oil, or other debris or contaminants that could be detrimental to the service life of the applied coatings. If steel shot media is used it shall be limited to no more than 1/3 of the operating mix. Recycled abrasive shall be tested for contamination through the use of a vial test in accordance with the procedures outlined in SSPC's Publication 91-12 and ISO 8502-3.
- F. Upon completion of blasting and priming operations, primer on plates and structural steel shall be dried sufficiently to minimize damage during handling.
- G. Primer applied to steel that has not sufficiently dried shall be protected from contamination, including ambient moisture.
- H. Handling of Shop Primed Steel: Contractor shall adhere to the following procedures and practices for handling, transporting and storing shop primed steel:
1. Curing: Upon completion of blasting and priming operations, primer on structural steel shall be dried sufficiently to minimize damage during handling.

2. Separation of Steel: When structural steel and appurtenances are stored or transported, spacers, and other protection shall be used to separate steel to eliminate primer being pulled off during unloading operations. If wood spacers are used, no splinters or wood particles will be allowed to remain in primed surfaces after separation.
3. Covering of Steel during Transit: Shop primed structural members and appurtenances shall be covered 100% to prevent deposition of road salts, fuel residue, and other contaminants which may be present along the route of shipment to jobsite.
4. Load Binders: Loaded steel must be bound with padded chains or ribbon binders to minimize damage to coatings and paint during shipment.
5. Handling: Care shall be exercised during loading, unloading, storage and erection operations to minimize damage to primed steel. Sliding of steel across another member will not be permitted.
6. Storage: Primed steel at jobsite shall not be placed on ground or on top of other steel work unless ground or steel work is covered with an approved covering. Steel may be elevated above ground level or other steel members by use of approved spacers. Care shall be exercised during loading, unloading, storage and erection operations to minimize damage to primed steel. Sliding of steel across another plate or member will not be permitted, except for fitting sheets into position during roof construction.
7. Primed steel plate and structural steel at jobsite shall not be placed on ground or on top of other steel work unless ground or steel work is covered with an approved covering. Steel may be elevated above ground level or other steel members by use of approved spacers.
8. All materials shall be applied as specified herein. Care shall be made to not prime those areas that will be heat affected during tank erection welding or cutting.

### **3.04 TANK SURFACE PREPARATION, FIELD**

- A. Slag, weld spatter, or sharp edges such as those created by flame cutting and shearing not previously removed by the tank fabricator, erector or installer shall be removed by chipping and grinding. All sharp edges shall be ground or otherwise blunted as required by the Engineer in accordance with NACE SP 0178. The rolled edges of angles, channels, and wide flange beams do not normally require further rounding unless specifically directed by the Engineer.
- B. Upon completion of erection, the following procedure shall be utilized on all shop primed surfaces:
  1. All oily or greasy surface contaminants shall be removed by wiping the contaminated area with a clean rag wetted with degreasing solution, rinsed with clean water and wiped clean shall be in accordance with SSPC's Surface Preparation Specification No. 1 "Solvent Cleaning" (SSPC-SP1).
  2. All shop primed surfaces shall be additionally cleaned in conformance to SSPC's Surface Preparation No. 7 "Brush-off Blast Cleaning," (SSPC-SP7). Remaining primer shall be firmly bonded to the substrate with blast cleaned edges feathered. Extreme care shall be exercised to ensure that the remaining primer is not fractured or damaged by cleaning operations.

3. All interior surfaces exhibiting bare metal, rust, scaling, or damaged coating areas shall be blast cleaned in conformance to Steel Structures Painting Council Specification No. 10 "Near-White Blast Cleaning," (SSPC-SP10). Adjacent primer shall be firmly bonded to the substrate with blast cleaned edges feathered. Extreme care should be exercised to ensure that the remaining primer is not fractured or damaged by cleaning operations.
  4. All exterior surfaces exhibiting bare metal, rust, scaling, or damaged coating areas shall be blast cleaned in conformance to Steel Structures Painting Council Specification No. 10 "Near-White Blast Cleaning," (SSPC-SP10). Adjacent primer shall be firmly bonded to the substrate with blast cleaned edges feathered. Extreme care should be exercised to ensure that the remaining primer is not fractured or damaged by cleaning operations.
  5. After abrasive blast cleaning of damaged and defective areas and feathering of edges, cleaned areas will be primed as specified herein. It is the intent of this specification to ensure a three-coat system is applied to all exterior surfaces and interior vapor surfaces. The interior immersion surfaces shall receive a two-coat system.
- C. Abrasive blasting nozzles shall be equipped with "deadman" emergency shut-off nozzles. Blast nozzle pressure shall be a minimum of 95 P.S.I. and shall be verified by using an approved nozzle pressure gage at each start-up period or as directed by the Engineer. Number of nozzles used during all blast cleaning operations must be sufficient to insure timely completion of project as approved and directed by Engineer.
  - D. All blast hose connections shall be connected with external couplings. These connections shall be taped with duct tape prior to pressurizing. All taped connections shall be visually inspected for leaks within five minutes after start of blast cleaning operations and at the end of blast cleaning operations. Leaking connections shall be immediately repaired to prevent further damage.
  - E. Particle size of abrasives used in blast cleaning shall be that which will produce a surface profile or anchor pattern specified herein, or in accordance with recommendations of the manufacturer of the specified coating or paint system to be applied, subject to approval of Engineer.
  - F. Abrasive used in blast cleaning operations shall be new, washed, graded and free of contaminants, which would interfere with adhesion of coatings and paints and shall not be reused unless specifically approved by the Engineer. Abrasives shall be certified for unconfined dry blasting pursuant to the California Administrative Code, Section 92520 of Subchapter 6, Title 17, and shall appear on the current listing of approved abrasives.
  - G. Blast cleaning from rolling scaffolds shall only be performed within the confines of the interior perimeter of the scaffold. Reaching beyond the limits of the perimeter will be allowed only if blast nozzle is maintained in a position, which will produce a profile acceptable to the Engineer.
  - H. The Contractor shall select an abrasive media that is proper for the quality of surface preparation specified. Should it be determined that the production rate and quality of the surface preparation is less than specified, it shall be the Contractor's responsibility to use other types and/or sizes of abrasive to meet the requirements of this contract. At no time shall considerations of extra effort be considered by the Owner unless, in the opinion of the Engineer the Contractor has explored all alternative means of abrasive blasting during their operations.

- I. The Contractor shall keep the area of work in a clean condition and shall not permit blasting materials to accumulate as to constitute a nuisance or hazard to the prosecution of the work or the operation of the existing facilities. Spent abrasives and other debris shall be removed at the Contractor's expense as directed by the Engineer. If waste is determined to be hazardous, disposal by Contractor shall meet requirements of all regulatory agencies for handling such wastes.
- J. Blast cleaned surfaces shall be cleaned prior to the application of specified coatings or paints through a combination of blowing with clean dry air, brushing/brooming, and/or vacuuming as directed by the Engineer. Air hoses for blowing shall be at least 1/2" in diameter and shall be equipped with a shut-off device.
- K. The surfaces of any non-carbon steel substrates, or specialty items (i.e. galvanized, anodized, etc.) shall be properly treated and prepared prior to any coating operations in accordance with the coating manufacturer's written recommendations, subject to approval of the engineer. The galvanized steps of the circumferential stairway shall not be prepared or coated.

### **3.05 APPLICATION, GENERAL**

- A. Coating and paint application shall conform to the requirements of the SSPC's Paint Application Specification No. 1 (SSPC-PA1), latest revision, for "Shop, Field and Maintenance Painting," the manufacturer of the coating and paint materials printed literature, and as specified herein.
- B. Thinning shall only be permitted as recommended by the manufacturer and approved by the Engineer, and shall not exceed the limits set by applicable regulatory agencies.
  - 1. If the Contractor applies any coatings which have been modified or thinned to such a degree as to cause them to exceed established VOC levels, Contractor shall be responsible for any fines, costs, remedies, or legal action and costs which may result.
- C. Each application of lining and paint shall be applied evenly with a uniform appearance. The system shall be free of brush marks, unfeathered edges, sags, runs, and evidence of poor workmanship, or any aesthetic defects, as defined by SSPC. Care should be exercised to avoid lapping on glass or hardware. Coating or paint shall be sharply cut to lines. Finish surfaces shall be uniform in appearance and shall be free from defects or blemishes.
- D. Protective coverings or drop cloths shall be used to protect floors, concrete, fixtures, equipment, prepared surface and applied coatings. Personnel entering tank or walking on exterior roof of tank shall take precautions to prevent damage or contamination of coated or painted surfaces. Care shall be exercised to prevent coating or paint from being spattered onto surfaces, which are not to be coated or painted. Surfaces from which such material cannot be removed satisfactorily shall be repainted or recoated as required to produce a finish satisfactory to the Engineer.
- E. All material shall be applied as specified herein. Primer materials applied in the shop shall be those specified or approved equals. Care shall be made to not prime those areas that will be heat affected during tank erection welding or cutting.
- F. After abrasive blast cleaning of damaged and defective areas and feathering of edges, cleaned areas will be primed as specified herein. Spot prime repairs will not be included as part of the intermediate coat. It is the intent of this specification to ensure a three-coat system is applied to all interior Vapor Area surfaces, and a two-coat system to all interior Immersed Area surfaces.



- G. All welds and irregular surfaces, as defined by the engineer shall receive a brush coat of the specified product prior to application of each complete coat. Coating/paint shall be brushed in multiple directions to insure penetration and coverage, as directed by the Engineer. These areas include, but are not limited to welds, roof lap seams, nuts, bolts, ends, and flanges of rafters, etc.
- H. At the conclusion of each day's blast cleaning and coating operations, a 6" wide strip of blast cleaned primer or substrate shall remain uncoated to facilitate locating the point of origin for successive day's blast cleaning/priming operations.
- I. All attachments, accessories, and appurtenances (except Galvanized circumferential stairway steps) shall be prepared and finished in the same manner as specified for adjacent tank sections. All coating components shall be mixed in exact proportions specified by the manufacturer. Care shall be exercised to insure all material is removed from containers during mixing and metering operations.
- J. All coatings shall be thoroughly mixed utilizing an approved slow-speed power mixer until all components are thoroughly combined and are of a smooth consistency. Catalyzed coatings shall not be applied beyond potlife limits specified by manufacturer. Any required induction requirements shall be strictly followed.
- K. Thinners shall be added to coating materials only as required in accordance with manufacturer's printed literature and in the presence of the Engineer. Quantities of thinner shall not exceed limits set by applicable regulatory agencies.
- L. Application shall be by airless spray method except as otherwise specified. Drying time between coats shall be strictly observed as stated in the manufacturer's printed instructions.
- M. When two or more coats are specified, where possible, each coat shall be of contrasting color.
- N. Special attention shall be paid to assure that any field applied moisture cured zinc primers have reached full cure prior to the overcoating application of any field epoxies.
- O. Paint shall not be applied when wind speeds exceeds fifteen miles per hour.
- P. Care shall be exercised during spray operations to hold the spray nozzle perpendicular and sufficiently close to surfaces being coated to avoid excessive evaporation of volatile constituents and loss of material into the air or the bridging of cracks and crevices. Reaching beyond limits of scaffold perimeter will not be permitted. All dryspray or overspray shall be removed as directed by Engineer and the area recoated.

### **3.06 COATING APPLICATION, TANK INTERIOR SURFACES**

- A. After completion of surface preparation as specified, the VAPOR AREA shall receive three coats of the coatings specified under 2.02 "INTERIOR COATING MATERIALS." Topcoat shall be white. The total system shall include one of the following systems:
  - 1. Sherwin Williams
    - a. 3-4 mils DFT Corothane I Galvacpac 2K 100 Prime Coat
    - b. 4-6 mils DFT Macropoxy 646 PW Intermediate Coat
    - c. 4-6 mils DFT Macropoxy 646 PW Topcoat

- d. 13 mils (0.013") shall be the minimum DFT of the system.

2. Tnemec Company

- a. 3-4 mils DFT 94-H2O Hydro-Zinc Prime Coat
- b. 4-6 mils DFT L140F PotaPox Intermediate Coat
- c. 4-6 mils DFT L140F PotaPox Topcoat
- d. 13 mils (0.013") DFT shall be the minimum dry film thickness of the completed system.

3. Or equal

- B. After completion of surface preparation as specified, the IMMERSION AREA shall receive two coats of the coatings specified under 2.02 "INTERIOR COATING MATERIALS." Topcoat shall be white. The total system shall include one of the following systems:

1. Sherwin Williams

- a. DFT Corothane I Galvapak 2K 100 – Prime Coat
- b. 20-25 mils DFT Sherplate PW Epoxy – Topcoat
- c. 24 mils (0.024") DFT shall be the minimum nominal DFT of the system.

2. Tnemec Company

- a. 3-4 mils DFT 94-H2O Hydro-Zinc – Prime Coat
- b. 20-25 mils DFT Tnemec 22 or FC22 –Topcoat
- c. 24 mils (0.024") DFT shall be the minimum dry film thickness of the completed system.

3. Or equal

- C. Shell/roof junction, crevices from formed rafters, roof plate lap seams, and any void areas designated by the engineer that cannot be properly sealed with liquid coatings:

- 1. After completion of coating application, as specified, all void areas shall be filled with a joint sealant as specified under 2.02 "INTERIOR COATING MATERIALS". Joint sealant may be applied by caulking gun, trowel or other approved method. Sealant shall be pressed firmly into voids to insure 100% filling/sealing.
- 2. Special care shall be used to ensure that all applied caulking has reached a state of cure that will not allow dust or debris to collect on its (tacky) surface.

**3.07 PAINT APPLICATION, EXTERIOR SURFACES**

- A. After completion of surface preparation as specified, all exterior surfaces shall receive three complete coats of one of the coatings specified under 2.03 "EXTERIOR PAINT MATERIALS." The total system shall include one of the following systems:

1. Sherwin-Williams Company

- a. 3-4 mils DFT Corothane I Galvapak 2K 100 – Prime Coat

- b. 4-6 mils DFT Macropoxy 646-100 – Intermediate Coat
- c. 2-5 mils DFT Acrolon 100 – Finish Coat
- d. 9 mils (0.009") shall be the nominal dry film thickness of the completed system

2. Tnemec Company

- a. 3-4 mils DFT 94-H2O Hydro-Zinc Prime Coat
- b. 4-6 mils DFT Series L140 or L69 Epoxoline – Interm. Coat
- c. 2-4 mils DFT Endura-Shield Series 1095 – Finish Coat
- d. 9 mils (0.009") DFT shall be the minimum dry film thickness of the completed new system.

3. Or equal

- B. A minimum of 24 hours time is required before additional coats may be applied.
- C. Color Scheme: the Owner shall select exterior finish coat colors for the project. The Contractor shall submit a current chart of the manufacturer's available colors to the Owner's representative ten days prior to start of painting operations.
- D. Coating System Identification: unless otherwise directed by the Engineer, stencil the following information on the completed exterior system. Location will be selected by the Engineer. Use a black urethane coating and provide lettering that is 2 to 3 inches in height.
  - 1. Month and Year of Completion
  - 2. Identification of Cleaning Method
  - 3. Identification of Coating System
- E. Following all paint work, apply caulking to the gap between the exterior floor plate and concrete ring wall in accordance with the manufacturer's written recommendations, using backing rod as required to provide suitable seal. Exterior caulking shall have a smooth clean finish that is applied to clean, sharp lines. Sealant color shall be selected and approved by the Owner.
- F. Sealant shall be a material as specified under 2.03 "EXTERIOR PAINT MATERIALS" and shall include Sikaflex 2C, Vulkem 921, Sonolastic NP1, or approved equal.

**3.08 QUALITY CONTROL**

- A. Ambient Conditions: no coating shall be applied when the surrounding air temperature or the temperature of the surface to be coated or painted is below 50 degrees F. No coatings shall be applied at temperatures above 110 degrees F. No coatings shall be applied to wet or damp surfaces or in rain, snow, fog or mist, when the temperature is less than 5 degrees F. above the dewpoint, or when it is expected the air temperature will drop below 50 degrees F. Dewpoint shall be measured by the use of an instrument such as a Sling Psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychrometer Tables or equivalent in accordance with ASTM D337. If unacceptable conditions are prevalent, coating or paint application shall be delayed or postponed until conditions are favorable. The day's coating or paint application shall

be completed in time to permit the film sufficient drying time prior to damage though forecast/anticipated atmospheric conditions.

- B. Surface Preparation: surface preparation will be based upon comparison with: "Pictorial Surface Preparation Standards for Painting Steel Surfaces," SSPC-Vis 1 and as described herein. Anchor profile for prepared surfaces shall be measured by using a nondestructive instrument such as a Testex Press-O-Film System in accordance with ASTM D4417. Temperature and dewpoint requirements noted in 3.08-A shall apply to all surface preparation operations, except low and high temperature limits.

The Contractor shall conduct all operations so as to confine abrasive blasting debris and paint overspray to within the bounds of the site. The Contractor shall take all precautions necessary to prevent adverse off-site consequences of painting operations. Any complaints received by the Owner relating to any such potential offsite problems will be immediately delivered to the Contractor. The Contractor shall immediately halt painting work and shall take whatever corrective action is required to mitigate any such problems. All costs associated with protection of off-site properties and/or correction of damage to property as a result of coating operations shall be borne directly by the Contractor at no additional expense to the Owner.

- C. Film Thickness Testing: thickness of coatings and paint shall be checked with a non-destructive film thickness gauge in accordance with ASTM D1186 and/or ASTM D7091. An instrument such as Tooke Gage should be used in accordance with ASTM D4138 if a destructive tester is deemed necessary. The sampling of film thickness of flat (e.g. plate) surfaces shall be tested in accordance with SSPC-PA2. The sampling of structural members or irregular surfaces shall be tested in frequency and locations, as directed by the engineer.
- D. Holiday Detection: coating integrity of all interior coated surfaces shall be tested with an approved inspection device in accordance with NACE SP 0188. All pinholes shall be repaired in accordance with the manufacturer's printed recommendations and retested. No pinholes or other irregularities will be permitted in the final coating.
- E. Inspection Devices: Contractor shall furnish, until final acceptance of coating, inspection devices in good working condition for detection of holidays and measurement of dry-film thickness of coatings and paints.

They shall also furnish National Institute of Standards and Technology/National Bureau of Standards (NIST/NBS) certified thickness calibration plates to test accuracy of thickness gauges. Dry film thickness gauges and holiday detectors shall be available at all times until final acceptance of application. Inspection devices shall be operated by, or in the presence of the Engineer with location and frequency basis determined by the Engineer. The Engineer is not precluded from furnishing his own inspection devices and rendering decisions based solely upon their tests.

- F. Acceptable Inspection Devices: acceptable devices for ferrous metal surfaces include, but are not limited to Tinker-Razor Models AP and AP-W holiday detectors and SSPC, Type II units for dry film thickness gauging. Inspection devices shall be calibrated and operated in accordance with the manufacturer's instructions and SSPC-PA2.
- G. Upon completion of the interior coating operations and after the required drying intervals, holiday detection shall be accomplished on all coated surfaces. A thorough visual holiday detection shall be completed on all surfaces above the overflow with any suspect holidays verified by highvoltage

detection, as noted. The instrument shall be set at 2,000 volts for vapor area and 2500 volts for immersion area, include a wire brush electrode, and be properly grounded. Repairs shall be retested. The contractor shall obtain a letter from the coating manufacturer approving the test voltage, prior to any testing. Should the manufacturer not approve of the use of a high-voltage testing device for the vapor area, a 67.5 volt device Tinker and Razor M-1 device shall be used.

- H. All holiday detection of coatings shall be performed in the presence of the Engineer. All patched holidays shall be retested.
- I. The lining shall be verified as being properly cured, or as required by the coating manufacturer and approved by Engineer, before placing the lining system into service. The proper cure shall be assured, as determined in "FINAL CURING OF EPOXY COATING."

### **3.09 DEHUMIDIFICATION**

- A. Application of the first coat shall follow immediately after surface preparation and cleaning within an eight-hour working day. Any cleaned areas not receiving first coat within an eight-hour period shall be re-cleaned prior to application of first coat. Field priming operations may be postponed until the end the last shift of each work week provided that dehumidification equipment is utilized in accordance with this section.
- B. Should dehumidification be used to delay each day's field coating requirements it shall be used to control the environment within the tank space 24 hours a day during blast cleaning and coating application. The system shall be similar or equal to the following requirements. In order for payment to the contractor for the use of this equipment written authorization must be received from the Owner at the recommendation of the coating consultant.
- C. If dehumidification equipment is used, special care shall be made to assure that any field applied interior zinc primer is properly cured prior to overcoating with epoxy. If used, dehumidification equipment may be turned off in order to attain the proper ambient condition required during zinc primer curing phase.
- D. Operation Criteria:
  - 1. The tank shall be continuously dehumidified 24 hours per day, 7 days per week during blasting, coating, between applications of coating, unless approved in writing by the Engineer. The equipment shall provide a relative humidity within the work space that does not exceed 35 percent 24 hours per day.
  - 2. Maintain the dehumidification system at all times. Only ventilation equipment, not dehumidification equipment is required throughout final cure period.
  - 3. Dehumidification equipment shall also provide the necessary ventilation for the removal of solvent vapors during the coating. At all times, maintain the concentration of solvent vapors in all parts of the tank at 10-percent below the lower explosive limit (LEL).
  - 4. Ducting shall be a minimum of 18 inches in diameter, airtight and reinforced with spirally-wound wire to prevent collapse. Size of ducting shall be larger if deemed necessary by the Contractor in order to comply with these specifications or any local, state, or federal safety regulations. Sizing of the ducting, ventilation, and dehumidification equipment shall be the

sole responsibility of the Contractor. Provide an appropriate connecting device between the 18-inch duct and designated opening. All bends in duct work shall have a minimum radius of 2 X ID of the ducting (i.e. 18" ID = 36" minimum radius).

5. The Contractor shall design and submit for review a dehumidification and ventilation plan, which provides for a minimum cross-draft velocity of 100 feet per minute in the vicinity of the work area. The cross-draft velocities shall be obtained with the use of a portable blower or fans.
6. The areas adjacent to the surface that are to be blasted and coated shall not be exposed to a relative humidity over thirty-five percent. Furthermore, these areas shall not have a surface temperature that is less than 15 degrees F above dew point at any time during cleaning and coating phases.

E. Equipment:

1. The dehumidification equipment shall be a solid desiccant (not liquid, granular, or loose lithium chloride) design having a single rotary desiccant bed capable of continuous operation, fully automatic, with drip-proof automatic electrical controller.
2. The equipment shall be capable of making two complete air changes every sixty minutes unless the 100 feet per minute cross-draft velocity requirement requires a larger volume.
3. The processed air from the dehumidification unit must maintain a relative humidity of fifteen percent or less.
4. During the coating phase, dehumidification units shall have auxiliary heaters capable of maintaining a constant air temperature inside the tank.
5. Air heaters are not acceptable as substitutes for dehumidification units.
6. Air chillers, heaters, or air conditioners may be used downstream of the dehumidifiers if they are approved for use by the manufacturer of the dehumidification equipment and the Engineer.
7. A sound containment needs to be built around the equipment to reduce the noise in the neighborhood. Use of bale hay, blankets, plywood, acoustic panel or any sound barriers material can be used to build the structure.

F. When implemented, dehumidification equipment shall be operated continuously, 24 hours a day, seven days per week from the time abrasive blasting begins, through to completion of all lining application. Equipment shall be turned off only for regular servicing or fueling of climate control equipment or generator(s). Equipment can be turned off during periods when there is no demand for dehumidification only if automatic controls are installed that perform the following:

1. Activates and deactivates the equipment by determining the difference between the coldest surface temperature and the dew point temperature in the tank.
2. Measures and logs surface temperature, inside air temperature, inside dew point temperature and equipment run time at 1-minute intervals. Copies of this data will be delivered to the owner's representative.

### **3.10 FINAL CURING OF EPOXY COATING**

- A. Upon completion and acceptance of applied lining system, Contractor shall furnish an approved exhaust fan or blower of sufficient capacity to insure removal of solvent vapors during curing process. The fan or blower, after approval by Engineer, shall be installed as directed by the Engineer and shall remain in continuous operation until coating is completely cured as determined by the manufacturer of the coating system.
- B. After completion of curing cycle as required by the lining manufacturer, the Contractor shall test the applied coating with a solvent rub test performed in accordance with ASTM D5402 to verify adequate curing has been attained.
  - 1. If final cure has not been attained, ventilation shall be continued until applied lining passes the solvent wipe test.
- C. After final cure is approved by Owner, Contractor shall remove fan or blower.

### **3.11 DISINFECTION**

- A. Disinfecting of interior surfaces of the tank shall be accomplished in the presence of the Engineer, in conformance to AWWA Standard C652 Section 4.2 Chlorination Method 2 as modified herein:
  - 1. Disinfection shall be accomplished after protective coating has been applied to the interior surfaces and has been totally cured as required in 3.12 "FINAL CURING OF EPOXY COATING."
  - 2. Prior to disinfecting, the complete interior shall be cleaned by the Contractor with an approved cleaner or detergent applied via high pressure or hot solution method. All residue on the lining film shall be removed. Residual water and contamination removed during washing process shall be thoroughly flushed from the tank. This operation shall be accomplished after completion of interior coating work as approved by the Engineer.
  - 3. After completion of cleaning cycles as noted above, interior surfaces shall be jet washed with a chlorine or chloramine solution having a content of 200 P.P.M. Rinsing with clean water is not required unless directed by Owner.
  - 4. Once the tank has been completely filled, the tank will be isolated for the water system and the Owner will conduct Bac-T tests. Should the Bac-T test fail, the Contractor will be responsible for reimbursing the Owner for the water required to rechlorinate the tank as described above until the Bac-T tests are negative.

### **3.12 TESTING FOR VOLATILE ORGANIC COMPOUNDS (VOC'S)**

- A. In order to monitor the presence of excessive levels of VOC's leached into the water from the coating process, the following procedure shall be utilized:
  - 1. After satisfactory curing and disinfection, the Owner in accordance with standard filling procedures shall fill the tank. Water shall then be retained for a period of 5 days.
  - 2. On the sixth day following completion of filling of tank, samples of the water shall be removed by Owner in accordance with latest Health Department memoranda. Samples shall then be

forwarded, by Owner, to an approved test laboratory for testing to determine presence of VOC'S.

3. After testing of samples, results must show levels of leached organics to be in accordance with levels established by the Health Department for various VOC'S. Health Department will verify results and tank will be then placed into operating service.
4. If levels of leached organics exceed those acceptable to the Health Department, the tank shall be drained, flushed, refilled and retested; all at the Contractor's expense. Failure of the tank to attain levels acceptable to the Health Department shall be the responsibility of the Contractor and remedial measures to attain such levels shall be at his sole expense.

### **3.13 TASTE AND ODOR**

- A. In addition to the VOC test and Bac-T, the tank must past the water taste and odor by the District. The District has had the experience from tank coating, that if a taste and odor is detected at the tank source the consumers will also notice. Coating contractor shall have a contingent plan for this project. Contractor will be responsible for the cost of water if the tanks needs to be drain.

### **3.14 CLEAN-UP**

- A. Upon completion of the work, all staging, scaffolding and containers shall be removed from the site or destroyed in a manner approved by the Engineer. Coating or paint spots upon adjacent surfaces shall be removed and the entire jobsite cleaned. All damage to surfaces resulting from the work of this section shall be cleaned, repaired, or refinished to the complete satisfaction of the Engineer at no cost to the Owner.

### **3.15 OMISSIONS**

- A. Care has been taken to delineate herein those surfaces to be coated. However, if coating or painting requirements have been inadvertently omitted from this section or any other section of the specifications, it is intended that all metal surfaces, unless specifically exempted herein, shall receive a first-class protective coating or paint equal to that given the same type surface pursuant to these specifications.

**END OF SECTION**



## **SECTION 10 50 00 - FIBERGLASS REINFORCED PLASTIC (FRP) SHED FOR EQUIPMENT STORAGE**

### **PART 1 GENERAL**

#### **1.01 DESCRIPTION**

- A. The Contractor shall furnish and install all FRP buildings, equipment, components and accessories as specified herein. All said buildings, equipment, components and accessories shall be provided by a single supplier or manufacturer to assure compatibility and proper performance.
- B. Refer to the A2 – Chemical Feed Building – Layout in the Appendix.

#### **1.02 REFERENCE SPECIFICATIONS, CODES AND STANDARDS**

- A. All buildings, equipment, components and accessories shall be designed, manufactured, inspected and delivered in accordance with the latest edition of the following specifications, codes and standards:
  - 1. ASTM D 790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
  - 2. ASTM D2563 Standard Practice for Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts
  - 3. ASTM D 2583 Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.

#### **1.03 WARRANTY**

- A. The FRP building shall be provided with a five (5) year manufacturer's warranty against defects in material and workmanship beginning the when the entire project is deemed substantial completion.

#### **1.04 SUBMITTALS**

- A. The supplier or manufacturer shall submit the following documents for acceptance prior to manufacturing, assembling and/or shipping the specified buildings, equipment, components or accessories:
  - 1. Complete fabrication drawings showing all materials and dimensions of the FRP building and associated appurtenances.
  - 2. Complete assembly drawings showing the locations of all equipment, components and accessories to be provided by the manufacturer or supplier in accordance with this specification.
  - 3. Original Equipment Manufacturer (OEM) product data sheets for all equipment, components and accessories being provided by the manufacturer or supplier in accordance with this specification.

4. If required per section 2.02, submit complete design calculations for all design loads including: dead loads, live loads, wind loads, and seismic loads prepared and signed by Registered Civil Engineer licensed in the State of which the project will be completed.
5. Detailed information and/or drawings showing standard options for building anchorage. All material, equipment, labor and provisions associated with the FRP building foundation and anchorage design and construction shall not be made part of this specification section and shall not be provided by the FRP building supplier or manufacturer.
6. Instructions and recommendations for unloading, handling, storage, and installation.

#### **1.05 DELIVERY, STORAGE AND HANDLING**

- A. The manufacturer or supplier shall take reasonable precautions to protect all products covered within this specification section from damage during shipment.
- B. The contractor shall take the proper precautions to protect all products covered within this specification section from damage following receipt of shipment. Damage incurred while loading, unloading, moving, storing, assembling or installing the products covered within this specification section shall be the sole liability of the contractor.

### **PART 2 PRODUCTS**

#### **2.01 APPROVED MANUFACTURER AND SUPPLIERS**

- A. **Orenco Composites, a Division of Orenco Systems, Inc. – Roseburg, OR – (541) 459-6970.**
- B. To submit on alternative manufacturers or suppliers the following requirements must be met: The engineer must receive the formal substitution request no later than ten (10) calendar days prior to the assigned bid date. If approved, an addendum will notified prospective bidders at least minimum of 3 working days prior to bid opening which alternative manufacturers will be permitted use.
  1. No substitution requests will be considered after the project has formally bid.
  2. All substitution requests shall include this specification section marked-up with either a green (✓) or red (X) next to all paragraphs and subparagraphs. A green (✓) shall signify that the proposed substitution specifically adheres to the paragraph/subparagraph in question. A red (X) shall signify that the proposed substitution deviates from the paragraph/subparagraph in question. For all paragraphs/subparagraphs in which a red (X) is utilized a detailed description of the deviation shall be provided. IMPORTANT - It is the contractor's responsibility to accurately and fully document all deviations within this substitution document as any undocumented deviations will be cause for rejection of the structure and shall provide the Orenco product specified herein.
  3. All substitution requests shall include sufficient manufacturer provided literature, data sheets and drawings such that the engineer is able to confirm that all requirements of this specification section are met.

## 2.02 FRP BUILDING DESIGN AND MANUFACTURING REQUIREMENTS

- A. Provide (2) FRP buildings meeting the following requirements:
1. Structure Names:
    - a. Mid-Peninsula Water District Main
    - b. Mid-Peninsula Water District Secondary
  2. Exterior Width:
    - a. Main - 12'w
    - b. Secondary - 12'w
  3. Side Wall Height:
    - a. Main – 10'h
    - b. Secondary – 8'h
  4. Exterior Length:
    - a. Main – 31'l
    - b. Secondary – 11' l
  5. FRP Floor Required: None
  6. PE Stamped Structural/Seismic Calculations Required: Yes
  7. Exposure: C
  8. Category: Cat II
  9. Design Velocity(Wind): 115mph
  10. Minimum Design Thermal Resistance: R-24
  11. Exterior Color: Torque Tan
  12. Interior Color: White
- B. The FRP buildings shall each be a seamless, molded, one-piece building manufactured using a closed-molded RTM or vacuum-infusion process. Open-molded and/or panel assembled buildings shall not be acceptable. To ensure a seamless, strong and weather-proof design, a building shall be determined panel assembled (and therefore not allowed) if any portion of the walls and/or roof are molded or manufactured individually.
- C. To reduce the risk of delamination due to rotting, swelling and/or rusting, the FRP building shall be manufactured of 100% composite materials. Embedded wood and or ferrous metals shall not be allowed.
- D. The ability to move existing equipment and/or install new equipment within the structure is critical for future use. To ensure full and unimpeded equipment mounting access to all interior

and exterior wall locations all structural laminates shall be of sufficient strength to handle direct mounting of heavy equipment using standard, readily available mounting hardware. Specifically, each piece of mounting hardware shall be rated to an ultimate pull-out strength of 1,750lbs (minimum) when properly anchored within the structural laminate. Equipment mounting boards of any type or material shall not be allowed as they restrict mounting access for future equipment and introduce degradable materials into the structure.

- E. The FRP buildings shall be manufactured from fiberglass reinforced polyester resin, using grades of resin and fiberglass considered acceptable for use in water and wastewater environments. All FRP laminate shall obtain a minimum glass reinforcement content of 50%. Insulation foam with a minimum density of 2 lb/ft<sup>3</sup> shall be polyurethane or polyisocyanurate and shall be integrally molded within the structure walls, roof and floor. The FRP building walls, roof and floor shall be manufactured to include integrally molded FRP columns, spaced at a minimum of 8" on-center, to increase structural integrity and prevent delamination.
- F. All interior surfaces shall be protected with a polyester gelcoat. All exterior surfaces shall be protected with a high performance, UV resistant, acrylic urethane copolymer coating rated for continuous outdoor exposure.
- G. The FRP buildings shall be manufactured with in-wall, embedded anchor pockets. To ensure equipment may be located directly against all interior walls, internally protruding mounting flanges shall not be acceptable. Exterior mounting flanges shall not be acceptable for security reasons. A manufacturer provided gasket or butyl sealant shall be installed between the FRP building and concrete foundation at the time of installation.
- H. The FRP buildings shall include a roof of identical construction to that of the walls. The roof shall be sloped to allow drainage.
- I. The FRP buildings shall be equipped with lifting brackets or eyebolts installed on the roof exterior to facilitate lifting and installation of the structure.
- J. The Secondary building shall be joined/connected to the Main building in the field. The buildings shall connect using both a mechanical method and structural method.
- K. The Main building shall come with pultruded FRP angle at the opening location where the secondary building will connect to the main building.
- L. The FRP angles shall be used to square the secondary building with main building. The FRP angles shall be suitable for mechanical fastening and structural fastening of the two structures.
- M. All supplies needed for sealing, mechanical fastening and structural fastening of the Secondary building to the Main building shall be provided by the FRP building manufacturer.

### **2.03 DOORS, FRAMES AND HARDWARE**

- A. The FRP structure shall be supplied with the type, size and quantity of doors and hardware as specified below or as shown on the project drawings.
- B. All single/double doors shall be of FRP construction with a 2" minimum polyurethane or polyisocyanurate foam core (minimum density of 2 lb/ft<sup>3</sup>).
- C. Each single/double door shall be hung on 4-inch × 4-inch stainless steel ball bearing hinges with non-removable pins. The hinges shall be bolted through the door jam with 304 stainless steel fasteners. Single/double doors are supplied with commercial-grade 1, lever- type handles.
- D. Door frames shall be composed entirely of FRP material and shall be mounted separately to the structure after the molding process is complete. To permit use of standard, industrial doors and hardware, submarine style door systems (or similar systems in which the frame is molded into the wall of the unit) shall not be allowed.
- E. To eliminate tripping hazards and facilitate entry and exit from the building, the area below the door shall be free of any and all building material, framing and/or extensions of the structure. Raised or integral door sills shall not be acceptable.
- F. The FRP structure shall be provided with an FRP drip cover above the entire length of the doors.
- G. The building(s) shall contain a roll up style door. The roll up door shall be Thermacore 625 series insulated door or equivalent. Door shall be roll up design to allow maximum ceiling open area. Contractor shall submit a roll up door for review.

### **2.04 HEATING, VENTILATION, AND AIR CONDITIONING**

- A. Provide (2) exhaust fans rated to a minimum of 772cfm. Exhaust fan shall be a Dayton 1HLA2 or approved equal.
- B. Provide (1) timer to control exhaust fan. Timer shall be a Intermatic ST01 or approved equal.
- C. Provide (1) line voltage mechanical thermostat to control exhaust fan. Thermostat shall be a Dayton 4LZ94 or approved equal.
- D. Provide (2) 4.5kW electric wall heater with integrated thermostat. Heater shall be a King LPW2445 or approved equal.
- E. Provide (2) wall mounted air conditioning unit rated to 25,000 BtuH with integrated thermostat. Air conditioning unit shall be a Frigidaire FFRE25332 or approved equal.
- F. Provide (2) 18-inch square wall-mount intake louvers with adjustable damper and insect screen and electric actuator motor kit. Intake louver shall be Dayton 5NKH6 or approved equal. Actuator shall be Dayton 5NKPO or equivalent.
- G. A split ductless system for heating and air conditioning is considered an acceptable alternative. The split ductless shall be Mitsubishi, Daikin or equivalent. The split ductless system shall have appropriate number of head units to satisfy heating and cooling requirements in Main building and secondary building.

## **2.05 ELECTRICAL**

- A. All components, equipment, wiring and ancillary items shall be provided and installed in conformance with the National Electric Code as well as all applicable state and local codes.
- B. Provide (1) 125-amp, single-phase, NEMA 3R, surface-mount, load center in addition to all breakers and components required to provide a fully functioning system. Load center shall be Eaton or approved equal.
- C. Provide (6) 15-amp, duplex, feed-through, outdoor rated GFCI receptacles housed within weatherproof enclosures. Receptacles shall be Leviton or approved equal.
- D. All components shall be wired to the load center using standard 12 AWG THHN wiring within rigid, UL listed, schedule 40, PVC electrical conduit.
- E. Provide an adequate quantity of 20-amp toggle switch(s) to control all equipment. Toggle switches shall be housed within weatherproof enclosures and shall be Leviton or approved equal.
- F. Provide an adequate quantity of 4-foot, damp location rated, vapor-proof, florescent, dual light fixtures such to provide a minimum output of 35 lumens per square foot of interior structure space. Interior light fixtures shall be Lithonia XVML L48 5000LM MVOLT 40K 80CRI or approved equal.
- G. Provide (2) LED exterior light fixture above or adjacent to each door. Exterior light fixtures shall include an integrated photocell and shall be Lithonia TWS LED 1 50K 120PE or approved equal.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. All buildings, equipment, components, and accessories shall be stored, fabricated, assembled, erected, moved, and tested in accordance with the bid documents and the manufacturers, suppliers and original equipment manufacturers (OEM's) written recommendations and instructions.

### **3.02 INSTALLATION OF THE FRP SHED**

- A. All buildings, equipment, components and accessories shall be installed in strict accordance with manufacturer's printed recommendations. Appropriately sized lifting equipment shall be used to off-load the building using the manufacturer supplied lifting lugs.
- B. All buildings shall be installed on level and flat concrete slabs or foundations free of cracks and vertical projections. The contractor shall install a manufacturer supplied neoprene gasket in between the FRP building and concrete foundation at the time of placement.
- C. Slab and stem wall design per engineers plans.
- D. All pipe and conduit penetrations through concrete foundation, FRP roof, and FRP walls shall be completely sealed to provide an air and weather tight structure. All building equipment and accessories shall be mounted directly to the FRP wall using either walldog screws (60lb design pull-out strength, 406lb ultimate) and/or rivet nuts (200lb design pull-out strength, 1,781lb

ultimate) depending on the equipment loading requirements. The contractor shall consult with the manufacturer or supplier should equipment loadings exceed the aforementioned mounting hardware capabilities.

**END OF SECTION**

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**SECTION 13 47 13 – GALVANIC ANODE CATHODIC PROTECTION SYSTEM**

**PART 1 GENERAL**

**1.01 SCOPE OF WORK**

- A. Work included under this section consists of furnishing and constructing a galvanic anode cathodic protection system for *steel or ductile iron metallic pipe fittings only*. The anodes and appurtenances are to be installed as shown on the standard drawings and as specified herein.
- B. Cathodic Protection for tanks shall be designed by the tank manufacturer.

**1.02 SUBMITTALS**

- A. Submit catalog data on anodes, test boxes, shunts, exothermic welds, and weld coating.

**PART 2 MATERIALS**

**2.01 ZINC ANODES**

- A. Zinc anodes shall weigh 15 lb, 30 lb or/and 60 lb as directed by the District. All zinc anodes to be packaged inside a cotton cloth bag with special backfill as shown in Standard Drawings. A #12 AWG THHN, solid copper lead wire shall be silver soldered to the galvanized steel anode core and the connection sealed by the supplier. The lead wire shall be of sufficient length to reach the test station without splicing.
- B. Anode alloy and special backfill shall conform to the following chemical compositions:

Anode Composition

Lead 0.006% Max.  
Iron 0.0030% Max.  
Cadmium 0.025 - 0.07%  
Copper 0.005% max.  
Aluminum 0.1 – 0.55%  
Zinc Remainder

Anode Special Backfill

Ground Hydrated Gypsum 75%  
Powdered Wyoming Bentonite 20%  
Anhydrous Sodium Sulfate 5%

**2.02 ANODE BOXES**

- A. Anode boxes shall be precast concrete with cast iron locking cover marked "ANODE" and shall be a Christy Concrete G05T box with G05CT cover.

**2.03 TEST BOARDS**

- A. Test boards shall be COTT Manufacturing "Big Fink". Hardware shall be nickel plated brass. Solderless lugs shall be nickel plated copper or red brass of the smallest size suitable for the wire sizes. Identify each lead wire with a wire marker and coat with a clear heat shrink sleeve as shown in drawing.

## **2.04 WIRE**

- A. Anode wires are specified under Zinc Anodes. Other wiring to be of the size and color shown on Standard Drawing and shall have THHN insulation.
- B. For connecting wiring from anodes and fittings into test stations, the District will only allow the use of a single anode and single test station for fittings / tees / valves which are located within 20 feet or less of each other. These fittings / tees / valves shall be connected to a separate terminal with a wire labelled for identification, unless directed by the District otherwise.
- C. Any fittings / tees / valves located 20 feet or more of each other shall have their own anode and test station unless directed by District otherwise.
- D. Long bond wires shall be taped to the pipe every five (5) feet.

## **2.05 SHUNTS**

- A. Current measuring shunts shall be 0.01 ohm, with 5 ampere current capacity, Holloway type RS, Cott Manufacturing Company, or equivalent.

## **2.06 EXOTHERMIC WELDS**

- A. Exothermic welds shall be "Cadweld" by Erico Products, or "Thermoweld" by Continental Industries Inc. Mold shall be the type recommended by the manufacturer for the wire size, metal shape, and orientation. Weld alloy shall be formulated for use on steel or iron pipe as appropriate and shall be of the weight recommended by the manufacturer for the size cable and mold being used. Welds to be buried or submerged shall be primed with an elastomer resin based primer then be covered with a 100% solids mastic filled plastic cap. Primer and cap shall be Roybond Primer 747 and Handy Cap manufactured by Royston Laboratories.

## **2.07 INSULATED JOINTS**

- A. Insulate flange joints to electrically isolate tanks from below piping will be a full face dielectric gasket and double washer bolt insulation on each bolt and restraining rod passing through or around the dielectric gasket. Dielectric gasket shall be 1/8-inch thick, full face phenolic with a nitrile or neoprene sealing element in a groove in the gasket designed for 250 PSI pressure in a waterline. Bolt insulation shall be phenolic washers and polyethylene or mylar sleeves or shall be one piece Minlon sleeve and washer. Insulating materials shall be manufactured by Central Plastics Company, or PSI.

## **PART 3 EXECUTION**

### **3.01 PIPE-TO-SOIL POTENTIALS**

- A. Measure native pipe-to-soil and open anode potentials at each wire at each test station to portable reference cells. Repair or replace any wires, test stations, or anodes that are not operating properly. Remeasure potentials at least one hour after all anodes have been connected and measure anode shunts. Type data in clear tabular form and submit to the District.

### **3.02 ANODES**

- A. Anodes shall be installed as shown on the drawings. Anodes may be installed vertically or horizontally. Center anode in package by massaging package as necessary. The anode packages shall be soaked with ten gallons of water after backfilling to a point 12" above the top of the anode. Anode wires shall be carefully run and protected against damage during installation and backfilling operations. The anode lead wire shall not be used for lowering or handling the anode.

### **3.03 EXOTHERMIC WELDS**

- A. Clean pipe to bright metal. Weld according to manufacturer's instructions. Test completed weld by striking weld with a hammer and pulling on wire. If weld comes off, repeat pipe cleaning and welding, and retest. Remove flux and coat as specified above.

### **3.04 SPLICE**

- A. Splices shall be made only where shown or approved by District as a repair. Splices shall be made using split bolt connectors or crimp connectors of the smallest size compatible with the cables being used. Connections shall be insulated with two half lapped layers of rubber tape and at least one half lapped layer of plastic tape, by encasing in resin (3M Scotchcast), heat shrink sleeve (Raychem ASE).

### **3.05 BACKFILL**

- A. All backfill material and compaction shall be per Section 31 80 00 - Trench Excavation, Bedding, and Backfill.

**END OF SECTION**

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## **SECTION 22 14 00 – STORM DRAINAGE SYSTEM**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Site storm drainage up to 5-feet of any on-site building.

#### **1.02 RELATED SECTIONS**

- A. Section 31 80 00, Trench Excavation, Bedding, and Backfill
- B. Section 32 10 00, Paving, Restoration, and Resurfacing Work

#### **1.03 RELATED DOCUMENTS**

##### A. AASHTO:

1. M 199: Precast Reinforced Concrete Manhole Sections.
2. M 252: Corrugated Polyethylene Drainage Pipe.
3. M 294: Corrugated Polyethylene Pipe, 12 to 48-inch Diameter.

##### B. ASTM:

1. A 74: Cast Iron Soil Pipe and Fittings.
2. A 615/A615M: Deformed and Billet-Steel Bars for Concrete Reinforcement.
3. A 716: Ductile Iron Culvert Pipe
4. A 746: Ductile Iron Gravity Sewer Pipe
5. C 443: Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
6. C 478: Precast Reinforced Concrete Manhole Sections.
7. C 564: Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
8. C 1103: Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
9. C 1173: Flexible Transition Couplings for Underground Piping Systems.
10. D 1785: Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
11. D 2235: Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and fittings.
12. D 2321: Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
13. D 2564: Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.

14. D 2751: Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
15. D 3034: Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
16. D 4101: Specifications for Propylene Injection and Extrusion Materials.
17. F 477: Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
18. F 656: Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
19. F 679: Specification for Poly(Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings.
20. F-1336: Poly(Vinyl Chloride) (PVC) Gasket Sewer Fittings.

C. AWWA:

1. C104: Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
2. C105: Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. C110: Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76 mm Through 1,219 mm) for Water.
4. C111: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. C150: Thickness design of Ductile Iron Pipe.
6. C151: Ductile-Iron Pipe, Centrifugally Cast, for Water.
7. C153: Ductile-Iron Compact Fittings for Water Service.
8. M41: Ductile Iron Pipe and Fittings.

D. Caltrans Standard Specifications:

1. Section 51, Concrete Structures.
2. Section 52, Reinforcement.
3. Section 65, Reinforced Concrete Pipe.
4. Section 66, Corrugated Metal Pipe.
5. Section 70. Miscellaneous Facilities.
6. Section 72, Slope Protection.
7. Section 75 Miscellaneous Metal.

E. Caltrans Standard Plans:

1. Plan D94A: Metal and Plastic Flared End Sections.
2. Plan D94B: Concrete Flared End Sections.
3. Plan D97A: Corrugated Metal Pipe Coupling Details No.1, Annular Coupling Band Bar and Strap and Angle Connection.
4. Plan D97B: Corrugated Metal Pipe Coupling Details No. 2, Hat Band Coupler and Flange Details.
5. Plan D97C: Corrugated Metal Pipe Coupling Details No. 3, Helical and Universal Couplers.
6. Plan D97D: Corrugated Metal Pipe Coupling Details No. 4, Hugger Coupling Bands.
7. Plan D97E: Corrugated Metal Pipe Coupling Details No. 5, Standard Joint.
8. Plan D97F: Corrugated Metal Pipe Coupling Details No. 6, Positive Joint.
9. Plan D97G: Corrugated Metal Pipe Coupling Details No. 7, Positive Joints and Downdrains.
10. Plan D98A: Slotted Corrugated Steel Pipe Drain Details.
11. Plan D98B: Slotted Corrugated Steel Pipe Drain Details.

**1.04 DEFINITIONS**

- A. AASHTO: American Association of State Highway and Transportation Officials.
- B. ABS: Acrylonitrile-butadiene-styrene.
- C. ASTM: American Society for Testing Materials.
- D. AWWA: American Water Works Association.
- E. CMP: Corrugated metal pipe.
- F. DIP: Ductile iron pipe.
- G. HDPE: High-density polyethylene.
- H. NPS: Nominal pipe size.
- I. PE: Polyethylene.
- J. PVC: Polyvinyl chloride.
- K. RCP: Reinforced concrete pipe.

## **1.05 SUBMITTALS**

- A. Follow submittal procedure outlined in **Section 01 33 00**.
- B. Product Data and Shop Drawings for the following:
  - 1. Piping materials and fittings.
  - 2. Special pipe couplings.
  - 3. Polymer-concrete, channel drainage systems (trench drains).
  - 4. Joint sealants.
  - 5. Plastic area drains.
  - 6. Cleanout plugs or caps.
  - 7. Precast concrete catch basins, inlets, curb inlets, junction structures and area drains, including frames and grates.
  - 8. Precast clean out, drop inlets, and box covers.
  - 9. Concrete, metal and plastic flared end sections.
  - 10. Design Mix Reports and Calculations:
    - a. For each class of cast in place concrete.
    - b. Field Test Reports: Indicate and interpret test results for compliance with performance.

## **1.06 DELIVERY, STORAGE AND HANDLING**

- A. Do not store plastic structures, pipe and fittings in direct sunlight.
- B. Protect pipe, fittings, and seals from dirt and damage.
- C. Handle precast concrete pipe, manholes and other precast structures according to manufacturer's written instructions.
- D. Protect imported bedding and backfill material from contamination by other materials.



## **PART 2 PRODUCTS**

### **2.01 PIPING MATERIALS**

- A. ABS Pipe and Fittings: Smaller than 4-inch, ASTM D 2751, SDR 35.
  - 1. Solvent cement joints. Solvent Cement: ASTM D 2235.
- B. ABS Pipe and Fittings: 4-inch through 12 inch, ASTM D 2751, SDR 35. Bell and spigot joints.
  - 1. Bell and Spigot Joint Gasket: Elastomeric seal, ASTM F 477.
- C. Cast Iron Pipe and Fittings: Hub and spigot, 2-inch through 15-inch, ASTM A74, service class.
  - 1. Gaskets: ASTM C 564, rubber, compression type, thickness to match class of pipe.
- D. Corrugated Metal Pipe and Fittings: Caltrans Standard Specification Section 66.
  - 1. Bituminous Coating: Caltrans Standard Specification Section 66-1.03.
  - 2. Bituminous Lining: Caltrans Standard Specification Section 66-1.03.
  - 3. Bituminous Pavings: Caltrans Standard Specification Section 66-1.03.
  - 4. Corrugated Aluminum Pipe: Caltrans Standard Specification Section 66-2.
  - 5. Corrugated Steel Pipe: Caltrans Standard Specification Section 66-3.
  - 6. Slotted Corrugated Steel Pipe: Caltrans Standard Specification Section 66-3.09.
  - 7. Details: Caltrans Standard Plans D97A, D97B, D97C, D97D, D97E, D97F, D97G, D98A and D98B.
- E. DIP: Sizes 4-inch through 48-inch.
  - 1. Refer to Section 33 14 13 – Water Main
- F. PVC Pipe and Fittings, 4-Inch and Larger
  - 1. Pipe:
    - a. 4-inch through 15-inch: ASTM D 3034, SDR 35. Bell and spigot joints.
    - b. 18 inch through 36-inch: ASTM F 679, T-1 wall. Bell and spigot joints.
  - 2. Fittings:
    - a. 4-inch through 27-inch: ASTM F 1336.
    - b. 30-inch through 36-inch: ASTM D 3034, SDR 35.
  - 3. Joint Gasket: Elastomeric seal, ASTM F 477.

4. Joints:
  - a. Push-On Bell and Spigot Joint: AWWA C111.
  - b. Mechanical Joint: AWWA C111.
  - c. Flanged joint. AWWA C115.
  
- G. Reinforced Concrete Pipe:
  1. Designated by Class, rubber gasketed joints. Circular Reinforced Concrete Pipe: Caltrans Standard Specification Section 65-1.02A(1). Class III.
  2. Oval shaped (Elliptical) Reinforced Concrete Pipe: Caltrans Standard Specification Section 65-1.02B. Class HE-III and VE-III.
  3. Reinforced Concrete Pipe Arch: Caltrans Standard Specification Section 65-1.02C.
  4. Rubber Gasketed Joints: Caltrans Standard Specification Section 65-1.06.
  
- H. PE Pipe and Fittings: 4-inch through 10-inch, AASHTO M 252, Type S, smooth interior and corrugated exterior. Bell and spigot joints.
  1. Bell and Spigot Joint Gasket: Elastomeric seal, ASTM F 477.
  2. Couplings: AASHTO M 252, corrugated band type. Engage a minimum of 4 corrugations, 2 on each side of pipe joint.
  
- I. PE Pipe and Fittings: 12-inch through 48-inch, AASHTO M 294. Type S, smooth interior and corrugated exterior.
  1. Bell and spigot joints. Bell and Spigot Joint Gasket: Elastomeric seal, ASTM F 477.
  2. Couplings: AASHTO M 294, corrugated band type. Engage a minimum of 4 corrugations, 2 on each side of pipe joint.
  
- J. PVC Pipe and Fittings-Smaller than 4-Inch: ASTM D1785, Schedule 40.
  1. Joints: Solvent Cement, ASTM D 2564. Include primer according to ASTM F656.
  
- K. PVC Pipe and Fittings 4-Inch and Larger
  1. Pipe:
    - a. 4-inch through 15-inch: Schedule 40. Bell and spigot joints.
    - b. 18 inch through 36-inch: ASTM F 679, T-1 wall. Bell and spigot joints.

2. Fittings:

- a. 4-inch through 27-inch: ASTM F 1336.
- b. 30-inch through 36-inch: ASTM D 3034, SDR 35

3. Joint Gasket: Elastomeric seal, ASTM F 477.

**2.02 PIPE ANCHORS**

- A. Site Concrete: Section 03 31 00.

**2.03 SPECIAL PIPE COUPLINGS**

- A. Plastic, Cast Iron and Ductile Iron Pipe: ASTM C 1173. Rubber or elastomeric sleeve and stainless steel band assembly fabricated to match outside diameters of pipes to be joined.
- B. Reinforced Concrete Pipe: Portland cement collar as indicated.

**2.04 CLEANOUTS**

- A. Piping: Same as storm drain line if possible.
- B. Top Plug or Cap: Same material as piping if possible. Plug or cap to be secure but removable, threaded or non-threaded.
- C. Box Size: As required to provide access and allow easy removal and reinstallation of plug or cap.
- D. Box Types:
  - 1. Non-Traffic Areas: Portland cement concrete box and box cover, light duty.
  - 2. Traffic Areas: Portland cement concrete box and box cover or steel or cast iron cover, heavy duty, both box and cover to be rated for AASHTO H20 loading.
- E. Box Cover Markings: "S.D.," unless otherwise specified.
- F. Available Manufacturers: Subject to compliance with requirements, box manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
  - 1. Associated Concrete Products, Inc.
  - 2. Brooks Products Inc.
  - 3. Christy Concrete Products, Inc.

**2.05 CURB INLETS, CATCH BASINS, DROP INLETS, JUNCTION STRUCTURES, AREA DRAINS, ETC.**

- A. General: Size, shape, configuration, depth, etc. of structure and frame, grate, or cover shall be as indicated.
- B. Site Concrete: Section 03 30 00.
- C. Precast Structure: Rate for AASHTO H20 loading in traffic areas.

- D. Steps: ASTM C 478 or AASHTO M 199. Manufacture from deformed, ½-inch steel reinforcement rod complying with ASTM A 615 and encased in polypropylene complying with ASTM D4101. Include pattern designed to prevent lateral slippage off step. Acceptable manufacturer is Hanson Concrete Products.
- E. Frames, Grates and Covers: Caltrans Standard Specification Section 75-1.02, 75-1.03 and 75-1.05.
  - 1. Galvanize steel frames, grates and covers.
  - 2. Grates and covers shall be non-rocking.
  - 3. Rate for AASHTO H20 loading in traffic areas.

## **2.06 MANHOLES**

- A. General: Size, shape, configuration, depth, etc. of manhole and frame and cover shall be as indicated.
- B. Portland Cement Concrete and Reinforcing:
  - 1. Site Concrete Section 03 30 00.
  - 2. Precast Portion: ASTM C 478 or AASHTO M199. Rate for AASHTO H20 loading in traffic areas.
- C. Frames and Covers: As indicated and in accordance with Caltrans Standard Specification Section 75-1.02.
- D. Steps: Manufacture from deformed, ½-inch steel reinforcement rod complying with A 615/A 615M and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Acceptable manufacturer is Hanson Concrete Products or equal.

## **2.07 JOINT SEALANT FOR PRECAST STRUCTURES AND MANHOLES**

- A. Mortar: Caltrans Standard Specification Section 51-1.135.
  - 1. Use to seal around pipes at connections to structures and manholes. Also use to seal joints between precast sections of structures and manholes.
- B. Gaskets: Preformed flexible rubber or plastic gasket.
  - 1. Rubber Gaskets: ASTM C 443.
  - 2. Plastic Gaskets: Federal Specification SS-S-00210 (GSA-FSS), Type I, Rope Form; or alternate standard which may exist. Acceptable material is “Ram-Nek” as manufactured by the K. T. Snyder Company (Houston TX) or equal.

## **2.08 POLYMER-CONCRETE TRENCH DRAINS**

- A. General: Modular system of precast, polymer-concrete channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling. Include number of units required to form total length required.

- B. Include the following components:
  - 1. Channel Sections: Interlocking-joint, precast modular units with end caps. Inside width as indicated with deep, rounded bottom, with built in slope or flat invert as indicated and outlets in number, sizes, and locations indicated. Include extension sections necessary for required depth.
  - 2. Frame and Grate: Gray iron, ductile iron or galvanized steel as indicated. Where drain is located in traffic areas, rate for AASHTO H20 loading.
- C. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
  - 1. "Polydrain" by ABT Inc.
  - 2. "ACO Drain" by ACO Polymer Products Inc.

## **2.09 METAL, CONCRETE OR PLASTIC FLARED END SECTIONS**

- A. General: Caltrans Standard Specification Section 70-1.02C and Caltrans Standard Plan D94A and D94B.

## **2.10 SLOPE PROTECTION**

- A. Rock Slope Protection: Caltrans Standard Specification Section 72-2.02.
  - 1. Fabric: Caltrans Standard Specification Section 72-2.025.
- B. Concrete/Shotcrete Slope Protection: Caltrans Standard Specification Section 72-4.03.
  - 1. Bar Reinforcement: Caltrans Standard Specification Section 52-1.02A, minimum Grade 40.
  - 2. Welded Wire Fabric: Caltrans Standard Specification Section 52-1.02C. Use 6 x 6-W1.4 xW1.4 unless otherwise indicated.
- C. Concreted-Rock Slope Protection: Caltrans Standard Specification Section 72-5.02.
- D. Sacked Concrete Slope Protection.
  - 1. Site Concrete: Section 03 30 00, Class C.
  - 2. Sacks: 10 ounce burlap measuring approximately 19.5-inches by 36 inches when empty and laid flat.

## **2.11 CONCRETE/SHOTCRETE DITCH LINING**

- A. General: Caltrans Standard Specification Section 72-4.03.
  - 1. Bar Reinforcement: Caltrans Standard Specification Section 52-1.02A, minimum Grade 40.

2. Welded Wire Fabric: Caltrans Standard Specification Section 52-1.02C. Use 6 x 6-W1.4 xW1.4 unless otherwise indicated.

### **PART 3 EXECUTION**

#### **3.01 PIPE INSTALLATION**

- A. General: Install pipe, fittings, and appurtenances utilizing best practices, manufacturer's instructions, and in accordance with Section 6 and 7 of ASTM D 2321 for plastic pipe, Caltrans Standard Specification Section 65-1.07 for reinforced concrete pipe, Caltrans Standard Specification Sections 66-1.045 and 66-105 for corrugated metal pipe and chapter 11.3.3 of AWWA M41 for cast iron and ductile iron pipe.
- B. Pipe Depth and Trench Configuration: Conform to typical trench section(s) indicated Section 31 80 00.
- C. Excavation, Bedding, Backfill, and Compaction: Section 31 80 00.
- D. Handling: Carefully handle during loading, hauling, unloading and placing operations to avoid breakage or damage. Use strap type slings for lifting and placing; no chains or hooks will be permitted. Comply with manufacturer's recommendations.
- E. Laying: Before lowering pipe into the trench, remove all stakes, debris, loose rock and other hard materials from the bottom of the trench. Lay accurately in conformance with lines and grades indicated. Start laying the pipeline at the low end and proceed upstream. Lay bell and spigot pipe with the bell end facing upstream. Lay pipe on a bed prepared by handwork, dug true to grade. Furnish firm bearing for pipe throughout the entire length with bell holes provided at the ends of each pipe length of sufficient size to permit making up the particular type of joint being used. Adjust pipe to line and grade by scraping away or filling and tamping material under the body of the pipe for the entire pipe length and not by blocking or wedging. After final positioning, hold pipe in place in trench with backfill material placed equally on both sides of the pipe at as many locations as required to hold the pipe section in place.
- F. Curved Alignment: When necessary to conform to the alignment specifically indicated, lay pipe on a curved alignment by means of asymmetrical closure of joints or bending of the pipe barrel. If necessary, use shorter lengths of pipe than the standard length to achieve curvature specified. Do not exceed the recommendations of the pipe manufacture for deflections at the joints or pipe bending.
- G. Closure: Close open ends of pipes and appurtenance openings at the end of each work day or when work is not in progress.

#### **3.02 INSTALLATION OF PIPE ANCHORS**

- A. Install at location, configuration and details shown on the Plans.

#### **3.03 SPECIAL PIPE COUPLINGS**

- A. General: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

- B. Installation: Manufacturer's instructions.

**3.04 CLEANOUT INSTALLATION**

- A. General: Install as indicated.

**3.05 INSTALLATION OF CURB INLETS, CATCH BASINS, DROP INLETS, JUNCTION STRUCTURES, AREA DRAINS, ETC. AND MANHOLES**

- A. Excavation, Bedding, Backfill, and Compaction: Section 31 80 00.
- B. Poured in Place Structures: Install as indicated and Caltrans Standard Specification Section 51.
  - 1. Shape bottoms to convey flows as indicated.
- C. Precast Structures: Install as indicated.
  - 1. Seal all joints and pipe entrances and exits.
  - 2. Place concrete in bottom and shape to convey flows as indicated.

**3.06 POLYMER-CONCRETE TRENCH DRAIN INSTALLATION**

- A. Excavation, Bedding, Backfill, and Compaction: Section 2310.
- B. Install: As indicated and in accordance with the manufacturer's instructions.

**3.07 CONCRETE OR PLASTIC FLARED END SECTION INSTALLATION**

- A. Install: As indicated.

**3.08 SLOPE PROTECTION PLACEMENT**

- A. Rock Slope Protection: Caltrans Standard Specification Section 72-2.03 and as indicated. Use Method B Placement unless otherwise indicated.
- B. Concrete/Shotcrete Slope Protection: Caltrans Standard Specification Section 72-4.02 and 72-4.04.
- C. Concreted-Rock Slope Protection: Caltrans Standard Specification Section 72-5.03 and 72-5.04.
  - 1. Use Method B Placement unless otherwise indicated.
- D. Sacked Concrete Slope Protection.
  - 1. Detailed configuration: As indicated.
  - 2. Use one cubic foot of concrete per sack.
  - 3. Locate headers and stretchers as indicated.
  - 4. Headers: Folded end to bank.

5. Stretchers: Folded ends are not to be adjacent.
6. Place no more than four vertical courses until initial set has taken place in first course.

### **3.09 CONCRETE/SHOTCRETE DITCH LINING PLACEMENT**

- A. Concrete/Shotcrete Slope Protection: Caltrans Standard Specification Section 72-4.02 and 72-4.04.

### **3.10 TESTING**

- A. General: Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours advance notice.
4. Submit separate reports for each test.
5. Where authorities having jurisdiction do not have published procedures, perform tests in accordance with latest edition of the Uniform Plumbing Code (UPC) Section 1109.0, Testing.
6. Leaks and loss in test pressure constitute defects that must be repaired.
7. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

- B. Reinforced Concrete Pipe:

1. Reinforced concrete pipe, sizes 27-inch and larger, shall be hydrostatically joint tested, (air test is not to be used), in the field for water-tightness in accordance with ASTM Standard C 1103.
2. Perform test after pipe is bedded but prior to any backfill.
3. Testing may be done by manufacturing pipe with double gasket joints, or by utilizing a joint tester. Contractor shall obtain the Owner's Representative's approval of details of the Contractor's selected method prior to performing the testing.
4. Inspect all joints for leakage.
5. If the pressure holds, or drops less than 1psi in 5 seconds, the joint is acceptable.

**END OF SECTION**



## **SECTION 31 01 00 - EARTHWORK**

### **PART 1 GENERAL**

#### **1.01 SUMMARY**

- A. In accordance with pertinent provisions of this Section, excavate, backfill, compact, and grade the site to the elevations shown on the Drawings and as needed to meet the requirements of the construction shown in the Contract Documents.
- B. Related work:
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, of these Specifications.
  - 2. Geotechnical Design Report for Mid-Peninsula Water District Dekoven Water Tanks Replacement Project 15-89 per Cal Engineering & Geology (CE&G) Document 190060.01 dated June 24, 2020.

#### **1.02 QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.
- C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the soil engineer.

#### **1.03 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with pertinent provisions of Section 01400.

### **PART 2 PRODUCTS**

#### **2.01 2.01 SOIL MATERIALS**

- A. Fill and backfill materials:
  - 1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2-3/8" in their greatest dimension.
  - 2. Fill material is subject to the approval of the construction soil engineer. Material removed from excavations or imported from off-site borrow areas that is to be used as fill material shall be predominantly granular non-expansive soils, free from roots and other deleterious matter.
  - 3. Fill material shall not have rocks having a dimension greater than 1" in the upper 12" of fill or embankment.

4. Cohesionless material used for structural backfill: Provide sand free from organic material and other foreign matter, and as approved by the construction soil engineer.
5. Refer to **Section 31 80 00 – Trench Excavation, Bedding, and Backfill** for tank and underground utilities.

## **2.02 WEED KILLER**

- A. Provide a dry, free-flowing, dust-free chemical compound, soluble in water, capable of inhibiting growth of vegetation, and approved for use on this Work by governmental agencies having jurisdiction.

## **2.03 TOPSOIL**

- A. Where and if shown on the Drawings or otherwise required, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and reasonably free from subsoils, roots, heavy or stiff clay, stones larger than 1" in greatest dimension, noxious weeds, sticks, brush, litter and other deleterious matter.
- B. Obtain topsoil from sources with the project limits, or provide imported topsoil obtained from sources outside the project limits, or from both sources.

# **PART 3 EXECUTION**

## **3.01 SURFACE CONDITIONS**

Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

## **3.02 PROCEDURES**

- A. Utilities:
  1. Unless shown to be removed, protect active utility line shown on the Drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
  2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
  3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost at the Owner.
  4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer and secure instructions.
  5. Do not proceed with permanent relocation of utilities until written instructions are received from the District.

- B. Protection of persons and property:
  1. Barricade open holes and depressions occurring as part of this work, and post warning lights on property adjacent to or with public access.
  2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
  3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.
- C. Dewatering:
  1. Remove all water, including rain water, encountered during trench and substructure work to an approved location by pumps, drains, and other approved methods.
  2. Keep excavations and site construction area free from water.
- D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and other work being performed on or near the site.
- E. Maintain access to adjacent areas at all times.
- F. Wet Weather Construction
  1. If site earthwork and construction is to be performed during the winter rainy months, the owner and contractors should be fully aware of the potential impact of wet weather. Rainstorms can cause delay to construction and damage to previously completed work by saturating compacted pads or subgrades, or flooding excavations.
  2. Earthwork during rainy months will require extra effort and caution by the contractors. The grading contractor should be responsible to protect his work to avoid damage by rainwater.
  3. Standing pools of water should be pumped out immediately. Construction during wet weather conditions should be addressed in the project construction bid documents and/or specifications.

### **3.03 EXCAVATING**

- A. Perform excavating of every type of material encountered within the limits of the work to the lines, grades, and elevations indicated and specified herein.
- B. Satisfactory excavated materials:
  1. Transport to, and place in, fill or embankment areas within the limits of the work.
- C. Unsatisfactory excavated materials:
  1. Excavate to a distance below grade as directed by the construction soil `p, and replace with satisfactory materials.
  2. Include excavation of unsatisfactory materials, and replacement by satisfactory materials,

as parts of the work of the Section.

D. Surplus materials:

1. Dispose of unsatisfactory excavated materials and surplus satisfactory excavated materials away from the site at disposal areas arranged and paid for by the Contractor.

E. Excavation of rock:

1. Where rocks, boulders, granite, or similar material is encountered, and where such material cannot be removed or excavated by conventional earth moving or ripping equipment, take required steps to proceed with the general grading operations of the work, and remove or excavate such material by means which will neither cause additional cost to the City nor endanger buildings or structures whether on or off the site.
2. Do not use explosives without written permission from the District.

F. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.

G. Ditches and gutters:

1. Cut accurately to the cross sections, grades, and elevations shown.
2. Maintain excavations free from detrimental quantities of leaves, sticks, trash and other debris until completion of the work.
3. Dispose of excavated materials as shown on the Drawings or directed by the construction soil engineer; except do not, in any case, deposit materials less than 3'-0" from the edge of a ditch.

H. Unauthorized excavation:

1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from the District or the construction soil engineer.
2. Under footings, foundations, or retaining walls:
  - a. Fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering the required top elevation.
  - b. When acceptable to the construction soil engineer, lean concrete fill may be used to bring bottom elevations to proper position.
3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the construction soil engineer.

I. Stability of excavations:

1. Slope sides of excavations to 1:1 or flatter, unless otherwise directed by construction soil

engineer.

2. Shore and brace where sloping is not possible because of space restriction for stability of the materials being excavated.
3. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

J. Shoring and bracing:

1. Provide materials for shoring and bracing as may be necessary for safety of personnel, protection of work, and compliance with requirements of governmental agencies having jurisdiction.
2. Maintain shoring and bracing in excavations regardless of the time period excavations will be open.
3. Carry shoring and bracing down as excavation progresses.

### **3.04 FILLING AND BACKFILLING**

A. Backfill excavations as promptly as progress of the work permits, but not until:

1. Acceptance of construction below finish grade;
2. Inspecting, testing, approving, and recording locations of underground utilities;
3. Concrete formwork is removed;
4. Shoring and bracing are removed, and voids have been backfilled with satisfactory materials;
5. Trash and debris have been removed; and
6. Horizontal bracing is in place on horizontally supported walls.

B. Ground surface preparations:

1. Remove vegetation, debris, unsatisfactory soil materials, obstructions and deleterious materials from the ground surface prior to placement of fills.
2. Plow, strip, or break up surface steeper than one vertical to four horizontal, so that fill material will bond with existing surface.
3. When the existing ground surface has a density less than that specified under "Compacting", break up the ground surface, pulverize, moisture condition to the optimum moisture content, and compact to required depth and percentage of maximum dry density.
4. At exposed soils in areas to be paved, scarify to minimum depth of 6" and re-compact at a moisture content slightly above optimum that will permit proper compaction as specified for fill.
5. Because of likely significant disturbance of the upper 3 to 4 feet of soil at the site from demolition and removal of the existing site improvements as well as past earthwork activities

in the area, subgrade soil in areas to receive engineered fill, concrete slabs-on-grade or pavements should be scarified to a minimum depth of 24 inches, moisture conditioned and compacted to the recommendations.

6. Subgrade preparation should extend a minimum of 5 feet beyond the outermost limits of the fills, foundations, slabs or pavements, unless it is restricted. Prepared soil subgrades should be non-yielding when proof-rolled by a fully loaded water truck or equipment of similar weight. Moisture conditioning of subgrade soils should consist of adding water if the soils are too dry and allowing the soils to dry if the soils are too wet. After the subgrades have been prepared, the areas may be raised to design grades by placement of engineered fill.
  7. If unstable, wet or soft soil is encountered, the soil will require processing before compaction can be achieved. When construction schedule does not allow for air-drying, other means such as lime or cement treatment, over-excavation and replacement, geotextile fabrics, etc. may be considered to help stabilize the subgrade. The method to be used should be determined at the time of construction based on the actual site conditions. We recommend obtaining unit prices for subgrade stabilization during the construction bid process.
- C. Placing and compacting:
1. Place backfill and fill materials in layers not more than 8" in loose depth.
  2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
  3. Compact each layer to required percentage of maximum dry density for the area.
  4. Mechanically compacted to the recommendations below at the recommended moisture content.
- D. Do not place backfill or fill material on surfaces that are muddy, frozen or containing frost or ice.
- E. Place backfill and fill materials evenly adjacent to structures until the required elevations is achieved.
- F. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structures to approximately the same elevation in each lift.

### **3.05 GRADING**

- A. General:
1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
  2. Smooth the finished surfaces within specified tolerance.
  3. Compact with uniform levels or slopes between points where elevations are shown on the Drawings, or between such points and existing grades.

4. Where a change of slope is indicated on the Drawings, construct a rolled transition section having a minimum radius of approximately 8'-0", unless adjacent construction will not permit such a transition, or if such a transition defeats positive control of drainage.

B. Grading outside building lines:

1. Grade areas adjacent to buildings to achieve drainage away from the structures, and to prevent pounding.
2. Finish the surfaces to be free from irregular surface changes, and:

Shape the surfaces of areas scheduled to be under walks to line, grade, and cross-section, with finished surface not more than 0.10 ft above or below the required sub-grade elevation.

Shape the surface of areas scheduled to be under pavement to line, grade and cross-section with surface not more than 0.05ft above or below the required sub-grade elevation.

### 3.06 COMPACTING

- A. Control soil compaction during construction to provide the required percentage of density specified for each area as determined according to ASTM D1557.
- B. Provide not less than the following maximum dry density of soil material compacted at optimum moisture content for the actual density of each layer of soil material in place, and as approved by the construction soil engineer.

1. Structures:

- a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum dry density.

2. Lawn and unpaved areas:

- a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% maximum dry density.
- b. Compact the upper 12" of filled areas and natural soils exposed by excavating, at 85% of maximum dry density.

3. Walks:

- a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum dry density.

4. Pavement:

- a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 95% of maximum dry density.

C. Moisture control:

1. Where subgrade or fill material must be moisture-conditioned before compacting, uniformly apply water to surface of soil material to prevent free water appearing on surface during or subsequent to compacting operations.
2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
3. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the construction soil engineer.

**3.07 FIELD QUALITY CONTROL**

- A. Secure the construction soil engineer's inspection and approval of subgrades and fill layers before subsequent construction is permitted thereon.
- B. Provide at least the following tests to the approval of the construction soil engineer:
  1. At paved areas, at least one field density test for every 2000 sq ft of paved area, but not less than the three tests;
  2. In each compacted fill layer, one field density test for every 2000 sq ft of overlaying paved area, but not less than three tests.
- C. If reports from the testing laboratory indicate that subgrade or fills have been placed below specified density, provide additional compacting and testing under the provisions of **Section 31 80 00 – Trench Excavation, Bedding, and Backfill**.

**3.08 MAINTENANCE**

- A. Protection of newly graded areas:
  1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds;
  2. Repair and reestablish grades in settled, eroded, and rutted areas to the specified tolerances.
- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.

**3.09 CERTIFICATION**

- A. Upon completion of this portion of the work, and as condition of its acceptance, delivery to the Engineer a written report from the construction soil engineer certifying that the compaction requirements have been obtained. State in the report the area of fill placement, the compaction density and moisture content obtained, and the type of classification of fill material placed.

**END OF SECTION**



## **SECTION 31 80 00 - TRENCH EXCAVATION, BEDDING, AND BACKFILL**

### **PART 1 GENERAL**

#### **1.01 SCOPE OF WORK**

- A. Work included under this section consists of furnishing all necessary labor, materials, tools, equipment, and services in connection with and reasonably incidental to clearing, sawcutting pavement, excavating, installing bedding and backfill material, and disposing of excess excavated materials required for the construction of **water mains, storm drains, underground utilities, and tanks**. Work required shall also include the furnishing of all materials and equipment necessary for the construction and installation of all temporary shoring, sheeting and bracing and other facilities which may be necessary to perform the excavations and to place and compact the bedding and backfill, and the subsequent removal of such sheeting, bracing and other facilities.
- B. Excavation and backfill shall be in accordance with the Standard Drawings and these Standard Specifications.
- C. Soil conditions based on Geotechnical Design Report for Mid-Peninsula Water District Dekoven Water Tanks Replacement Project 15-89 per Cal Engineering & Geology (CE&G) Document 190060.01 dated June 24, 2020 (Appendix A).

### **PART 2 MATERIALS**

#### **2.01 BEDDING MATERIAL**

- A. Bedding material shall be "Quarry Fines," produced by Steven Creek Quarry, Cupertino, CA, free of organic material and clay.

#### **2.02 AGGREGATE BASE (CLASS 2)**

- A. Aggregate base shall conform to the requirements of Section 26 – Aggregate Bases of Caltrans Standard Specifications excluding processed reclaimed asphalt concrete. Grading and Quality Characteristics requirements shall meet 3/4" maximum, Class 2 material.

#### **2.03 DRAIN ROCK**

- A. Drain rock shall be 3/4" crushed rock.

#### **2.04 PAVEMENT**

- A. Pavement shall conform to the requirements in Section 32 10 00 - Paving, Restoration, and Resurfacing Work of these Standard Specifications.

### **PART 3 EXECUTION**

#### **3.01 CONSTRUCTION ACROSS IMPROVED AREAS**

- A. Asphalt concrete pavement or driveways removed or damaged in connection with construction shall be rebuilt to these Standard Specifications and have the same quality as the portion

removed. Where pavement or driveways must be removed, they shall be saw-cut prior to excavation.

- B. The Contractor may, when approved by the District, tunnel under driveways. Where existing driveways are removed or damaged by the Contractor, the Contractor shall replace after completion of the installation of the water main or utilities with the same type and quality of material as that which was removed or damaged.

### **3.02 UNDERGROUND OBSTRUCTIONS**

- A. The Contractor shall notify North USA at (811) a minimum of 2 working days before proceeding with the work. Work may not begin until utilities marked.
- B. The Contractor shall determine the exact location of all existing utilities before commencing work, and agrees to be fully responsible for any and all damages by the Contractor's failure to exactly locate and preserve any and all underground utilities.
- C. Excavation and other work under or adjacent to existing water mains, conduits, or structures of any kind, shall be executed in such a manner as not to interfere with the safe operation and use of such installations. Should any damage occur to these facilities during the operations of the Contractor, they shall immediately notify the District and the facility owner(s) or authorities, and shall arrange for the immediate repair of the facilities at his own expense. If any conflicts are encountered during construction, the District shall be notified immediately.

### **3.03 TRENCH EXCAVATION**

- A. Subgrade Preparation (Tanks and Chemical Feed Building)
  - 1. Subgrade preparation should extend a minimum of 5 feet beyond the outermost limits of the fills, foundations, slabs or pavements, unless it is restricted. Prepared soil subgrades should be non-yielding when proof-rolled by a fully loaded water truck or equipment of similar weight. Moisture conditioning of subgrade soils should consist of adding water if the soils are too dry and allowing the soils to dry if the soils are too wet. After the subgrades have been prepared, the areas may be raised to design grades by placement of engineered fill.
  - 2. If unstable, wet or soft soil is encountered, the soil will require processing before compaction can be achieved. When construction schedule does not allow for air-drying, other means such as lime or cement treatment, over-excavation and replacement, geotextile fabrics, etc. may be considered to help stabilize the subgrade. The method to be used should be determined at the time of construction based on the actual site conditions. We recommend obtaining unit prices for subgrade stabilization during the construction bid process.

B. Trench Width

1. In all cases, trenches must be of sufficient width to permit the proper jointing of the pipe. However, trenches wider than the maximums specified herein will result in a greater earth load on the pipe than it was designed for; consequently, if the maximum trench widths specified are exceeded by the Contractor without the written permission of the District, the Contractor will be required, at their own expense for both labor and material, to provide a higher class of pipe or to embed the pipe in a concrete cradle as directed by the District.
2. Permissible trench widths are as follows: For all pipes up to and including 18" diameter, and in all types of soil, maximum trench width of 24" greater than the outside diameter of the pipe will be permitted. This shall be interpreted to permit a maximum of no more than 12" on each side of the pipe. This clearance shall be measured from the outside of the barrel of the pipe to the sides of the trench and shall include any sheeting used. The minimum width of un-shored trenches shall be 12" plus the outside diameter of the pipe (a minimum of 6" on each side of the pipe). Where shoring is required the Contractor shall allow sufficient width to comply with codes and regulatory safety requirements.

C. "T" Cut

1. A second saw-cut operation is required prior to final paving to achieve the "T"-cut section as shown on the standard drawings. Saw-cutting a wider trench during initial trench excavation to achieve a "T" cut section will not be allowed.

D. Shoring

1. The Contractor shall furnish, place and maintain shoring and bracing as may be required to support the sides of excavations for the protection of workers, to facilitate the work; to prevent damage to manholes, structures, and water mains being constructed; to protect adjacent embankments, structures or facilities from damage; and as required by applicable local, State and Federal safety codes.
2. Shoring shall be removed by the Contractor unless field conditions make the removal of sheeting impractical. In such case, the District may permit portions of the sheeting to be cut off to a specified depth and to remain in the trench. Backfill shall be brought to one foot above the top of the pipe before sheeting may be removed.
3. When trenching or excavation over five (5) feet in depth, under the Labor Code Section 6705, Contractor shall provide the following:
  - a. Written and detailed plan covering trench and excavation safety procedures that meets CalOSHA requirements under the Construction Safety Orders Sections 1539-1543.
  - b. Submit a written safety plan reviewed and approved by a registered civil or structure engineer for review and approval prior to the start at work.
  - c. Assign a competent person to supervise trenching and excavation operations when work is being performed.

- d. The Contractor shall obtain and provide the District a copy of a CalOSHA permit for all trench and excavation operations.
4. The Contractor must provide ladders or a safe access within 25 feet of a work area in trenches 4 feet or deeper.
- E. Dewatering
1. During water main excavation and backfill operations, the Contractor shall provide temporary drains, diversion ditches, pumps, cofferdams, or other devices as may be necessary to remove surface water or groundwater from the work area. Unless otherwise specifically permitted by the District, water, either of surface or subsurface origin, will not be permitted in the trenches or in new or existing water mains at any time during construction and until backfilling over the top of the pipe has been completed; nor will the groundwater level in the trench be permitted to rise above an elevation 4" below the invert of the pipe. If trench has been flooded prior to placement of bedding material, the bottom of the native trench shall be compacted to the satisfaction of the District. Special care shall be taken during dewatering to ensure compliance with (Section 01 57 23 - Storm Water Pollution Control Plan).
  2. All excavations shall be kept free from water during the time when concrete is being placed and until such time as water will not be detrimental to the finished work. Dewatering trenches, when required, may be accomplished in any manner the Contractor desires, provided the method is acceptable to the District. Any damage resulting from the failure of the chosen method to operate properly shall be the responsibility of the Contractor and shall be repaired in a manner satisfactory to the District, at the Contractor's expense.
- F. Structural Clearances
1. Excavation near structures such as catch basins, manholes, and drain inlets shall be sufficient to leave at least 12" between the outer surfaces of the structure and the sides of the excavation.
- G. Care of Excavated Material
1. All material excavated from trenches and piled adjacent to the trench, or in a roadway or public thoroughfare, must be piled and maintained in such a manner that the toe of the slope of the excavated material is at least a lateral distance equal to the height of the excavation from the edge of the trench. It shall also be piled so that as little inconvenience as possible is caused to public travel. Free access shall be provided to all fire hydrants, water valves, and meters, and all other conduits shall be kept clean to allow free flow of storm water.
- H. Open Trench
1. Unless otherwise directed by the District or stated otherwise on the project drawings, no trench shall be excavated more than 200 feet, nor left unfilled past construction working hours or non-working hours.
  2. All trenches in roads, whether located on the project roads or in an easement, shall either be backfilled or plated during non-working hours.

I. Excavation Below Grade

1. Except where unsatisfactory native subgrade material exists, no excavation below the bottom of the water main bedding will be permitted. If, for any reason other than unsatisfactory subgrade, excess material is excavated beyond the limits specified for bedding, such excavation below grade shall be replaced beneath the pipe zone with thoroughly compacted subgrade material at the expense of the Contractor. Unsatisfactory subgrade material shall be removed and replaced as directed by the District.

J. Tree Roots

1. Tree roots two inches or more in diameter at adjacent trees shall not be cut without prior approval of a licensed arborist or the District. Material shall be removed from around root system to avoid damage thereto. Roots shall be protected with burlap wrapping while exposed.

K. Excavation

1. All excavation is unclassified. Work shall consist of performing all excavation operations regardless of the character of subsurface conditions. The Contractor shall make their own evaluation of the type of materials which may be encountered.

L. Excavated Trench Material Disposal

1. Any excess material resulting from trench excavation shall be disposed of offsite by the Contractor own expense in a manner satisfactory to the District. Such excess material may be deposited on private property if so requested by the property owner and their approval, proper permits shall be obtained for the pertinent local agencies by the property owner and the Contractor. It is recommended that disposed of materials be recycled wherever possible.

M. Trench Plates

1. When backfilling operations of an excavation in the traveled way, whether transverse or longitudinal, cannot be properly completed within a work day, steel plate bridging with a non-skid surface and shoring shall be required to preserve unobstructed traffic flow. Smooth surface plates are not allowed. No more than two (2) trench plates in length will be allowed unless directed by the District.
2. Trench plates shall be A-36 grade steel, non-skid, a minimum of 1-inch thick, and rated for H/20 loading or greater.
3. Tack weld plates together when using multiple plates.
4. Trench plate signage shall be per Section 01 52 00 - Traffic Control Plan.
5. The Contractor shall maintain trench plates at all time and respond to and correct shifting trench plates regardless of the time of day. If the Contractor fails to correct sinking backfill material or shifting trench plates in a timely manner, the District reserves the right to correct the problem at the expense of the Contractor.

6. In the event pending inclement weather or other conditions as determined by the District may adversely affect the use of trench plates, they shall be removed, the excavation backfilled, and the surface secured with temporary asphalt.

### 3.04 TRENCH BACKFILL

#### A. General

1. No backfilling shall commence until the pipe has been inspected and approved by the District, until concrete in masonry structures such as thrust blocks or encasement has attained a proper strength, and until required fittings are installed and inspected.
2. In backfilling the trench, the Contractor shall take all necessary precautions to prevent damage or shifting of the pipe. Backfilling from the sides of the trench will be permitted after sufficient material has first been carefully placed over the pipe to such a depth as is acceptable to the District.
3. Any backfill which becomes displaced or depressed during construction or during the warranty period, shall be refilled, shaped, and restored to proper grade as frequently as is necessary until the surface is unyielding, at the Contractor's expense.
4. Placement and compaction operation shall be done in 8" maximum loose lifts unless otherwise specified by the District. Lifts shall be compacted by the use of mechanical means approved by the District. Compaction equipment or methods that produce horizontal or vertical earth pressures, which may cause excessive displacement or may damage the water main or structure, shall not be used. Ponding or jetting of backfill materials will not be permitted. The trench excavation and adjacent areas shall be backfilled to the grades existing prior to construction.

#### B. Pipe Embedment Zone Definitions

1. Quarry Fine Bedding shall be defined as the area between the bottom of the pipe and 4" below the bottom of the pipe. Pipe Bedding shall consist of leveling the bottom of the trench and furnishing, placing, and compacting quarry fines or other specified material as shown on the project drawings and as specified herein.
2. Quarry Fine Backfill shall be defined as the area between the pipe, the sides of the trench, and 6" above the pipe. Pipe Backfill shall consist of furnishing, placing and compacting quarry fines above the pipe or other specified material as shown on the project drawings and as specified herein.
3. Bedding and backfill material shall be compacted to 90% relative compaction and placed in three lifts. Quarry fines shall be placed in no more than 6" lifts or as specified here in. Vibratory plate will not be allowed to compact the pipe backfill.

#### C. Pipe Embedment Zone Lifts

1. **Lift One** – The first lift shall consist of placing 4" of compacted quarry fines to the satisfaction of the District prior to the placement of the pipe. The pipe shall be placed prior to the second lift.

2. **Lift Two** – The second lift shall consist of placing quarry fines around the pipe to the top of the pipe to the satisfaction of the District. The top of the pipe shall be visible prior to the start of compaction for the second lift. Compaction of the backfill around the pipe shall be performed by a pneumatic means such as a “Powder Puff.” No other means of compaction tool shall be allowed without prior approval by the District. Contractor shall use extreme care to avoid hitting the pipe and V-Bio polyethylene wrapping while compacting.
3. **Lift Three** – The third lift shall consist of placing and compacting 6” of quarry fines.

D. Pipe Upper Level Zone

1. “Type A” Trench (Paved Surfaces)
  - a. Shall be defined as filling the trench with class 2 aggregate base and compacting it in uniform layers to a relative density of 95%. Temporary pavement of 2” minimum thickness shall be placed and maintained to the satisfaction of the District. Compact temporary pavement per Section 32 10 00 - Paving, Restoration, and Resurfacing. The existing paved surface shall then be replaced with a minimum 6” thickness of asphalt concrete within 30 days of placing temporary pavement.
2. “Type B” Trench (Graveled Areas and Road Shoulders)
  - a. Shall be defined as filling the trench with class 2 aggregate base and compacting it in uniform layers to a relative compaction of 95% to the surface.
3. “Type C” Trench (Unimproved Areas)
  - a. Shall be defined as compacting native material removed from the trench in uniform layers to a relative density of 90%. Material removed from the trench shall be deposited at a suitable site acquired by the Contractor or on abutting property if requested by the property owner, in writing.
4. “Type D” (Controlled Density Fill)
  - a. Shall be defined as filling the trench with density fill as defined in Section 03 30 00 – Cast in Place Concrete Structures to within 6” minimum of the surface.
5. “Type E” (Drain Rock at Bottom)
  - a. Shall be defined as placing ¾” drain rock, as defined in Section 31 80 00, wrapped in filter fabric at 12” thickness layer at the bottom of the trench within 4” minimum of water main.

E. Subgrade

1. If the bottom of the trench contains stones or other hard objects which would interfere with the proper placement of bedding material or is unsatisfactory for supporting the pipe, it shall be removed to a depth to be determined by the District and backfilled with bedding material as directed by the District.

2. If water is encountered in the trench or the District inspector determines the subgrade below the pipe embedment zone is unstable the Contractor shall excavate and additional 12" and install crushed drain rock. Drain Rock at Bottom shall be defined as placing ¾" drain rock, as defined in Section 31 80 00, wrapped in filter fabric at 12" thickness layer at the bottom of the trench within 4" minimum of water main.

F. Compaction Tests

1. The Contractor is responsible achieving the compaction requirements of these specifications. At its discretion the District may perform compaction tests on its own to determine the adequacy of the trench bedding and. Retesting for compaction required by a failing test shall be paid for by the Contractor.

**END OF SECTION**



## **SECTION 32 10 00 - PAVING, RESTORATION, AND RESURFACING WORK**

### **PART 1 GENERAL**

#### **1.01 SCOPE OF WORK**

- A. Work required under this section consists of furnishing all labor, materials, tools, and equipment incidental to placing new asphalt concrete and/or driveway, road restoration. Paving shall include asphalt concrete surfacing and untreated aggregate base course. Paved and gravel roads includes excavation, filling, spreading, and compaction of the filled areas to conform to the lines, grades, and slopes as shown on the drawings. The work also includes furnishing, installing and maintaining temporary paving and trench plates during construction.

#### **1.02 SUBMITTALS**

- A. The Contractor shall submit manufacturer data including catalog cuts, drawings and samples, as appropriate, and letter(s) of compliance as required by Section 01 33 00 - Submittals.

### **PART 2 MATERIALS**

#### **2.01 AGGREGATE BASE/SURFACING**

- A. Aggregate shall conform to the requirements of Section 26 - Aggregate Bases, of the latest requirements of Caltrans Standard Specifications. Grading requirements shall be for ¾" Class 2 aggregate base.

#### **2.02 ASPHALT CONCRETE**

- A. HMA shall be confirm to local agencies Standard and Specification and Section 39 - Asphalt Concrete, of the latest requirements of Caltrans Standard Specifications.

#### **2.03 ASPHALT BINDER**

- A. Asphalt binding shall be Grade PG 64-10 per Section 92 - Asphalt Binders, of Caltrans Standard Specifications.

#### **2.04 TACK COAT**

- A. Material for covering all (vertical and horizontal) surfaces of old pavement shall be asphalt emulsion Types SS-1 or RS-1, Section 94, Asphalt Emulsions" of the latest requirements of Caltrans Standard Specifications.

#### **2.05 TEMPORARY PAVING**

- A. Temporary pavement shall consist of 2" of cold mix asphalt over Class 2 aggregate base. The aggregate base shall be equal in depth to the new pavement structural section or more. The aggregate base shall be brought within two (2") inches of the top of the existing pavement and covered with temporary "cold mix" asphalt paving using an SC-250, SC-800 or approved equal. All temporary surfacing shall be installed the same day as backfilling and shall be level with existing paving.

## **2.06 SLURRY SEAL**

- A. Slurry seal shall be Type II conforming Section 37 - Bituminous Seals, of the latest requirements of Caltrans Standard Specifications.

## **2.07 STRIPING AND PAVEMENT MARKINGS**

- A. Striping and pavement markings shall be thermoplastic per Section 84 – Markings, of Caltrans Standard Specifications.
- B. Striping shall be placed in a continuous operation. The Contractor shall ensure there is enough material to prevent any stopping during placement. No overlapping of striping material or markings is permitted.

## **PART 3 EXECUTION**

### **3.01 AGGREGATE BASE COURSE**

- A. The aggregate base course shall be spread and compacted on the prepared subgrade. The base course material shall be placed in 6-inch max compacted layers and shall be compacted to a minimum relative density of 95%, or for water main work be spread and compacted as described under Section 31 80 00 - Trench Excavation, Bedding, and Backfill.

### **3.02 AGGREGATE SURFACING COURSE**

- A. Gravel road surfacing shall be an aggregate course applied to the base course after compaction in the same manner as specified for the aggregate base course. The surface course shall be placed in one layer. Special care shall be taken to maintain crown or slope for drainage.

### **3.03 TACK COAT**

- A. Apply tack coat to all horizontal and vertical surfaces of existing pavement and to vertical surfaces of curbs, gutters, conforms, and construction joints before placing asphalt concrete on or against them, at the rate of 0.10 gallons per square yard.

### **3.04 TEMPORARY PAVING**

- A. Temporary paving shall be installed over all trenches to a thickness of 2-inches. Temporary paving shall be installed on the same day as acceptable trench compaction is obtained and base material installed and shall be smoothed out using a vibratory plate or other means approved by the District. No tire/wheel rolling compaction will be allowed. Temporary paving shall be maintained on a daily basis until permanent paving is installed. The final paving operation shall occur within 30 days of placing temporary paving.

### **3.05 ASPHALT CONCRETE**

- A. Asphalt concrete shall be placed in accordance with local agencies Standard and Specifications and Section 39 - Asphalt Concrete, of the latest requirements of Caltrans Standard Specifications for method compaction.

1. Minimum Temperature: The minimum temperature of asphalt concrete delivered to the site shall be at least 250° F, and no more than 370° F.
2. Lift Thickness: Where the total thickness of asphalt concrete to be placed is greater than 3", place in lifts of equal thickness, none of which shall exceed 3".

**3.06 SLURRY SEAL**

- A. Slurry seal shall be placed in accordance with Section 37 - Bituminous Seals, of the latest Caltrans Standard Specifications. Slurry seal shall be fully cure prior of placing traffic striping/markings.

**3.07 TRAFFIC STRIPING**

- A. Traffic striping shall be placed, per the City of Belmont, City of San Carlos and/or County of San Mateo requirements, minimum two weeks after placing slurry seal, and shall comply with Section 84 – Markings, of the latest requirements of Caltrans Standard Specifications. All damaged striping and reflectors shall be replaced in kind to duplicate, insofar as possible, pre-construction striping. Cat track shall be approved by the City/County prior to placing any striping and/or marking.

**3.08 DAMAGE REPAIR**

- A. The Contractor shall be responsible for any damage to existing infrastructures such as curbs, gutters, sidewalks, driveways and any asphalt concrete, liquid asphalt or asphaltic emulsion stains occurring during the course of this Contract. Stains shall be cleaned by sandblasting or any other method satisfactory to the District.

**END OF SECTION**

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## **SECTION 32 01 91 – TREE PROTECTION**

### **PART 1 GENERAL**

#### **1.02 SCOPE**

- A. Perform all tree protection as shown on the plans and as specified herein including, but not necessarily limited to, the following:
  - 1. Protection of existing trees to remain
- B. Related work specified elsewhere:
  - 1. **Demolition – Section 02 41 00**

#### **1.03 STANDARDS**

- A. All work shall be completed per the International Society of Arboriculture (ISA) tree protection requirements.

#### **1.04 ACCESS AND STORAGE**

- A. Prior to commencement of work, the Contractor shall confer with the District's Representative for the purposes of determining the exact scope of work. At no time shall materials, soil or equipment be stored or placed within the "dripline" of existing trees to be preserved. At no time shall vehicles be parked within the "dripline" of an existing trees to be preserved.

#### **1.05 COORDINATION AND SCHEDULING OF WORK**

- A. All work shall be scheduled and conducted in a cooperative manner in order to give the least possible interference with or annoyance to others. Contractors shall work out any cooperative schedules. Any underground trenching or excavation around existing trees shall receive priority in scheduling so that trenching, excavation, and backfilling can be done in an expedient manner.

### **PART 2 PRODUCTS**

#### **2.01 TRUNK WRAP**

- B. All trees to be protected shall have their trunks wrapped as indicated on the drawings.

#### **1.06 PLYWOOD**

- A. Place plywood on the ground surface within the work zone at the base of trees to be protected, to minimize soil compaction.
- B. Cover any exposed tree roots with mulch prior to placing plywood.

## **PART 2 – EXECUTION**

### **2.01 PRESERVATION OF EXISTING TREES**

- A. Protection: Shall be achieved with trunk wrap and plywood as shown on plans.
- B. Excavation, Trenching and Backfill: All trenching under the drip lines of trees shall be hand dug with no roots over 1-inch diameter being cut or damaged.
- C. Root Cutting: All exposed severed root ends are to be cut cleanly using a sharp pruning saw. Cuts shall leave roots that remain free of splits, cracks or other damage.
- D. Watering: Provide supplemental irrigation as necessary during construction to prevent drought stress.
  - 1. If trees show stress it may become necessary to perform deep root watering as required at no extra cost to the District.

**END OF SECTION**

## **SECTION 33 14 13 – WATER MAIN**

### **PART 1 GENERAL**

#### **1.01 SCOPE OF WORK**

- A. Work included under this section consists of furnishing and installing all water main piping, fittings and appurtenances shown on the project drawings and as specified herein.
  - 1. All water mains for this project, including hydrant runs and tie-ins, shall be constructed entirely of Class 350 Ductile Iron pipe with restrained joint; wrapped in low density V-Bio polyethylene film and marked with No. 8 standard tracer wire.

#### **1.02 SUBMITTALS**

- A. The Contractor shall submit manufacturers' data including catalog cuts, drawings and samples, as appropriate, and letter(s) of compliance as required by **Section 01 33 00 - Submittals**.

### **PART 2 MATERIALS**

#### **2.01 DUCTILE IRON (DI) PIPE**

- A. General
  - 1. Ductile iron pipe shall conform to ANSI A21.50 and A21.51 (AWWA C150 and C151) and shall be Pressure Class 350.
- B. Joints
  - 1. Buried pipe and pipe fittings shall all have restrained push-on joints, "Field Lok 350 Gasket" with the use of Tyton Joint pipe or fittings as required by the manufacturer. At fittings and tie-ins, pipe shall have restrained push-on joints or mechanical joints (Megalug Series 1100). Mechanical joints may be used for closures, subject to meeting thrust restraint requirements. Flanged ends, or plain ends with restrained couplings, shall be used for piping above ground.
  - 2. For mechanical joints, dimensional and material requirements for pipe ends, glands, bolts, nuts and gaskets shall conform to ANSI A21.11 (AWWA C111).
  - 3. For flanged joints, ends of pipe and fittings shall be provided with ductile iron flanges conforming to ANSI A21.10 and A21.15 (AWWA C110 and C115), as applicable. Bolts, nuts, and gaskets for flanged connections shall conform to ANSI B16.1 and as specified in Section 2.08 - Hardware. All flanged connections shall use "Ring Flange-Tyte" gaskets as manufactured by U.S. Pipe capable of withstanding pressures up to 350 psi.
- C. Fittings
  - 1. Fittings shall be ductile iron conforming to ANSI A21.53 (AWWA C153) with push-on joint bell design to fit the particular make of the pipe furnished or to fit a pipe-to-fitting adapter unless specified on the plans. Fittings shall have a pressure rating at least equivalent to that of the pipe used.

D. Coating and Lining

1. Buried ductile iron pipe, sleeves and fittings shall be asphalt seal-coated and cement-mortar lined. The lining shall conform to the Standard Specifications of AWWA C104. All above ground fittings and couplings shall be fusion epoxy lined and coated.

E. V-Bio Polyethylene Encasement

1. All buried ductile iron pipe and fittings shall be wrapped in low density V-Bio polyethylene in accordance with AWWA C105, Method A. The tape used to secure the encasement shall be black polyethylene pipe wrap tape, minimum 10 mil thick. No other tape is allowed.

F. Pipe End Caps During Transport / Storage

1. The interior of all pipe, fittings, and other accessories shall be kept clean and free from organic matter at all times. All pipes shall be delivered to the construction site with end caps on both ends. End cap components must adhere sufficiently to withstand the stresses caused by wind during shipment. Pipes delivered on-site with damage shall be immediately field cleaned to remove all undesirable material along the entire length of the pipe interior. New end caps shall be installed after cleaning.
2. Cut pipe lengths of 5.0 feet or less, fittings, and valves do not require end caps but shall be field cleaned prior to installation.

**2.02 PVC PIPE**

A. General

1. PVC water mains shall conform to the applicable requirements of latest AWWA C900. Pipes shall be DR 14 pressure class 305 with a DI pipe equivalent outside diameter. Maximum length of each section of pipe between elastomeric rings shall be twenty (20) feet.

B. Joints

1. Buried pipe and pipe fittings shall all have internally restrained push-on joints, unless shown otherwise on the drawings or specified otherwise. At fittings and tie-ins, pipe shall have restrained push-on joints or mechanical joints (mega-lugs). Plain ends with restrained couplings, shall be used for piping above ground.
2. For mechanical joints, dimensional and material requirements for pipe ends, glands, bolts, nuts and gaskets shall conform to latest ANSI A21.11 (AWWA C111).
3. For flange joints with adapters, ends of pipe and fittings shall be provided with flange couplings. Bolts, nuts, and gaskets for flanged connections shall conform to ANSI B16.1 and as specified in Section 2.06 - Hardware. All flanged connections shall use "Ring Flange-Tyte" gaskets as manufactured by U.S. Pipe capable of withstanding pressures up to 350 psi.



C. Fittings

1. Fittings for use on C900 PVC shall be DI conforming to the applicable requirements of latest ANSI A21.53 (AWWA C153). Joints shall be restrained (mega-lug). All bolt-up sets (nuts, bolts and washers) and tie rods for buried valves and fittings shall be stainless steel, ASTM A-276 type 316L. Isolated fitting and associate adjacent restraints shall be cathodically protected per Section 13 47 13 – Galvanic Anode Cathodic Protection System.

D. Coating and Lining

1. Buried and/or above ground DI fittings and sleeves shall have all internal and external ferrous surfaces coated with a fusion bonded epoxy coating of 10 mils nominal thickness. The coating shall conform to latest AWWA C116.

E. Pipe End Caps During Transport / Storage

1. The interior of all pipe, fittings, and other accessories shall be kept clean and free from organic matter at all times. All pipes shall be delivered to the construction site with end-covers on both ends. End-cover components must adhere sufficiently to withstand the stresses caused by wind during shipment. Pipes delivered on-site with damage shall be immediately field cleaned to remove all undesirable material along the entire length of the interior of the pipe. New end covers shall be installed after cleaning.
2. All pipe to be used for water main installation located in the storage area, staging area, or left overnight prior to installation shall have the ends of the pipes covered with plastic (visqueen) and secured with tape to keep the pipe free of debris and dirt.
3. Cut pipe lengths of 5.0 feet or less, fittings, and valves do not require end-covers but shall be field cleaned prior to installation.

**2.03 THRUST RESTRAINTS**

A. Push-On Joint Locking Gasket

1. The locking gasket type restrained joint shall consist of stainless steel locking segments molded into the gasket that shall grip the spigot end of the pipe to prevent joint separation. This restrained joint system shall be "Field Lok", manufactured by U.S. Pipe for DI pipe and "RieberLok" manufactured by McWane for PVC pipe or equivalent.

B. Mechanical Joint Restraint

1. Mechanical joint fittings shall be EBAA Iron "Megalug". Bolts, nuts, and washers shall be low alloy (Corten).
2. Wedge gaskets shall be used with all mechanical joints. Standard mechanical joint gaskets are not allowed.

**2.04 THRUST BLOCKS**

- A. Concrete thrust blocks are optional except where required on the drawings. Thrust blocks shall be constructed per the Standard Drawings and Section 03 30 00 – Cast in Place Concrete

## **2.05 PIPE CONNECTORS**

### **A. Flexible Couplings**

1. Flexible couplings shall be Macro HP Extended Range manufacturer by Romac Industries Inc. Flex coupling must conform to latest AWWA C-219, with Type 316 bolts, nuts, and washers.

### **B. Flanged Coupling Adapters**

1. Flanged coupling adapters shall be EBAA 2100 adapter. Flanges, spools and sleeves shall be high strength ductile iron with Type 316 stainless steel bolts, nuts, and washers.
2. Flange gaskets shall conform to Section 2.01 – Ductile Iron Pipe, Sub-Section 2, Joints and Section 2.02 – PVC Pipe, Sub-Section 2, Joints.

### **C. Tapping Sleeves**

1. Tapping sleeves shall be JMC 6432 all Type 316 stainless steel body, mechanical joint. Bolts, nuts, washers and associated hardware not part of a mechanical joint assembly shall be plated. No tapping sleeves shall be used for asbestos cement pipe.

## **2.06 HARDWARE**

- ### **A.**
- All bolts, nuts and washers, and restraining tie rods and associated hardware, used with flanged fittings, couplings and appurtenances shall be Type 316 stainless steel for all buried and exposed applications. All bolts shall be furnished with finished hexagonal nuts. The dimensions of all heads and nuts shall be not less than those required for the American Standard regular, and the height shall be sufficient to break the bolt in the body portion when tested. Threads shall be American Standard screw thread, coarse thread series.

- ### **B.**
- Type 316 Steel bolts and nuts hardware shall be used one time per application. Reusing Type 316 Steel hardware is not permitted.

- ### **C.**
- Mechanical joint hardware EBAA shall be high strength, low alloy (Corten).

## **2.07 TUBING AND FITTINGS**

- ### **A.**
- Copper tubing and fittings used for service connections and reconnections shall be Type K, soft, and conform to ASTM 88.

## **2.08 MARKER TAPE FOR BURIED PIPING**

- ### **A.**
- Marker tape shall be metallic foil bonded to plastic film not less than 2-inches wide. The adhesive shall be colored and be compatible with the foil and film. Film shall be inert polyethylene plastic with thickness not less than ten (10) mil.

- ### **B.**
- The buried utility line tape shall be identified with an appropriate imprint such as "Caution: Water Main Below" and the identification repeated at approximately 24-inch intervals. Letters shall be 3/4-inch high minimum. The tape shall have a blue imprint.

- C. Marking and warning tape shall be as manufactured by Calpico, Inc., Lineguard, Inc., Allen Systems, Inc., Paul Potter Associates, all of Wheaton, Illinois, or Reef Industries, Houston, Texas, or equivalent.

## **2.09 TRACER WIRE**

- A. Tracer wire shall be No. 8 AWG, standard copper THWM, 600 volt with solid blue insulation.

## **PART 3 EXECUTION**

### **3.01 TRENCH EXCAVATION, BEDDING AND BACKFILL**

- A. Trench excavation, bedding and backfill work shall be performed in accordance with Section 31 80 00 - Trench Excavation, Bedding and Backfill, per the Standard Drawings.

### **3.02 EXISTING UTILITIES AND STRUCTURES**

- A. The locations of underground utilities and drainage facilities, where shown on the project drawings, are approximate only. It is the Contractor's responsibility to determine the exact locations of all existing utilities. Where existing culverts, underground facilities, under-ground structures, power, telephone or guy poles or guy wires interfere with construction, the Contractor shall be responsible for coordinating with the appropriate utility companies before removing or relocating any interfering utilities providing that the interfering utilities are shown on the drawings or are visible above grade.

### **3.03 HANDLING AND DISTRIBUTION OF MATERIALS**

- A. Pipe and appurtenances shall be stored in a manner to avoid damage to the materials and to linings and coatings.
- B. The pipe shall be inspected before laying for cracked, broken, or defective pieces. Pipe sections shall be carefully lowered into the trench to prevent damage using padded blocking or cables. All dirt or other foreign matter shall be removed from inside the pipe before lowering into the trench and shall be kept clean during installation. The Contractor shall replace all damaged pipe.

### **3.04 INSTALLATION OF BURIED PRESSURE PIPING**

- A. General
  1. Pipe, fittings, and appurtenances shall be installed in accordance with the manufacturer's instructions and in accordance with the latest AWWA C600 for DI pipe and AWWA C605 for PVC pipe.
  2. The Contractor shall furnish such parts and pieces as may be necessary to complete the fixtures and apparatus in accordance with best practices of the trade and to the satisfaction of the District.
- B. Handling
  1. The pipe shall be protected to prevent entrance of foreign materials during installation.

2. All pipe and fittings shall be carefully examined for defects, and no piece shall be installed which is known to be defective. Special care shall be taken to avoid leaving bits of wood, dirt, or foreign particles in the pipe.
3. All pipe and fittings shall be carefully handled at all times and at no time while loading, unloading, moving, or installing any lined pipe and fittings shall be dropped. All pipe and fittings shall be handled by mechanical means. Wye belt sling shall be used for all coated pipe.

#### C. Alignment

1. Piping shall be installed as indicated on the project drawings. Where not detailed, exposed pipe shall be installed in straight horizontal and vertical runs parallel to the axis of the structures.
2. Parallel runs of pipe shall be grouped and kept uniformly parallel. Bends and fittings shall be properly located to maintain uniform spacing and elevation of pipe groups at changes of direction and at branch connections.
3. All pipe shall be carefully placed and supported, and proper lined and grade. Minor adjustments may be necessary to avoid architectural and structural features. Major relocations shall be approved by the District.
4. Project drawings are diagrammatic for piping that is not shown in detail. Size of piping and their location are indicated, but it is not limited to show every offset and fitting nor every structural difficulty that may be encountered during the installation for the work. The pipe alignment shall be varied from indicated on the project's drawings without extra expense to the District where necessary to complete the fixtures and apparatus in accordance with the best practice of the trade and to the satisfaction of the District.
5. The allowable angle of deflection at any joint shall not exceed the amount recommended by the pipe, or coupling, manufacturer for the particular pipe size used.
6. A minimum 3 foot homogeneous length of pipe shall be installed before and after any fitting, valve or other appurtenance. Any sections less than 3 feet will not be permitted.
7. Trench Dams shall be placed on new water main alignments where slopes exceed 10% or as directed by the District and shall be placed every 100' in accordance with the Standard Drawings.

#### D. Valves

1. Valves shall be set with the stems upward and in vertical position, unless indicated otherwise on the drawings. The Contractor shall not operate existing District valves at any time.

#### E. Joints

1. Pipe shall be assembled and joined in accordance with the manufacturer's published instructions for the type of pipe and joint used. All portions of the joints shall be thoroughly cleaned before the sections of pipe are assembled. The ends of each pipe shall abut against the next pipe section in such a manner that there will be no unevenness of any kind along the bottom half of the interior of the pipe.

2. Where mechanical joints are used with ductile iron pipe, the pipe shall be marked in such a manner that it can be determined after installation that the pipe is properly seated.

F. Pipe Plugs

1. When pipe laying is not in progress, the open ends of the installed pipe shall be closed with a water tight plug. The plug shall be fitted with means for venting. When practical, the plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe flotation if the trench fills with water.

G. Thrust Resistance

1. Restrained joints shall be provided on all joints, at all bends, vertical bends, tee branches, and dead ends for ductile iron pipe.
2. Concrete thrust blocks shall be cast between undisturbed ground and the fitting to be anchored as shown on Standard Drawings. Blocks shall be poured so that the pipe and the fitting will be accessible for repairs.
3. Restraints must be used throughout the full length of any DI and/or PVC pipe installed in a casing to the nearest fitting on each side of the casing (i.e., the casing installation does not provide effective thrust resistance.
4. Where restraints are used, the manufacturer's written instruction for installation shall be followed.

H. Encasement for Ductile Iron Pipe and Fittings

1. Installation of 8-mil V-Bio polyethylene encasement for ductile iron pipe and fittings shall be in accordance with ANSI/AWWA C105/A21.5-05 Method A.
2. Ductile iron pipe and fittings shall be encased with the encasement prior to placement in the trench. Encasement shall be cut approximately 2 ft. longer than the length of the pipe. It shall be slipped around the pipe, centering it to provide a 1 ft. overlap on each adjacent pipe section and bunching it in an accordion-fashion lengthwise until it clears the pipe end.
3. After assembling the pipe joint, the overlap of the encasement from the proceeding shall be pulled over to the new length of pipe and secured in place. Then, the overlap end of the encasement from the new pipe section shall be slip over to the preceding pipe and secured in place. Installation of the next section of pipe shall be in the same manner.
4. The excess encasement along the length of the pipe shall be folded back and secured at quarter points. The slack of the pipe shall be snug but not tight.
5. Cuts, tears, punctures, or other damage to the encasement shall be repaired with adhesive tape or with a short length of encasement sheet wrapped around the damaged area.
6. Bends, reducers, offsets, and other pipe shaped appurtenances shall be covered with encasement in the same manner as the pipe.

I. Installation of Marker Tape

1. Install tape in backfill directly over each water main, as shown on the Standard Drawings.

J. Installation of Tracer Wire

Standard tracer wire No. 8 shall be taped to PVC and DI pipe every six feet (6') along top center axis.

K. Corrosion Protection

1. Corrosion protection for buried metallic fitting and appurtenances located east of the Caltrain right of way or anywhere else with known corrosive soils as directed by the District shall be used per Section 13 47 13 - Galvanic Anode Cathodic Protection System.

L. Disinfection

1. Disinfection of the water main shall be supervised by the District. The Contractor shall not disinfect the water main until they have coordinated with the District.
2. Disinfection of water main shall be in accordance with latest ANSI/AWWA C651, minimum of 2ft/sec.
3. Contractor shall install a double check valve backflow preventer from the water source (fire hydrant on Dekoven).
4. Prior to construction, Contractor shall submit disinfection plans and material information for the District review and approval, per Section 01 33 00 – Submittals.
5. Filling and contact time shall be per AWWA C651. When installation is completed, the water main shall be filled with water at a rate to ensure the water within the water main will flow at a velocity no greater than 1 ft/sec (0.3 m/sec). Precautions shall be taken to ensure air pockets are eliminated. This water shall remain in the pipe for at least 24 hours. If the water temperature is less than 41 F (5 C), the water shall remain in the water main for at least 48 hours.

M. Bacteriological Test

1. Standard conditions:
  - a. After the final flushing and before the new water main is connected to the distribution system, two consecutive sets of acceptable samples, taken at least 24 hours apart, shall be collected from the new water main. First sample will be taken 24 hours after flushing the main. At least one set of samples shall be collected from every 1,200 ft of the new water main, plus one set from the end of the line and at least one set from each branch. Samples shall be tested for bacteriological (chemical and physical) quality in accordance with the most recent *Standard Methods for the Examination of Water and Wastewater* (AWWA, 6666 W. Quincy Avenue, Denver, CO 80232, (303) 794-7711, APHA, 800 I Street, NW, Washington, DC 20001, (202) 777-2742, or WEF, 601 Wythe Street, Alexandria, VA 22314-1994, (800) 666-0203). Water shall show absence of coliform organisms, and the chlorine residual shall be within 0.4 mg/l of the chlorine residual of the water being used to fill the new water main and HPC count shall be less than 500 colony-forming units (cfu)

per ml. If the first sample test fails the District will require additional tests to find the turbidity, pH, and a standard heterotrophic plate count (HPC) level.

2. Special conditions:

- a. If excessive quantities of dirt, debris, or trench water have entered the new water main, bacteriological samples shall be taken at intervals of approximately 200 ft or as directed by the District. Additional samples shall be taken of water that stood in the new water main for at least 16 hours after final flushing has been completed.

3. Sampling Procedure:

Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate, as required by *Standard Methods of the Examination of Water and Wastewater*. No hose or fire hydrant shall be used in the collection of samples without prior approval from the District. If no other sampling ports are available, a well-flushed fire hydrant with a hose bib may be used with the understanding they do not represent optimum sampling conditions. A corporation-stop with a copper standpipe assembly or a temporary combination blow-off assembly may be used for sampling the new water main. The sampling pipe must be dedicated and clean, disinfected and flushed prior to sampling. There should be no water in the trench up to the connection for sampling. All samples shall be delivered to the lab within 8 hours after collection.

4. Sample Results.

- a. If sample results from the lab indicate a measured coliform organism and/or HPC greater than 500 colony-forming units (cfu) per mL, flushing should be resumed and another coliform and HPC set of samples should be taken until no coliform are present and the HPC is less than 500 cfu/mL.

5. Record of Compliance.

- a. The record of compliance shall be the bacteriological test results certifying the water sampled from the new water main is free of coliform bacteria contamination.

6. Re-disinfection

- a. If the initial disinfection fails to produce satisfactory bacteriological results, the new water main shall be re-flushed, re-chlorinated, and re-sampled at the expense of the Contractor. If check samples also fail to produce acceptable results, the water main shall be re-chlorinated until satisfactory results are obtained – that being two consecutive sets of acceptable samples taken 24 hours apart.

N. Tie-ins

1. Final connection to existing water main shall be in accordance with latest ANSI/AWWA C651.
2. Water main and all appurtenances must be completely installed, flushed, disinfected, and satisfactory bacteriological sample results received prior to permanent connections being made to the active distribution system. The new pipe, fitting, and valve(s) required for the

connection shall be swabbed with a minimum 1-5% solution of chlorine just prior to installation.

3. District shall be notified at least 2 working days in advance of any scheduled tie-ins.
4. No tie-ins, or shutdowns, will be allowed on Fridays or the day preceding a holiday.
5. No shutdown shall exceed 6 hours in duration.
6. The Contractor shall designate a person to contact should trench maintenance or other problems arise during non-working hours or days. The District shall be given that person's name and phone number.

### **3.05 INSTALLATION OF ABOVE GROUND EXPOSED PRESSURE PIPING**

#### **A. General**

1. Pipe, fittings, and appurtenances shall be installed in accordance with the manufacturer's specifications and related section 3.04 of these Standard Specifications or as directed by the District.

#### **B. Exposed Pipe**

1. Extreme care shall be taken to ensure watertight joints. All pipe shall be free of all dirt and grease to secure a tight bond with concrete or waterproof material.
2. Metallic pipe shall be coated with fusion epoxy bound.

### **3.06 CASING**

#### **A. Fittings**

1. Field locks shall not be used on the first fittings on the pipe coming out of the steel casing.

### **3.07 ACCEPTANCE TESTS FOR PRESSURE PIPING**

- A. All newly installed sections of pressure piping including but not limited to service connections shall be pressure and leak tested as described herein. Testing procedures shall be in accordance with the requirements of latest AWWA C600 for ductile iron pipe and latest AWWA C605 for PVC pipe as modified herein. The tests may be run simultaneously at the Contractor's option.
- B. For buried pressure water mains, tests shall be made on sections not to exceed 2500 feet in length. All necessary equipment, material and labor required shall be furnished by the Contractor. The District will monitor all testing operations. Testing against new valves is permitted at the Contractor's risk. No testing is permitted against existing system valves.
- C. Tests can only occur after the trench has been backfilled.
- D. The test pressure shall not be less than 1.25 times the stated working pressure of the water main measured at the highest elevation along the test section and not less than 1.5 times the stated working pressure at the lowest elevation of the test section. The test pressure in the main shall be maintained for a period of 2 hours. The test pressure shall not vary by more than  $\pm 5$  psi for



the duration of the test. The water required to maintain the test pressure within the allowance pressure loss shall be measured by means of a graduated barrel, drum or similar device at the pump suction.

- E. No leakage shall be permitted for any pipe.

### **3.08 FLUSHING AND DECHLORINATION**

- A. Flushing and dechlorination of the water main shall be supervised by the District. The Contractor shall not flush or dechlorinate the water main until they have coordinated with the District.
- B. A Storm Water Pollution Control Plan must be approved by the District prior to any flushing or draining of the new/abandoned water main, fire hydrants, reconnects.
- C. Prior to any flushing, the Contractor shall install and secure BMP's at storm drain inlets/catch basins. Repair, replace, and secure BMP's if needed before proceeding with the flushing operation.
- D. A flushing sock shall be installed to treat chlorinated water with dechlorination tablets.
- E. All foreign matter shall be flushed from the water main prior to disinfection. Hoses, temporary piping, or other devices shall be provided to dispose of flushing water without damage to adjacent properties. An approved backflow device shall be used when flushing and filling newly-constructed mains.
- F. Following chlorination, all treated water shall be flushed from the mains until the replacement water shall, upon testing, both chemically and bacteriologically, be proven equal to the water quality at the point of supply. Chlorination shall be repeated, if necessary, by the Contractor if the replacement water does not prove equal to the water quality at the point of supply. Actual testing of the bacteriological water sample for chlorine residual shall be conducted by District personnel.
- G. A disposal plan of chlorine-water mixture shall be submitted to the District 5 working days in advanced for review. Upon approval of the disposal plan by the District, the Contractor may proceed with disposal of the chlorine-water mixture per Section 01 57 23 - Storm Water Pollution Control Plan\Erosion Control.
- H. The Contractor shall not allow the treated water to discharge onto open surface or waterway without adequate dechlorination or other satisfactory method of reducing the chlorine concentration to zero.

### **3.09 CUTTING AND DISPOSAL OF EXISTING ASBESTOS CEMENT PIPE**

- A. Contractor shall use due care when working with asbestos cement pipe and shall comply with all applicable laws and regulations regarding such work. When cutting asbestos cement pipe, Contractor shall ensure that adequate means are used to protect its workers and the environment against asbestos exposure. Asbestos cement pipe shall not be cut with a saw or comparable dust-generating tool, unless adequate encapsulation is provided. Asbestos cement pipe removed by the Contractor's operations shall become his property and be properly bagged and disposed of in an approved manner as required by federal, state, and local regulations.

- B. Contractor shall use due care when working with asbestos cement pipe and shall comply with applicable laws and regulations regarding such work.
- C. When cutting asbestos cement pipe, Contractor shall ensure that adequate means are used to protect its workers and the environment against asbestos exposure.
- D. Asbestos cement pipe shall not be cut with a saw or comparable dust-generating tool.
- E. Snap cutters shall be used to cut asbestos cement pipe. Asbestos cement pipe shall not be cut with a saw or cutting tool. Asbestos cement pipe removed by the Contractor's operations shall become their property and be properly bagged and disposed of in an approved manner as required by federal, state and local regulations.

**END OF SECTION**

## **SECTION 33 14 20 - VALVES AND APPURTENANCES**

### **PART 1 GENERAL**

#### **1.01 SCOPE OF WORK**

- A. Work included under this section consists of furnishing and installing valves and appurtenances as shown on the Standard Drawings and as specified herein.

#### **1.02 SUBMITTALS**

- A. The Contractor shall submit manufacturer's data including catalog cuts, drawings and letter(s) of compliance as required by Section 01 33 00 - Submittals.

### **PART 2 MATERIALS**

#### **2.01 GENERAL**

- A. Brass goods furnished under this section shall be new and unused. All fittings shall conform to latest ANSI/AWWA Standard C800.
- B. All brass components in contact with potable water must be made from either CDA/UNS Brass Alloys C89520 or C89833 with a maximum lead content of .25% by weight. Brass alloys not listed in ANSI/AWWA C800 Paragraph 4.1.2 are not approved. Brass saddles shall be made from CDA/UNS C83600.
- C. All fittings shall be stamped or embossed with a mark or name indicating that the product is manufactured from the low-lead alloy as specified above.

#### **2.02 GATE VALVES**

- A. Gate valves shall be Mueller A-2362 and have either flanged or mechanical joint ends as shown on the Standard Drawings. The valve shall be resilient seat and fully comply with the latest AWWA C509, and also be UL listed and FM approved. The valves shall be tested and certified to ANSI/NSF 61.
- B. The valve shall have a 250psig working pressure. Each valve shall be factory seat tested to 250psig and shell tested to 500psig. Buried valves shall be NRS (non-rising stem), equipped with a 2-inch square bronze operating nut (open left), and have an arrow cast on the operating nut opening direction. The bolt that attaches the operating nut to the stem shall be recessed into the operating nut so as not to interfere with valve wrench operation.
- C. All main line valves shall be 8" or larger in diameter and shall have flanged or mechanical joint ends (on PVC or DI pipes) or push-on with FieldLok (on DI pipes). Valves smaller than 8" shall require prior written approval by the District. Flanges shall be dimensioned, faced and drilled in accordance with ANSI B16.1 for Class 125 unless stated otherwise on the drawings or the specifications. All necessary caulking materials, gaskets, bolts, and nuts shall be provided. All valves shall be protected from damage before installation and until completion of work.

- D. All buried valves shall be furnished with Type 316 stainless steel valve stem packing and bonnet bolts. All external flanged bolts, nuts and washers for all valves shall be Type 316 stainless steel. Corten T-bolts are allowed on mechanical joints.
- E. The valve stem shall be made of ASTM B98-C66100/H02 (Everdur) bar stock material. The stem shall have at least one "anti-friction" thrust washer above and below the stem collar to reduce operating torque. The design of the NRS valve stem shall be such that if excessive input torque is applied, stem failure shall occur above the stuffing box at such a point as to enable the operation of the valve with a pipe wrench or other readily available tool. The stem material shall provide a minimum 70,000psi tensile strength with 20% elongation and yield strength of 38,000psi. Valves with two-piece stem collars are unacceptable.
- F. The NRS valves shall have a stuffing box (with dirt seal) that is o-ring sealed. Two o-rings shall be placed above and one o-ring below the stem thrust collar. The thrust collar shall be factory lubricated. The thrust collar and its lubrication shall be isolated by the o-rings from the waterway and from outside contamination providing permanent lubrication for long term ease of operation. Valves without a stuffing box are unacceptable. Valves without at least three stem o-rings are also unacceptable.
- G. The valve disc and guide lugs must be fully (100%) encapsulated in EPDM. The peel strength shall not be less than 75 pounds per inch. Guide caps of an Acetal bearing material shall be placed over solid guide lugs to prevent abrasion and to reduce the operating torque. Guide lugs placed over bare metal are not acceptable.
- H. The valves shall have all internal and external ferrous surfaces coated with a fusion bonded thermosetting powder epoxy coating of 10 mils nominal thickness. The coating shall conform to AWWA C550.
- I. The valves shall be warranted by the manufacturer against defects in materials or workmanship for a period of ten (10) years from the date of manufacture. The manufacturing facility for the valves must have current ISO certification.

### **2.03 GATE VALVE EXTENSION**

- A. Gate valve extension is required on any valve nuts installed more than 3' below finished grade. Gate valve extension shall be ProSelect, PS4000 series with centering plate.
- B. The Contractor shall have various sizes of valve extension on hand to accommodate varying field conditions. The extension length selected shall be such that the top of extension nut is installed at least 18-inch but no more than 20-inch below the finished grade

### **2.04 HYDRANTS**

- A. Hydrants shall be Clow 860 (wet barrel) with Clow Valve model LB400 break-off check valve assembly. The break-off check valve assembly shall have Type 316 stainless steel bolts and nuts between the body and extension/riser.
- B. Hydrants shall have two 2½-inch outlets and one 4½-inch pumper outlet. Hydrants shall have a 6-inch flanged inlet per the Standard Drawings.

- C. The Contractor shall have various sizes of hydrant buries on hand to accommodate varying field conditions. The bury length selected shall be such that the bottom of the break-off flange is at least 1-inch but no more than 4-inch above the finished grade.
- D. Hydrants and all metal above the concrete collar shall be factory painted “white” using Ellis priming V17500 and semi-gloss high solids polyurethane P29 direct to metal paint as manufactured by Ellis. Contractor shall submit a color sample for review.
- E. All bolts, nuts and washers, and restraining tie rods and associated hardware, used with flanged fittings, couplings and appurtenances shall be Type 316 stainless steel.

## **2.05 COMBINATION AIR VALVES**

- A. Combination air valves shall be capable of positive action in releasing air accumulations in water mains under full line operating pressure and shall vent or exhaust air during filling and draining operations. Valves shall be of the size and pressure rating indicated on the project drawings or if not so indicated shall be 1-inch with a  $\frac{5}{64}$ -inch orifice and simple type lever, rated for operation at 300 psi minimum for water main 8-inch and smaller, and 2-inch with a  $\frac{3}{32}$ -inch orifice and simple type lever, rated for operation at 300 psi minimum for water main 10-inch and larger. Combination air valve shall be A.R.I. D-040.

## **2.06 METER VALVES AND COUPLINGS**

- A. All service fittings shall be certified as suitable for contact with drinking water by an ANSI accredited organization in accordance with ANSI/NSF Standard 61, Drinking Water Systems Components – Health Effects.
- B. Compression ball angle meter valves shall be angle pattern, with lock wing. Compression ball angle meter valves for 5/8” and 1” meter connections shall be Mueller B-24258N. Compression ball angle meter valves for 1-1/2” and 2” meter connections shall be Mueller B-24276N.
- C. When a 5/8” meter is being installed, Ford A-13-NL and/or Ford A-14-NL meter adapters shall be installed on the inlet and/or outlet sides of the meter.
- D. Meter couplings shall be Mueller H-10871N (insulated).
- E. Residential ball valve shall be Red White 5044AB
- F. When the customer’s water service is PVC, Mueller V-15442 (female) or V-15440 (male) Pack Joint connection shall be used.

## **2.07 CORPORATION STOPS**

- A. Corporation stops shall be Mueller N-35008N (insulated), with inlet AWWA taper thread and outlet compression connection for 5/8” and 1” service.
- B. Corporation stops shall be Mueller B-20045N on a 1” combination air valve.
- C. Corporation stops shall be Mueller N-35008N on a 1½” to 2” service connection.
- D. Corporation stops shall be Mueller B-20045N on a 2” combination air valve.

## **2.08 SERVICE SADDLES**

- A. Service saddles shall be bronze with neoprene gaskets with double bronze straps, Mueller No. BR2B "CC" for DI pipe and Mueller No. BR2S "CC" for PVC pipe, sized for the exact outside diameters of the pipes on which they will be installed.

## **2.09 BLOWOFF ASSEMBLY**

- A. Blowoff assembly shall have a 2-inch vertical FIP inlet and 2-inch NIP for mains 6-inches and smaller, or 4-inch vertical FIP inlet and 4-inch MIP outlet for mains 8-inches and larger. Blowoff assembly shall be operated by turning a top-mounted square operating nut. All internal working parts and the inlet and outlet fittings shall be manufactured from low-lead brass. All working parts shall be serviceable from above without removing the valve box. Blowoff assembly shall be Truflo Model No. TF550 (2-inch) or Model No. 7600 (4-inch) as manufactured by the Kupferle Foundry Co., St. Louis, MO.

## **2.10 BACKFLOW PREVENTER**

- A. Backflow preventer shall operate on the reduced pressure principle and shall consist of two spring-loaded check valves and a spring-loaded, diaphragm actuated, differential pressure relief valve located between the two check valves, in accordance with the Standard Drawings. The backflow preventer assembly shall meet all applicable requirements of latest AWWA C511 and shall be included on the most current "List of Approved Backflow Prevention Assemblies" of the San Mateo County Health System.
- B. Backflow preventer shall be provided on all service connections to properties having a supplemental source of water, wells, fire sprinkler system, irrigation system that has an automatic chemical feeding control, pumps, multi story buildings or any other instances that has a potential to contaminate potable water supply or as directed by the District.

## **2.11 VALVE AND METER BOXES**

- A. Valve boxes shall be concrete traffic-type boxes with cast iron traffic covers. Covers shall be marked "WATER". Concrete extension pieces shall be provided with each box as required. For deep bury conditions for valve boxes, 8" SDR 35 PVC pipe extensions shall be. Diameter shall be 10 <sup>3</sup>/<sub>8</sub>-inches minimum with 9-inch throat diameter. Valve boxes shall be Christy "Machined Faced" Model G05T with G505CT cover.
- B. For <sup>5</sup>/<sub>8</sub>-inch or 1-inch meters, meter boxes shall be Christy Model B16 concrete box with B16P reinforced concrete lid. For 1½-inch or 2-inch meters, meter box shall be Christy Model FL30T Fiberlyte box with a FL30P Fiberlyte lid. For 1 ½-inch or 2-inch meters with bypass, meter box shall be Christy Model N48 concrete box with a N48-62D-P Steel lid. Meter Lids shall be marked "WATER" and have one recessed probe hole, made for Sensus FlexNet radio readers. Traffic rated box and cover shall be provided in traffic area and where directed by the District.
- C. Water service PRV boxes shall be concrete reinforced concrete cover. For 1-inch PRV, boxes shall be a Christy BX09B with a BX09D reinforced concrete lid or as noted on the plans. For 2-inch PRV, boxes shall be a Christy B16B with a B16G reinforced concrete lid or as noted on the plans.

- D. Boxes for the 2" and 4" blowoff assembly shall be Christy Model B1324 (H/20 loading) with B1324-61JH steel checker plate cover.
- E. Boxes installed in driveways and other paved areas shall be traffic rated box and have traffic rated covers.

## **2.12 PRESSURE REDUCING VALVE**

- A. The pressure reducing valve shall be installed according to the project plans. Contractor shall submit for review and approval shop drawings for the pressure reducing valve and vault assembly.
- B. Pressure reducing valve shall be a Cla Val, models approved by the District, and installed per the plans and manufacturer's recommendation.
- C. Pipe supports shall be installed per detail drawings.
- D. Pressure gages shall be liquid filled and accommodated pressure shown on plans.
- E. After the pressure reducing valve and vault has been installed, the vault shall be cleaned from all construction debris.
- F. All bolts, nuts and washers, and restraining tie rods and associated hardware, used with flanged fittings, couplings and appurtenances shall be Type 316 stainless steel.
- G. Contractor shall coordinate with District for a temporary shutdown.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION OF VALVES**

- A. Valves shall be carefully installed in their respective positions, accessible for operation and repair, and free from all distortion and strain, with joints made as specified, and shall be left in satisfactory operating condition. Buried gate valves, and valve boxes, shall be installed in accordance with the Standard Drawings.
- B. Before installation, all valves and appurtenances shall be thoroughly cleaned of all foreign material, and shall be inspected for proper operation, both opening and closing and to verify that the valves seat properly. Valves shall be installed so that the stems are vertical.
- C. A marker post shall be installed adjacent to each gate valve, combination air valve, air/vacuum valve, and blow-off assembly. The location for each post will be selected by the District based on field conditions.
- D. Valves located within 10' of a fitting shall be moved directly to the fitting and connected via a flanged joint or as directed by the District.
- E. Gate valve marker signs will be supplied by the District, it is the responsibility of the Contractor to install the post and affix the sign on the post per Standard Drawings.

### **3.02 INSTALLATION OF VALVE AND METER BOXES**

- A. Valve boxes shall be centered and set plumb over the wrench nuts of the valves and shall not transmit shock or stress to the valves. Valve box covers shall be set flush with the surface of the finished grade or as directed by the District. Backfill shall be placed around the valve boxes and thoroughly compacted to a 95% relative in such a manner that will not damage or displace the valve box from proper alignment or grade. Misaligned valve boxes shall be re-excavated, replumbed, and backfilled at the Contractor's expense. No riser or extension rings are allowed. 8" SDR 35 PVC pipe extensions shall overlap the gate valve box a minimum of 6".
- B. Water meter boxes shall be the last item set after the existing angle meter and copper piping is removed. Meter boxes shall be set parallel to the service line following the contour of existing ground. After the box is set and aligned with the meter, contractor may use native material, aggregate base, or fines to backfill around the box as directed by the District and as applicable. Soil within a 12-inch perimeter of the box shall be compacted to a relative density of 90% using a pneumatic device such as a "Powder Puff" or other mechanical means approved by the District.
- C. Finished elevation of the box shall be 1-inch above finished grade when located in non-traffic areas and flush with pavement when located in traffic areas and pathways.
- D. Contractor shall set the box "knockout" in-line with service, and a 1-inch clearance between the box and service line. The box shall not sit on top of the service line.
- E. After the box has been set and compacted, any debris and dirt inside the box shall be removed and disposed of to the satisfaction of the District.
- F. Contractor shall bear the responsibility of private property structures such as mail boxes, retaining walls, landscaping, etc., during construction.

### **3.03 INSTALLATION OF SERVICES**

- A. All services shall be 1" or 2" in size and installed in conformance with the Standard Drawings. Applications for services larger than 1" require hydraulic calculation justification and prior approval from the District. Services larger than 2" also require submitting a shop drawing.
- B. When connecting copper to PVC, Mueller's V-15442 (female) or V-15440 (male) pack joint connections shall be used. Contractor is responsible to determine ahead of time the necessary material to connect the service with the resident's service line. Contractor shall coordinate with the District to determine the configuration and location of the service.
- C. Direct tapping of ductile iron pipe shall be done using the "preferred method" described in AWWA C600, Section 4.8 to preserve the integrity of the existing encasement. This method requires the application of two or three layers of polyethylene adhesive tape completely around the pipe to cover the area where the tapping machine and chain will be mounted. The corporation stop shall then be installed directly through the polyethylene tape and encasement. If damaged, the encasement and/or tape shall be repaired with tape.
- D. Direct tapping of PVC pipe shall be done using the "preferred method" described in AWWA C605, Section 6.4.



- E. Service relocations shall be done by “freezing” the service line with CO<sub>2</sub>, or other approved method by the District to temporary discontinue the supply of water while relocating the service. Crimping will not be allowed to temporary block the supply of water.

### **3.04 INSTALLATION OF FIRE HYDRANTS**

- A. Fire hydrants shall be plumbed vertical and installed in accordance with the Standard Drawings. Fire hydrants shall be set so the bury line mark on the break-off is level with finish grade.
- B. All hydrants shall be flushed and tested after installation to ensure a sound setting and smooth operation. All valves shall close drip tight.
- C. Contractor shall install a two-way, reflective pavement marker at each fire hydrant location as directed by the local agencies. If the marker does not adhere to existing ground, place it on top the gate valve cover located directly off the main. For fire hydrants located on fire roads, fire a hydrant marker post shall be installed per the Standard Drawings. The markers shall be furnished and installed in accordance with applicable paragraphs of Section 84 – Markings, of the latest requirements of Caltrans Standard Specifications. Fire hydrant valve lid and rim shall be painted direct to metal white.

### **3.05 INSTALLATION OF BLOW-OFF ASSEMBLY**

- A. Blow-off assembly shall be installed in accordance with the Standard Drawings.

### **3.06 INSTALLATION OF COMBINATION AIR VALVES**

- A. Combination air valves shall be plumbed vertical and installed in accordance with the Standard Drawings.

### **3.07 INSTALLATION OF BACKFLOW PREVENTERS**

- A. Backflow preventer shall be installed horizontal and level, with the minimum clearances for obstructions as shown on the Standard Drawings. Vertical installations are allowed but require District approval prior to design and installation. A ball valve shall be installed on both sides of the backflow preventer assembly. Mueller’s H-15531N compression x MIPT 90°s shall be used at both ends of the assembly to allow removal of the unit in the event of a malfunction. Backflow preventers assembly shall be tested and certified by a San Mateo County’s Certified Tester prior to being put in service. Valves failing the test shall be replaced, and retested.
- B. Contractor is responsible to determine ahead of time the necessary material to connect the backflow preventer with the resident’s service line. Contractor shall coordinate with the District to determine the configuration and location of the backflow preventer.

**END OF SECTION**

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**SECTION 43 41 13 - WELDED STEEL WATER STORAGE TANKS**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. This section describes the design, fabrication and erection of a flat-bottom, seismic, welded steel water storage tank in accordance with AWWA D100-11 including Section 13 and ASCE07- 16. Contractor shall provide the steel tank, pipe connections, manholes, ladders, hatches, vents, water level indicator, bridge crossing, hatches, vents and other appurtenances shown on the drawings and specifications.

**1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 09 96 56 High Performance Coatings.

**1.03 DESIGN INFORMATION**

- A. The tank dimensions (feet) are as follows:

Type of Tank	Diameter (feet)	Maximum Operating Level (MOL) & Overflow Height, TCL, (feet)	Tank Height (feet)
Flat Bottom	55	45	46
Flat Bottom	60	45	46

- B. Provide a 1/4 inch minimum thick bottom.
- C. Shell plate thickness shall be minimum ¼ inch.
- D. Provide a supported roof with a slope of 1 inch in 12 inches. The minimum thickness of the roof shall be ¼ inches.
- E. The roof plates shall be fully welded on the top side and all accessible joints on the underside shall be seal welded.
- F. Earthquake design: Per AWWA D100 Section 13 and Part 1.04 of this specification.
- G. Design roof live load: 20 psf.
- H. Basic wind speed shall be 85 mph.
- I. Lowest one-day mean ambient temperature: +30 °F.
- J. Allowable soil bearing pressure for supporting loads imposed by interior columns shall be DL = 2,000 psf; DL + LL = 3,000 psf; DL + LL + E = 4,000 psf (exclusive of the weight of water).

- K. Allowable soil bearing pressure for supporting loads imposed by ring footing shall be DL = 3,000 psf; DL + LL = 4,500 psf; DL + LL + E = 6,000 psf (including the weight of water).
- L. Design shall comply with AWWA D100. Alternative rules and design stresses in Section 14 may not be utilized.

#### **1.04 SEISMIC DESIGN**

- A. Design the steel tank in accordance with AWWA D100, Section 13, for flat-bottom tanks. Design based on the following criteria:
  - 1. Seismic Use Group: III
  - 2. Site Class: C
  - 3.  $S_s = 2.092g$ ;  $S_1 = 0.867g$
  - 4.  $F_a = 1.2$ ;  $F_v = 1.4$
  - 5. Freeboard shall be 1'.
  - 6. The roof shall be designed to resist the seismic sloshing forces in compliance with ASCE07-16.

#### **1.05 SUBMITTALS**

- A. Design Calculations: After award of the contract, the contractor shall provide the Structural District complete design calculations and plans for review. The calculations shall be signed and stamped by a licensed Civil Engineer registered in the state of California.

### **PART 2 MATERIALS**

#### **2.01 ACCESSORIES**

- A. Locations of accessories shall be as shown on the contract drawings.
- B. Roof columns: Column base plates shall be welded to the bottom plates.
- C. Shell Manways: Provide two (2) 42" diameter Monobolt Manhole with stainless steel interior davit assembly and self-positioning u-shaped gaskets. Manways shall have provisions for locking. Stainless steel components inside the tank shall be electrically isolated from the tank.
- D. Ladders:
  - 1. Conform to applicable local, state and federal regulations.
  - 2. Provide type 304 stainless steel inside ladder with a type 304 stainless steel Saf-T-Climb assembly including removable section. Provide stainless steel storage brackets mounted on the tank roof for the removable Saf-T-Climb extension. The inside ladder and safety climb shall be electrically isolated from the tank and provided from roof hatch to the bottom of the tank.

3. Provide an outside ladder with galvanized Saf-T-Climb assembly.
  4. Provide one (1) safety climb belt and sleeve set.
  5. All ladder devices and construction shall comply with OSHA regulations.
- E. Size of Posts and rails and the height of guardrail assemblies shall comply with applicable state and federal regulations and AWWA D100. Roof guardrails shall be provided at the locations and to the extent shown on the drawings. Gate shall be self-closing type.
  - F. Provide four (2) 39" and two (2) 30" square roof hatch in accordance with AWWA D100. Hinges shall be stainless steel.
  - G. Provide on (1) 48" diameter mushroom type roof vent with removable lid. Vent design shall conceal the screens from horizontal exposure. The vent shall be outfitted with an 8 mesh bronze insect screen held in place with a stainless steel clamping system.  
  
Provide additional seven (7) 24" perimeter vents on the West Tank and five (5) for the East Tank with removable lid.
  - H. All nuts and bolts in the roof structure system shall be hot dip galvanized. All nuts shall be free of grease and oil.
  - I. Overflow: Provide a weir inlet with overflow pipe as shown on the drawings. Design the overflow per the average flow of 2,000 GPM
  - J. Level gauges: Provide two gages per tank 1) Varec Model 2500 automatic tank gauge and 2) Rosemount 3051L Level Transmitter. Provide a 4" flange connection to the tank and power source to the tanks. Location as shown on the drawings.
  - K. Provide one (1) 1" sample port coupling as shown on the drawings.
  - L. Provide one (1) 20" double flanged inlet/outlet shell nozzle as shown on the drawings.
  - M. Inlet/outlet mixing system on tank interior as shown on drawings.
  - N. Provide other pipe connections as shown on the drawings.
  - O. Cleanout shall be per drawings.
  - P. Provide sample station as shown on the drawings with stainless steel fittings and accessories.
  - Q. Pulley shall be connected to steel pipe that is securely attached to the roof of the tank as detailed on the plans. The design load for tool pulley should be 500 lbs with a safety factor of 2.
  - R. Insulators shall be provided at all connections involving dissimilar metals
  - S. Antenna roof support welded on the roof.
  - T. Provide cathodic protection for both tanks.

## **PART 3 EXECUTION**

### **3.01 EXECUTION**

- A. Erection: Erection shall be performed in accordance with the provisions of AWWA D100.
- B. Fabrication: All fabrication and shop assembly shall conform to the requirements of AWWA D100, Section 9, Shop Fabrication.
- C. Welding: All field welding shall conform to AWS and Section 10, AWWA D100. The contractor shall ensure that welders are qualified in accordance with ASME Section IX or ANSI/AWS B2.1.
- D. Inspection and Testing: Inspection and testing shall be as specified in Section 11 of AWWA D100.
- E. Radiography: The tank Contractor shall be responsible to radiograph the tank in accordance with AWWA D100. A complete radiography package including x-ray film and Radiographic Report shall be submitted to the District's representative prior to acceptance of the structures.
- F. Vacuum test: After the tank is completed and before it is painted, the welded seams in the tank bottom shall be tested in accordance with AWWA D100 section 11.10.1.2.
- G. Tank coatings: Interior and exterior tank coatings shall be applied in accordance with "Protective Coatings for Welded Steel Reservoirs" and Section 09900.
- H. Disinfecting: Disinfection of the reservoir shall be performed by the contractor in accordance with the requirements of AWWA standard C652-92 or latest revision, and "Protective Coatings for Welded Steel Reservoirs".

After all the work on the tank has been completed, the Contractor shall remove all staging, scaffolding, containers, surplus material, abrasive, dust, dirt, debris, liquids and rubbish from the tank in a manner approved by the District.

Disinfection of the tank's interior surfaces shall be performed in the presence of the District in accordance with all the requirements of applicable regulatory agencies. Disinfection shall be performed immediately after cleanup is completed and accepted by the District. Disinfection shall be accomplished in accordance as described in AWWA latest C652.

Samples for bacteriological analyses and volatile organic compounds (VOC's) will be collected by the District. The District will pay for initial testing. If coliform bacteria counts in any sample exceed those allowed by Title 22 of the California Administrative Code, sampling shall be repeated by the District. The Contractor shall be responsible for the cost of any repeat testing.

After the tank has been filled for 5 days, a sample for VOC analysis will be collected by the District. The VOC analysis include all chemicals from the Standard Method 524.1/524.2 lists and methyl ethyl ketone (MEK) and methyl isobutyl ketone (MIBK). Any solvent in the coating not included in method 524's standard list shall also be included in the analysis. A copy of the analytical reports shall be submitted to the California Department of Health Services (DHS) for review prior to putting the tank into operation. If all VOC results are less than State of California maximum containment levels (MCLS's) or action levels (AL's), then the tank can be put into service and the California DHS notified. If any VOC results exceed State MCLs or LAs, then DHS shall be notified,

and the tank shall be drained and refilled. After the tank has again been filled for 5 days, sampling for VOCs shall be redone as described above.

Any VOC contaminated water shall be properly disposed of according to Federal and State Laws and regulations for disposal of a hazardous waste.

Following successful disinfection bacteriological and VOC sampling results, and District testing which shows the water in the tank to contain 0.5-2.0 mg/L residual chlorine (or equal to the source of water and as noted by the District), the water will be deemed acceptable for return to the distribution system.

If the water in the tank is not suitable for return to the distribution system, the Contractor shall be responsible for dechlorination to less than 0.1 mg/L residual chlorine before release to the storm drain system.

The Contractor shall bear all costs of disinfection (and dechlorination if necessary) except that the District shall bear the cost of initial sampling and water quality testing.

- I. Filling and hydrotesting: Upon completion of all protective coatings as outlined in the plans and specifications, and after disinfection is satisfactorily completed, the reservoir shall be filled with water. The water required for hydrotesting shall be furnished by the owner. Once the reservoir is completely filled it shall sit for a period of 24 hours. If no leaks are present, the tank has satisfactorily passed the hydrotest. If repairs are required, the interior and exterior coatings shall be protected during repairs, coatings shall be touched up as necessary, and the tank shall be retested to the satisfaction of the District before the work is accepted.
- J. Warranty: The reservoir shall be deemed accepted when the reservoir has been proven free from leaks and other defects to the satisfaction of the Owner. The acceptance by the Owner of the completed work as herein specified is subject to the Contractor's warranty for the completed work against defects in materials or workmanship furnished by the Contractor for a period on one (1) year from the date of acceptance of the work.
- K. Steel Pipe: Interior pipe shall be painted similar to the tank exterior or as directed by the District.

**END OF SECTION**

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## SECTION 46 33 00 – MONOCLOR RESIDUAL CONTROL SYSTEM

### PART 1 GENERAL

#### 1.01 DESCRIPTION

##### A. Scope

1. This Section covers the work necessary by the Contractor, Residual Control System (RCS) Supplier, Owner, and Engineer, to furnish, install, test, and make ready for operation a Residual Control System.
2. The RCS includes, but is not limited to the system control cabinet with PLC, on-site sodium hypochlorite generator, tank mixer, water sampling cabinet, smart control center, piping, valves, ancillary equipment as specified herein, installation, related testing, start-up, and training services.
3. The RCS Supplier shall furnish an entire residual control system consisting of the following major components:
  - a. Control cabinet, PLC, VFDs, networking communication components, and associated equipment
  - b. On-site sodium hypochlorite generator
  - c. Tank mixer
  - d. Water Quality Station
  - e. Smart Control Center
  - f. Hydrogen Dilution System
  - g. Water Softeners & Cartridge Filters
  - h. Brine Tank and accessories
  - i. Chemical storage tanks
  - j. Chemical metering pumps
  - k. Acid cleaning cart
  - l. FRP Shed for equipment storage

##### B. System Description

1. The Monoclor® RCS is an automated system designed to continuously monitor the disinfectant level and precisely dose chemicals in order to control and maintain a disinfectant concentration target.
2. The Monoclor® RCS shall improve water quality through multiple processes:
  - a. The reservoir shall have high energy, active mixing that ensures instantaneous reaction of introduced chemicals and ensure a homogenous water body that will not stratify.
  - b. The Monoclor® RCS shall allow for optimization of the chloramine residual curve by continuous monitoring of water quality parameters and controlled dosing of ammonia and chlorine.

3. The on-site sodium hypochlorite generator shall generate an aqueous solution of a minimum concentration of 0.8% ( $\pm 0.05\%$ ) by weight sodium hypochlorite expressed as chlorine. The minimum capacity shall be demonstrated to be equal to the capacity specified for each installation while not exceeding the maximum aggregate raw material quantities specified below.
4. The on-site sodium hypochlorite generator system shall be designed for the following operating conditions:

SYSTEM I.D.	GENERATION CAPACITY*	STORAGE CAPACITY^
	300	24

\*Expressed as pounds per day (PPD) free available chlorine (FAC)

^Expressed as hours storage capacity

5. The system shall use solar salt containing no additives (organic binders, flow control agents, resin cleaning material, etc.), and meeting the following specifications:

COMPONENT	WEIGHT
Sodium Chloride (dry basis)	99.7% minimum
Insolubles	0.15% maximum
Surface Moisture	0.20% maximum

6. Expected water consumption will be in the range of 14.0-17.0 gallons per pound of chlorine equivalent output. Water temperature must measure between 55 °F and 78 °F. Higher temperature water will result in lower system efficiency and higher total consumable units. A minimum of 50 psi water pressure is required at the inlet to the water softener. The raw water supply to the softener must be potable.
7. Generator performance is to be measured as a function of total consumption for salt and power. Expected ranges of consumption for salt will be 2.5-3.5 pounds of salt and 1.8-2.4 KWH per pound of equivalent chlorine (PE). Product concentrations will be in the range of  $0.8\% \pm 0.05\%$ .
  - a. Performance will be measured as the sum of the unit measurements for salt (PPE) and power (KEMPE) and will not exceed 6.0 consumable units. Example: salt consumption at 3.0 PPE and 2.0 KWHPPE will measure 5.0 consumable units and will be considered proper performance.
  - b. Note that electrolytic cells require an initial acclimation period of approximately 300 operational hours. Performance measured before the cells have completed this exercise may not satisfy specification requirements. Equipment ancillary to the generator shall be excluded from performance calculations.

8. The only liquid waste product allowed from the on-site sodium hypochlorite generator will be the periodic backwash discharge from the water softener.
  9. The system must maintain the incoming disinfectant residual within  $\pm 0.2$  ppm of the desired set-point within 48 hours after initial system start-up.
- C. Refer to A3 – Monoclor on Site Hypochlorite Generation System MC-300 in the Appendix.

## **1.02 RELATED SECTIONS**

- A. All electrical, mechanical, metal, painting and instrumentation work included herein shall conform to the applicable Sections or Divisions of this project except as otherwise shown or specified.

## **1.03 REFERENCE SPECIFICATOINS CODES AND STANDARDS**

- A. American National Standards Institute (ANSI).
- B. Underwriter Laboratory (UL): UL 508A- Industrial Control Panel
- C. Occupational Safety and Health Administration (OSHA)
- D. National Electrical Manufacturers Association (NEMA)
- E. National Electrical Code (NEC)

## **1.04 QUALITY ASSURANCE**

- A. RCS Supplier Requirements

1. All equipment provided under this section shall be obtained from a single manufacturer, who shall:
  - a. Assume full responsibility for the completeness and proper operation of the RCS.
  - b. Have experience, be reputable, and be qualified in designing and manufacturing Residual Control equipment.
  - c. Have current NSF Standard 61 Certification for the generation skid being offered.
  - d. Satisfy the following experience requirements:
    - 1) At least five years with Residual Control equipment for storage tanks ranging in capacity from 0.5 MG to 49 MG.
    - 2) At least 15 years with on-site sodium hypochlorite generation equipment ranging in capacity from 20 to 2400 pounds per day of 100% chlorine equivalent.
  - e. Supply units containing all necessary appurtenances and components for a complete and operating system conforming to this specification. The on-site sodium hypochlorite generator shall be pre-assembled, piped, and factory-tested to assure compliance with all operational requirements. The tank mixer shall be pre-assembled, piped, and

factory-inspected to assure compliance with all operational requirements. Loose hypochlorite generation or tank mixer components shall not be acceptable. No field assembly or wiring will be permitted with the exception of external conduits. Equipment footprint as shown on the drawings shall not be exceeded.

f. Satisfy the following reference installation requirements

1) At least ten similar on-site hypochlorite generation systems in operation for at least three years.

2. To ensure quality and complete unit responsibility, components of the RCS must be assembled to the furthest extent possible and inspected by the RCS Supplier at its facility. The complete RCS must be a regularly marketed product of that manufacturer. The RCS Supplier must have a physical plant, technical and design staff, and fabricating personnel to complete the work specified.
3. The manufacturer shall provide Remote Monitoring System, or Telemetry Service for a minimum of 3 months after the installation of the RCS system. Service includes daily reports on system performance to the customer. The service should be further supported by the manufacturer beyond the three-month period as a monthly or yearly paid service based on customer's interest.
4. The Owner reserves the right to be present at the fabricator's facility for visual inspection of equipment to be supplied.

B. Specified Manufacturer

1. Residual Control System shall be Monoclor® RCS as manufactured and supplied by PSI Water Technologies, Inc., Milpitas, California, (408) 370-6540.
2. Monoclor® is the basis of design Contractors are responsible for any additional costs associated with selection, design, and installation of an alternate manufacturer, including revision of Contract Drawings (mechanical, process, etc.) by the Engineer.

C. Alternates

1. Alternate products shall be presented as a substitution request to the Engineer for review per the bid schedule and shall include a list of all exceptions detailing specific areas that do not meet the specification requirements herein, if applicable. The submittal must include technical documentation and test data for the SPECIFIC EQUIPMENT MODELS PROPOSED. Request for approval must be made at least 21 days prior to bid due date.
2. Should equipment from an alternate manufacturer be offered, such equipment may be acceptable only on the basis that any revisions in the layout and construction of the structures, piping and appurtenant equipment, electrical work, etc., required to accommodate such a substitution shall be made with all revision costs to be borne by the Bidder.

#### D. Hydrogen Safety Management

1. The generators shall have no waste products associated with its use other than hydrogen gas, which is to be vented to the atmosphere. Hydrogen Dilution blowers will be used to purge all residual hydrogen out of the system and storage tanks and dilute the hydrogen concentration 100 to 1 or below 25% of the LEL.
2. Any proposed system must meet every operational and material aspect of this specification. Hydrogen management shall be accomplished by the passive venting of each electrolytic cell without potential restrictions. This flow path should not have baffle plates, orifice plates or backpressure valves between the last point of product generation and atmospheric evacuation.
3. The presence of over-pressure rupture disks is not acceptable as the initiation of disk rupture would render the system inoperable. No hydrogen shall be vented directly to the hypochlorite storage tank where an accumulation could occur.
4. Under no circumstance will waste hydrogen be allowed to flow from one cell or cell compartment to the next. All hydrogen must immediately be released from each cell pack.
5. Minimum passive venting capability from each electrolytic cell pack shall be 4.0 square inches for every 100 pounds of chlorine production.
6. The hydrogen dilution system shall dilute the hydrogen concentration to below 25% of the LEL or 1% by volume.
7. Generator skid hydrogen dilution shall include passive vents connected to each cell and blower connected to the vent header. Sodium hypochlorite storage tanks shall be evacuated by blower.
8. Under no circumstance will the Hydrogen Safety Management requirements (Part 1.04.D.) be relaxed or modified as they are critical operator safety features and core to the generator design. **NOTE: THIS HYDROGEN SAFETY DESIGN MUST BE MET, REGARDLESS OF ONSITE GENERATOR MANUFACTURER SELECTED, AND WILL BE REQUIRED FOR SUBMITTAL APPROVAL.**

#### E. Warranty

1. Prior to acceptance of the Residual Control System, provide written warranty from the RCS Supplier that includes the following statements:
  - a. RCS Supplier has inspected the installation during and after completion and the Residual Control system is free from faults and defects and is in conformance with the Contract Documents.
  - b. The warranty period shall start from the date of commissioning of the system or 6 months after equipment shipment whichever comes sooner.

- c. Principal components of the sodium hypochlorite generator system will remain free of defects for a period of three (3) years from the date of final acceptance and all other equipment supplied for one (1) year.
- d. The electrolytic cells including cell body shall have a three (3) year full replacement warranty and a prorated straight-line replacement warranty for years 4-7 from the date of final acceptance.
- e. PAX PWM400 tank mixing system will remain free of defects for a period of two (2) years from the date of final acceptance.
- f. The FRP building shall be provided with a five (5) year manufacturer's warranty against defects in material and workmanship.

F. Product Submittals

1. The following product data shall be electronically submitted by the RCS Supplier for review and approval by the Engineer that the product provided conforms to the site-specific requirements prior to the fabrication of the systems:
  - a. Process and instrumentation diagram for the systems.
  - b. Shop drawings and catalog literature showing dimensional information and details of piping, fabrication, and erection of all materials and equipment furnished under this section, including:
    - 1) Detailed drawings of tank mixer orientations provided
    - 2) Detailed drawings of hatch installations provided
  - c. Scaled drawing of general layout, general arrangements, and major system components, including:
    - 1) Dimensions, including those for system inlet and outlet connections
    - 2) Anchor bolt layout
  - d. Drawings showing fabrication, assembly, installation, and wiring diagram. Wiring diagrams for the electrical control panel and rectifier transformer shall consist of, at a minimum, control schematics, including coordination with other electrical devices operating in conjunction with the RCS.
  - e. Manufacturer's literature, illustrations including weight and dimensions, specifications, materials of construction, and bill of materials for each component of the system. Data shall include a complete description in sufficient detail to permit comparison with the technical Specifications. Major system components include:
    - 1) Water softener
    - 2) Brine pump
    - 3) Hydrogen dilution blower
    - 4) Flow meter
    - 5) Miscellaneous instrumentation, valves, and accessories

- f. Performance data: for each pump and blower furnish a performance certification indicating:
  - 1) Pressure
  - 2) Capacity
  - 3) Efficiency
  - 4) Horsepower
- g. Motor data: For each motor furnish a certified motor data sheet for the actual motor or for a previously manufactured electrically duplicate motor which was tested.
- h. Control philosophy including I/O list and loop descriptions.
- i. The acceptable range of water pressure for proper system operation. If a pressure or flow regulator is required, it shall be provided.
- j. A list of all parameters, ratings or other characteristics where the proposed Residual Control System deviates from the requirements set forth in these Specifications.
- k. Installation instructions.
  - 1) Performance testing protocol including a recommended test plan, measurement methods, and sample data sheet showing all pertinent process data to be recorded and the frequency and data readings.
- l. Current NSF Standard 61 Certification for the generation skid and mixer being offered.
- m. References for equipment installed and in continuous operation to demonstrate conformed to 1.03.A.1.f.
- n. Affidavits of compliance with referenced standards and codes.

**G. Operation and Maintenance Manuals**

- 1. Detailed operation and maintenance (O&M) manuals for the RCS shall be provided by the Supplier to the Engineer for review and approval. At a minimum, the following shall be included:
  - a. Required Operation Data.
    - 1) Complete, detailed operating instructions for each piece of equipment.
    - 2) Explanations for all safety considerations relating to operations.
    - 3) Recommended spare parts lists.
  - b. Required Maintenance Data.
    - 1) All information and instructions required by plant personnel to keep equipment properly cleaned, lubricated, and adjusted so that it functions economically throughout its full design life.
    - 2) Maintenance summary forms.

- 3) Explanation with illustrations as necessary for each maintenance task
- 4) Recommended schedule of maintenance tasks.
- 5) Lubrication charts and table of alternate lubricants.
- 6) Troubleshooting instructions.
- 7) List of maintenance tools and equipment.
- 8) Name, address, and phone number of manufacturer and manufacturer's local service representative for major system components.

#### H. Manufacturer Services

1. Prior to scheduling services by the RCS Supplier, the Contractor shall verify the equipment installation and provide the completed installation checklist with photo documentation. Upon receipt of the completed installation checklist with photo documentation, the RCS Supplier shall schedule start-up and training to take place no sooner than two (2) weeks. The Contractor shall coordinate testing requirements and scheduling with the Engineer.
2. The RCS Supplier shall be present at each jobsite for the following after the system is installed:
  - a. Certification of proper installation, system startup, and functional testing.
    - 1) Installation inspection shall include supervising the correction of any defective or faulty work before acceptance by Owner.
    - 2) System startup shall include testing, calibrating, and adjustment of all components for optimum performance.
  - b. Functional testing shall include inspection of integration of the provided equipment's controls to the Owner's SCADA system, etc. Training Owner's personnel and providing detailed instructions in the operation, maintenance, and troubleshooting for the system.
    - 1) Upon request, a training manual will be provided with an outline of the training procedures.
  - c. Provide one trip for each jobsite for two days, travel time excluded, for tasks (a) and (b) above.
3. Services shall be provided by a technician that is factory-trained by the RCS Supplier and has demonstrated ability and experience in the installation and operation of the equipment.

## PART 2 PRODUCTS

### 2.01 RESIDUAL CONTROL SYSTEM (RCS)

- A. A PLC-based control panel containing system controls, water quality analyzer, tank mixer, chemical metering pumps, and all other necessary interconnecting wiring and hardware shall form a complete Residual Control System. Components of the RCS shall comply with this specification. All components of the Residual Control system shall be pre-assembled, piped, and



factory-inspected prior to shipping. The installation contractor shall provide all interconnecting piping and conduit, which shall be PVC.

- B. The Monoclor® RCS shall have the capability to automatically detect the disinfectant regime within the breakpoint curve through the analysis of rate of change of total chlorine residual and rate of change of ORP, and the system shall automatically adjust the ammonia and chlorine dosing strategy based on the regime detection analysis. Systems that do not utilize the rate of change of total chlorine residual and rate of change of ORP for automatic chloramine regime detection or require to pause ammonia and chlorine dosing strategy by operator shall not be accepted.

## 2.02 WATER QUALITY

- A. Water Quality Station consists of a reagentless amperometric probe type analyzer able to read at least residual chlorine or chloramine, pH, ORP, and temperature simultaneously.
- B. At a minimum, the Water Quality Station shall have the following features, components, and functionality:

- 1. Materials

- a. Housing: Powder coated steel
    - b. Enclosure Rating: NEMA 3R
    - c. Power Requirements: 115 VAC, 60 Hz or 240 VAC, 50 Hz
    - d. Sampling and discharge flow rate: 10 GPH
    - e. Maximum inlet pressure of flow cell: 30 PSI HMI: 3.8" LCD Touch Screen
    - f. SCC Communication: Modbus RS-485
    - g. SCADA: 8 analog outputs
    - h. Real-time data acquisition on USB Flash Drive.
    - i. Sensors

- 1) Total Chlorine Sensor

- a) Dual probe configuration
        - b) Type: 3-electrode amperometric
        - c) Measuring Range: 0 - 20 mg/L
        - d) Resolution: 0.01 mg/L

- 2) pH Sensor

- a) Type: Combined 2-electrode type pH probe
        - b) Measuring Range: 0 – 14
        - c) Resolution: 0.01

- 3) ORP Sensor

- a) Type: Single Junction
        - b) Measuring Range: +/-2000mV or range of ORP meter
        - c) Measuring surface: Platinum Extended Tip

## 2.03 SMART CONTROL CENTER

- A. The Smart Control Center (SCC) shall continuously monitor the water quality data from the WQS and issue dosing commands to the Chemical Metering Pumps to maintain residual levels at a predetermined set-point. The control panel shall house the operator interface terminal (OIT), PLC, and terminal strips to fully support the functions of water quality monitoring, and chemical metering pumps to precisely add disinfectant chemicals.
- B. The control panel shall display all relevant operating parameters and/or alarm conditions. The OIT will serve as the operator interface, data input screen, and alarm log.
- C. At a minimum, the Smart Control Center shall have the following features, components, and functionality:
  - 1. Materials
    - a. Housing: Powder coated steel
    - b. Enclosure Rating: NEMA 4
  - 2. Power Requirements:
    - a. 115 VAC, 60 Hz
  - 3. Allen Bradley MicroLogix 1400 programmable logic controller (PLC) with Ethernet communication protocol.
  - 4. Human-machine interface (HMI): Magelis DT351 7.4" LCD touch screen
  - 5. Ethernet based access to HMI software from computer or smartphone within same network
  - 6. SCADA Communication:
    - a. Modbus TCP/IP
    - b. 2 Analog Output (0-10 V)
    - c. 6 Digital Outputs ("Dry-Contact")
  - 7. Chemical metering pump controls.
  - 8. Alarm Management System will produce an automated alert on the HMI if monitored parameters fall out of range of set-point values.
  - 9. Remote Monitoring System (RMS) provides real-time access to water quality data and automated alerts and alarms via SMS.
  - 10. Real-time data acquisition on USB Flash Drive.
  - 11. Three different levels of access: Viewer, Operator or Administrator.
  - 12. Three operating modes: Off, Manual and Auto.
- D. Remote Monitoring System (RMS)
  - 1. The RMS is capable of providing remote access for operators to monitor or control the system.
  - 2. The RMS has the ability to restrict access to approved IP addresses or allow no remote access.

3. The RMS has the ability to report data back to a central SCADA system.
4. The RMS has the ability to send out alarms via e-mail.
5. The RCS supplier shall be responsible for programming the RCS package control software.

#### **2.04 ONSITE HYPOCHLORITE GENERATION SYSTEM**

- A. A transformer rectifier, electrolytic cells, water solenoid valve, brine solenoid valve, brine pump, rectifier cabinet, hydrogen dilution blower, chemical storage tanks, and a PLC-based control panel containing system controls, water softener with flow meter, and all necessary interconnecting wiring and hardware shall form a complete on-site sodium hypochlorite generation system. Components of the OSHGS shall comply with this specification. All components of the electrolytic cell skid shall be pre-assembled, piped, wired to input and output, flanged, threaded, etc. connections located at easily accessible points on the skid. The installation contractor shall provide all interconnecting piping and conduit, which shall be Sch 80 PVC. The OSHGS shall be factory-tested prior to shipping as one self-contained unit.

#### **2.05 ELECTRICAL CONTROL PANEL**

- A. The RCS supplier shall provide a NEMA 4X, 304 stainless steel, electrical control panel, which shall include controls for the entire Residual Control System. The panel shall be mounted onto the generator skid and pre-wired at the factory to system components. The control panel shall house the operator interface terminal (OIT), PLC, hydrogen blower controls, and terminal strips to fully support the functions of generator operation, tank levels, and metering pump proportional controls.
- B. All controls and operations logic specified herein and as shown on the instrumentation loop diagrams required for the system shall be programmed in a Programmable Logic Controller (PLC). The control cabinet logic will function at the PLC level where operating parameters will be measured, corrected, scaled, reported, and controlled. Contractor shall coordinate with RCS Supplier and instrumentation supplier for proper integration of the system.
- C. The control panel shall display all relevant operating parameters and/or alarm conditions. The OIT will serve as the operator interface, data input screen, and alarm log.
- D. At a minimum, the panel shall have the following features, components, and functionality:
  1. The generator shall automatically start and stop based on the high and low levels in the sodium hypochlorite storage tank.
  2. The generator shall shut down and alarm for the following conditions:
    - a. Low electrolyte level in cell.
    - b. Hypochlorite temperature exceeds 130°F (55°C).
    - c. Inlet flow falls below a preset value.
    - d. Rectifier high or low amperage.
    - e. Rectifier high temperature.
    - f. Hydrogen dilution blower failure.
  3. Low-low level alarm for hypochlorite storage tank.

4. High-high level alarm for hypochlorite storage tank.
  5. Low level alarm for ammonia storage tank.
  6. High level alarm for ammonia storage tank.
  7. Enclosure cabinet, 24" x 24" x 8", with ample interior volume so as to be easily wired and serviced.
  8. Magelis 6" color touchscreen human-machine interface (HMI) with dedicated screens, including help dialogs covering all basic operations and detailed alarm explanations, for each portion of the process and Ethernet communications for PLC connection.
  9. Allen Bradley MicroLogix 1400 programmable logic controller (PLC) with Ethernet communication protocol.
  10. Remote monitoring telemetry (if required).
  11. Rectifier controls.
  12. Blower controls.
  13. Logging and storing alarm history.
  14. Security protection.
  15. Dedicated 24 VDC power supply for PLC and HMI.
  16. Emergency stop pushbutton.
  17. Cabinet-mounted electrical disconnect switch.
- E. The RCS supplier shall be responsible for programming the RCS package control software.

**2.06 ELECTROLYTIC CELL SKID ASSEMBLY**

- A. An electrolytic cell skid assembly shall be provided with the following overall dimensions:

QUANTITY	WIDTH	DEPTH	HEIGHT
One (1)	74"	20"	76"

- B. The electrolytic cell skid assembly shall have the following components and features:
1. 316 Stainless steel brine gear pump, with:
    - a. Magnetic drive.
    - b. Cavity-style design.

- c. PEEK gear construction.
  - d. Integral speed control.
  - e. Series GA by MicroPump.
- 2. Water solenoid valve.
- 3. Polycarbonate water and brine rotameters.
- 4. Electrolytic cells Transformer rectifier.
- 5. Magnetic flow meter.
- 6. Optical level switches.
- 7. Temperature switches.
- 8. Temperature sensor.
- 9. PTFE (Teflon®) and PVDF (Kynar®) interconnecting tubing.
- 10. 304 stainless steel frame, electrolytically polished for passivation, corrosion resistance, and chemical compatibility.
  - a. Horizontal and vertical tube sections shall be of .125-inch wall thickness.
  - b. All vertical and horizontal frame connections shall be welded.
  - c. The completed frame with all mounted components shall comply with the UBC structural requirements for seismic zone four.
- C. The generator shall be factory wired, plumbed, and mounted on a self-contained skid assembly.
- D. Each electrolytic cell shall be arranged so that it can be completely drained in place.
- E. The rack-mounted flow control panel will consist of a water rotameter, water sensor, brine rotameter and a positive displacement gear pump with variable speed drive.
 

The variable speed drive will respond to a 0-5 VDC signal generated by the PLC algorithm in order to maintain constant current relative to variable water temperature or flow rate.
- F. The process shall operate in a batch environment allowing for consistent hypochlorite concentrations and greatest efficiencies.
- G. The generator skid will be supplied with a 4-20 mA electrolyte temperature sensor that will function to return a linear signal proportional to 0-100°C, which will allow continuous operation up to 130°F without interruption. Under no circumstance will bimetallic “snap” switches be permitted as the primary over-temperature sensor.
- H. The generator shall have the following redundant interlocked safety features:
  - 1. Cell high temperature switch.
  - 2. Low level switch for each cell.

3. Water flow sensor.
  4. Transformer high temperature switch.
  5. Automatic current regulation.
- I. All electrical equipment and enclosures will be built and certified to UL 508 standards and will possess the appropriate label.
  - J. The generation system shall be pre-piped and skid-mounted.
    1. The generator skid frame shall be constructed of 304 stainless steel tube for structural strength. Horizontal and vertical tube sections shall be of .125-inch wall thickness and have a depth no greater than twenty-four inches by a length not exceeding six feet. The entire skid shall undergo electrolytic polishing for ultimate passivation, chemical compatibility, and corrosion resistance. The completed frame with all mounted components shall comply with the UBC structural requirements for seismic zone four.
    2. The skid frame shall be configured to allow easy access to all components, including the electrolytic cells. All vertical and horizontal frame connections shall be welded. Under no circumstances can water/liquids handling and/or cells be located immediately above the power supplies. The skid frame shall support, as a minimum, the following mounted equipment:
      - a. Generator electrolytic cells
      - b. Power supply/rectifier
      - c. Water and brine rotameters
      - d. Control panel
      - e. Interconnect pipes valves and fittings
      - f. Interconnect conduit and wiring
      - g. Water flow sensor
      - h. Variable-speed, positive-displacement brine pump

**2.07 ELECTROLYTIC CELLS**

- A. Electrolytic cells shall be provided as follows:

CELL QUANTITY	CELL CAPACITY	ACTIVE SURFACE
5	60	2" x 12"

Any system using fewer electrolytic cells than that specified above must demonstrate its ability to achieve 80% production capacity with one of the cells removed from service.

- B. The electrolytic cell bodies shall be constructed of and clear acrylic materials, allowing for front and rear visual inspection of the electrodes from all angles.

- C. Each electrolytic cell will be constructed utilizing DSA coated titanium anodes and titanium cathodes. The cells must be configured in a vertical format with a recirculating loop provided for each cell. This recirculating loop will also allow the passive removal of hydrogen from each cell via the upper hydrogen vent. Under no circumstance will hydrogen be allowed to be driven from one cell or cell loop to the next.
- D. Each cell loop will also incorporate an optical level sensor so as to preclude any possibility of exposing an active electrode surface.
- E. The wetted cell components will consist only of the electrodes and acrylic cell body. No internal baffles, spacers, or connecting hardware will be allowed.
- F. Cells shall utilize titanium bolting hardware.

**2.08 TRANSFORMER RECTIFIER**

- A. The 6-pulse D.C. Rectifier will consist of a fully isolated three phase step down transformer and bridge rectifier. D.C. voltage output will be fixed with multiple primary taps for + 5-10% voltage correction. Under no circumstance will switching rectifiers or phase angle fired SCR voltage correction be permitted. D.C. ripple will be less than 4% with a power factor of 99% or better.
- B. The transformer rectifier will be a fixed voltage unit where the current will be allowed to float as a function of electrolyte conductivity.
  - 1. Constant current will be achieved via an active feedback loop where rectifier amperage is measured and reported to the PLC. The control algorithm calculates the appropriate amount of brine to mix with the incoming water so as to maintain constant current.
  - 2. SCR-controlled rectifiers will not be allowed.
- C. Rectifier efficiency will be 97% or greater.
- D. The transformer/rectifier will house a 4-20 mA D.C. current transducer.
- E. The rectifier cabinet and base frame will be constructed of 304 Stainless Steel and will be of a modular design. All internal wiring connections and components will be easily accessible by removing the front access panel.
- F. The transformer enclosure will be removable from the skid assembly as one piece, allowing for unobstructed access to the transformer.
- G. The transformer rectifier shall be designed for the following operating conditions:

QUANTITY	CAPACITY (KVA)	PRIMARY VOLTAGE	SECONDARY VOLTAGE
One (1)	36	240VAC/1PH/30A	300VDC/120A

- H. The stepdown transformer rectifier shall be provided with the following accessories:
1. DC bridge rectifier utilizing three diode assemblies and an aluminum heat sink with 120 VAC cooling fan.
  2. Panel-mounted electrical disconnect switch.

**2.09 HYDROGEN DILUTION BLOWER**

- A. A hydrogen dilution blower shall be designed for the following operating conditions:

QUANTITY	CAPACITY (ACFM)	STATIC PRESSURE (IN WC)	MOTOR HP	ELECTRICAL SERVICE
One (1) for Hypochlorite Tank	163	3.19	1/2	230V/1Ph/60Hz
One (1) for the Generator System	406	3.36	1	230V/1Ph/60Hz

- B. The blower shall be AMCA type B spark resistant of cast aluminum construction. The blower shall be cast with commercial grade 319 cast aluminum, having a 3/16" minimum wall thickness. Housing halves should be attached with tapered lugs having a minimum 45-degree taper from centerline for additional strength. Inlets and outlets shall be round.
- C. The blower wheel hub shall be an integral part of the wheel casting. The wheel shall be a radial-type wheel. The blower shall be statically balanced by removal of material only – no additional weights are to be used in the balancing process.
- D. The blower shall be arrangement 4 with a base of 12-gauge steel (minimum).
- E. Hydrogen dilution blower shall be PB Series by Cincinnati Fan or equal.
- F. The hydrogen dilution blower shall be provided with the following accessories:
1. Inlet guard.
  2. Teflon shaft seal.
  3. Current sensor.
  4. Differential pressure switch positioned in the dilution ductwork vent stack.
  5. Software controlled safety interlocks to detect control system sequence failure.



**2.10 WATER FILTER**

- A. A wall-mounted large-capacity cartridge type filter housing holding a 10" cartridge for dirt, rust, and particulate matter from softener's feed water shall be provided. The filter housing shall be featured NPT inlet and outlet connections and a mounting bracket that must be non-metallic construction. A polypropylene cap with Buna-N O-ring shall be supplied.
- B. The filter cartridge shall be a 50-micron, disposable cartridge. Cartridge shall be manufactured from a pleated non-woven and reusable polyester fabric with polypropylene core.
- C. Two (2) pressure gauges shall be provided to measure the pressure drop across the filter.

**2.11 WATER SOFTNER**

- A. A dual-tank automatic water softening system shall be provided to remove hardness in the feed stream to the OSHGS, plus provides brine water makeup. The softener shall be designed for the following operating conditions:

QUANTITY	TANK DIMENSIONS	EFFICIENCY*	KINETICO MODEL NO.
Two (2)	10" ø x 54" H	3,000	CP-210S

\*Expressed as grains exchanged per pound of salt

- B. Softener shall remove hardness to less than ½ gpg. One tank will be on-line during service. A water meter shall automatically initiate system regeneration. The water meter shall measure the processed volume and be adjustable. Water softeners that regenerate on a fixed time will not be acceptable. When the ion exchange capacity of one resin tank is nearly exhausted, the hydraulically-driven, flow-controlled switchover valve will automatically divert flow to the alternate tank while initiating brine backwashing of the first tank for regeneration of the ion exchange resin. During regeneration cycles, one tank shall provide water to service and to the regenerating tank. Regeneration shall use salt solution from the brine tank.
- C. The regeneration control valve shall be top mounted (top of media tank) and manufactured from non-corrosive materials. Control valve shall not weigh more than four pounds. Control valve shall provide service and regeneration control for two media tanks. Inlet and outlet ports shall accept a quick connect, double O-ring sealed adapter. Interconnection between tanks shall be made through the regeneration valve with a quick connect adapter. Control valve shall operate using a minimum inlet pressure of 15 psi. Pressure shall be used to drive all valve functions. No electric hook-up, electric timers, or gear motors shall be required. Control valve shall incorporate four operational cycles including service, brine draw, slow rinse, and a combined fast rinse and brine refill. The brine cycle flow shall be opposite the service flow, providing a countercurrent regeneration. Control valve shall contain a fixed orifice eductor nozzle and self-adjusting backwash flow control. The control valve will prevent the bypass of hard water to service during the regeneration cycle.

- D. The tanks shall be designed for a maximum working pressure of 125 psi and hydrostatically tested at 300 psi. Tanks shall be made of engineered plastic. Each tank shall include a 2.5 in. threaded top opening.
- E. Each tank shall be NSF-approved. Upper and lower distribution system shall be of a slot design. Distributors will provide even flow of regeneration water and the collection of processed water. Each softener shall include a non-solvent, high capacity cation resin having a minimum exchange capacity of 30,000 grains/ft<sup>3</sup> when regenerated with 15.0 lbs/ft<sup>3</sup>. The media shall be solid, of a proper particle size and shall contain no plates, shells, agglomerates or other shapes, which might interfere with the normal function of the water softener.
- F. The water softener shall be provided with the following accessories:
  - 1. 3/8-inch HDPE tube with in-line check valve for feeding brine for regeneration.
  - 2. 1/2-inch wastewater discharge to sewer for backwash waste.

**2.12 BRINE STORAGE TANK**

- A. A fiberglass-reinforced plastic (FRP) salt/brine storage tank shall be provided for the following operating conditions:

QUANTITY	DIAMETER	WALL HEIGHT	BRINE CAPACITY (TONS)
One (1)	5'-6"	8'-0"	5

## B. Design Criteria

1. The brine tank vessel shall be designed for pressure service conditions as specified for Type I Grade 1 tanks in ASTM D 3299. Brine tank vessel shall conform to the following structural design criteria:
  - a. Working Pressure: Hydrostatic load of SG 1.2
  - b. Wind Load: 100 mph
  - c. Maximum Temperature: 140 °F
2. A 10:1 safety factor shall be used for internal pressure loadings and a 5:1 safety factor shall be used for external and vacuum loadings.

## C. Quality Assurance

1. Tanks shall be manufactured in an RTP-1 Accredited manufacturing facility.
2. Visual defects shall be better than Level II on the inside of the vessel and better than Level III on the outside in accordance with ASTM D 2563 Table 1.
3. The manufacturer shall have been regularly engaged in the design and manufacture of brine make-up and storage systems tanks such as specified herein for at least five years. The manufacturer's experience shall include at least fifteen installations of equal or larger capacity than specified herein, that have been in operation for at least five years.

## D. Materials and Construction

1. The brine tank shall be vertical and consist of FRP vessel, salt fill line, water distribution system, outlet plenum, salt and brine level controls, and all internals. The brine tank shall be cylindrical with a flat bottom and domed top. Vessel size and configuration shall be as shown on the drawings. Unit shall be complete with flanges, nozzles, manways, lifting lugs, anchor lugs, and other appurtenances.
2. The vessel shell shall be helically filament wound according to ASTM D-3299. Any shell fabrication by hand lay-up shall not be acceptable. Only the tank bottom and dome may be fabricated by hand lay-up. Any tank made of PVC, polypropylene, or any other material shall not be acceptable. Contact molded components and accessories, shall be fabricated in accordance with ASTM D 4097 and NBS PS 15-69. The resin used shall be a premium isophthalic polyester type such as AROPOL 7241 T-15 by Ashland Chemicals or approved equal. The resin will be exposed continuously to a saturated brine solution.
3. All non-molded surfaces shall be coated with resin incorporating paraffin to facilitate a full cure of the surface. All cut edges, bolt holes, secondary bonds shall be sealed with a resin coat prior to the final paraffinated resin coat. All voids to be filled with a resin paste.
4. The laminate shall consist of a single resin rich layer, with either c-veil or Nexus 111-00010 reinforcement followed by two 1-1/2-ounce layers of -1/2-ounce layers of random chopped strand glass, fully wetted out with resin. This interior surface shall yield a minimum 100-mil thick corrosion barrier. Filament wind over this to the required thickness. Exterior surface coat shall be paraffinated. Vessels shall be surface coated on the exterior with gel coat containing ultra-violet light such as UV-9. No thixotropic or other additives shall be used.

5. Other than those associated nozzles, couplings, manways, and top and bottom heads, the towers shall be filament wound in one piece with no more than one joint.
6. The minimum properties of filament wound laminate shall be as specified in ASTM D 3299.
7. 24" diameter manways shall be in accordance with ASTM D 3299. As a minimum, two manways (lower side, top) shall be provided for each tank. The top manway cover shall include over-pressurization relief protection.
8. Flanged nozzles, double flanged gusseted nozzles, bottom drain nozzle, and threaded full couplings shall be provided as required. Flanged nozzles with 1/8-inch thick EPDM full-face gaskets of 60 durometer shall be provided by the supplier. Press-molded flanges are not acceptable. Threaded full couplings shall be FRP.
9. The tank shall include salt fill connection, softener water connection, brine outlet connection, drain, overflow, salt level indicator, brine level indicator, and vent.
10. The minimum properties of contact molded laminate shall be as specified in ASTM D 4097.
11. Anchorage: Each tank shall be furnished with concrete anchors and hold down lugs, complete with 304 stainless steel plates, for proper anchoring of the tank as required by the design calculations. A minimum of four (4) hold down lugs shall be provided.
12. Unless otherwise specified, all fasteners, and metal attachments, such as anchors, brackets, etc. shall be ANSI 316SS. If necessary, based on installation location, vessels designed for outdoor use shall have the bottom 6'-0" of straight sheet insulated for protection against freezing. Insulation shall be 2" thick polyurethane foam and be covered with a 1/8" thick FRP protective covering and receive a white pigmented gel coat with UV inhibitors. The top of the insulation will be capped to seal out any moisture.

E. Accessories

1. The brine tank shall be provided with a full-radiused Sch 40 304 stainless steel salt fill line designed to receive salt pneumatically unloaded from a truck. Long-radius fittings shall be used. One aluminum quick connect adapter and cover shall be provided to connect the truck's hose to the brine tank salt fill line as indicated on the drawings. One gooseneck vent shall be integrally molded into the brine tank dome. A vent dust collector bag shall be furnished and installed. The dust collector shall be properly sized for the salt fill rate and the brine tank capacity. The dust collector shall be polyester cloth material.
2. A water distribution system and a brine collection plenum shall be provided. Each assembly shall be securely installed in the brine/salt storage tank. Each assembly shall be designed to produce a saturated brine solution as required by the hypochlorite generators.
3. The brine tank shall be provided with a liquid level control assembly, including:
  - a. A pressure sensing-type electronic level transmitter.
  - b. Normally-closed, solenoid pilot-operated diaphragm valve shall have a brass body be ASCO 8210 Series. The solenoid valve shall open when brine solution level in the Brine Storage Tank is low. The solenoid valve shall close when the brine solution level in the Brine Storage Tank is high.

4. For tanks using granular or fine grade (less than 12 mesh) solar salt, a quartz rock filter bed shall be installed in the sump. The filter bed shall consist of a 5" layer of 0.125" x 0.125" on top of a 7" layer of 0.250" x 0.250". The filter bed shall be evenly-distributed over the entire bottom of the vessel. All quartz rock shall be AWWA-washed and NSF-certified.
5. The salt level sensor shall be a cable measurement transmitter. Cable measurement transmitter shall continuously measure salt level in the brine tank with 0.25% accuracy. Measuring cable length shall extend the entire height of the brine tank to measure salt at all levels. The cable shall be constructed of material resistant to saturated brine. Transmitter shall be Bin Master "Smart Bob II A.O." or equal.
6. For tanks with straight shell greater than 12'-0", an OSHA-approved fiberglass ladder with safety cage shall be provided. The ladder shall be mounted to the vessel, but fully supported by concrete or other suitable support base. Attachment fasteners shall be stainless steel.
7. A fiberglass-encapsulated nameplate shall be provided. At a minimum, the nameplate shall include the following information:
  - a. Project name
  - b. Installation location
  - c. Service
  - d. Specific gravity
  - e. pH
  - f. Pressure rating
  - g. Temperature rating
  - h. Resin
  - i. Size
  - j. Capacity
  - k. Shipping Weight
  - l. Date of manufacture
8. Unless otherwise specified, all pipe and fittings shall be Sch 80 PVC and all fasteners stainless steel.

### **2.13 BRINE FILTER**

- A. A wall-mounted large-capacity cartridge type filter housing holding a 10" cartridge for dirt, rust, and particulate matter from brine stream shall be provided. The filter housing shall be feature NPT inlet and outlet connections and a mounting bracket that must be non-metallic construction. A polypropylene cap with Buna-N O-ring shall be supplied.
- B. The filter cartridge shall be a 50-micron, disposable cartridge.

### **2.14 HYDROGEN DETECTOR**

- A. A hydrogen gas monitoring system shall be provided to continuously measure and display gas concentration and provide alarms when preset limits are exceeded. A transmitter will send the signal to the control panel.

- B. The gas monitoring system shall have a NEMA 4X enclosure and two-line, eight-alphanumeric character LCD display with linear 4-20 mA output signal.
- C. The gas detector shall be model CN06 by Conspec Controls.

#### **2.15 ACID CLEANING CART**

- A. A pre-assembled, mobile cart including acid cleaning tank and centrifugal pump shall be provided by the OSHGS Supplier for periodic washing of the electrolytic cells.
- B. The cart shall be pre-piped and pre-wired prior to shipment. All piping, fittings, and valves shall be Sch 80 PVC. The 120VAC, single-phase plug shall be included for connection to a standard electrical receptacle.
- C. A discharge hose, quick-connect couplings, and appurtenance shall be included to transfer acid to and from the electrolytic cells.

#### **2.16 COMMERCIAL STRENGTH HYPOCHLORITE DILUTION PANEL**

- A. Under emergency conditions commercially available sodium hypochlorite (10-12 percent solution) can be added if required via a commercial strength hypochlorite dilution panel provided by the OSHGS Supplier as part of the OSHGS.
- B. The commercial strength sodium hypochlorite dilution panel shall include a wall-mounted PVC panel with the following instruments and accessories:
  - 1. Venturi eductor, polypropylene construction.
  - 2. Polysulfone inline potable water rotameter.
  - 3. Polysulfone inline commercial strength sodium hypochlorite rotameter.
  - 4. Two (2) manually-operated flow control valves.
  - 5. Outlet check valve.
  - 6. Sch 80 PVC piping and fitting.
- C. A centrifugal magnetically-driven booster pump shall be provided for the concentrated sodium hypochlorite to ensure pressure interruptions will not disrupt the dilution process. Pump shall be Series 3 by March Pump or equal.

#### **2.17 HYPOCHLORITE STORAGE TANK**

- A. Under emergency conditions commercially available sodium hypochlorite (10-12 percent solution) can be added if required via a commercial strength hypochlorite dilution panel provided by the OSHGS Supplier as part of the OSHGS.
- B. The commercial strength sodium hypochlorite dilution panel shall include a wall-mounted PVC panel with the following instruments and accessories:
  - 1. Venturi eductor, polypropylene construction.
  - 2. Polysulfone inline potable water rotameter.
  - 3. Polysulfone inline commercial strength sodium hypochlorite rotameter.
  - 4. Two (2) manually-operated flow control valves.

- 5. Outlet check valve.
  - 6. Sch 80 PVC piping and fitting.
- C. A centrifugal magnetically-driven booster pump shall be provided for the concentrated sodium hypochlorite to ensure pressure interruptions will not disrupt the dilution process. Pump shall be Series 3 by March Pump or equal.

**2.18 AMMONIA STORAGE TANK**

- A. High density linear polyethylene (HDLPE) chemical storage tank(s) shall be provided for the following operating conditions:

CHEMICAL STORED	DIAMETER	WALL HEIGHT	CAPACITY (GALLONS)
Liquid Ammonium Sulfate (40%)	48"	61"	320

Under no circumstances will HDLPE tanks greater than 72" high be acceptable.

- B. The chemical storage tanks shall be upright, cylindrical, flat bottom, double wall tanks molded in a one-piece seamless construction by the rotational molding process (laminated or fabricated tanks will not be accepted. The material used shall be virgin polyethylene resin as compounded and certified by the manufacturer. All polyethylene resin material shall contain a minimum of a U.V. 15 stabilizer as compounded by the resin manufacturer.
- C. The standard design specific gravity shall be 1.9. The minimum required wall thickness for the cylinder straight shell must be sufficient to support its own weight in an upright position without any external support. The top head must be integrally molded with the cylinder shell. The minimum thickness of the top head shall be equal to the top of the straight wall.
- D. The chemical storage tanks shall be properly vented and have a minimum of three inches clearance on all sides to allow for expansion and contraction.
- E. One (1) submersible level transmitter for the chemical storage tank shall be provided according to the following specifications:
- 1. Operating pressure: 0-13 ft. w.c. (+/- 0.5% Accuracy)
  - 2. 4-20mA output to chemical dosing controller
  - 3. Materials: PVC housing and cable. Ceramic sensor diaphragm.
  - 4. Model 59P as manufactured by Viatran or equal.

- F. The chemical storage tank shall be supplied with the following accessories utilizing threaded bulkhead fittings:
  1. Vent connection.
  2. Fill connection.
  3. Pump suction connection.
  4. Drain and overflow connections.
  5. 18-inch threaded access manway with cover.
- G. Unless otherwise specified, all pipe and fittings shall be Sch 80 PVC and all fasteners stainless steel.

**2.19 CHEMICAL METERING PUMPS**

- A. Under normal operating conditions, site generated sodium hypochlorite (nominally 0.8% ± 0.05%) and ammonia will be injected into the process at locations shown on the drawings for disinfection.
- B. A metering pump shall regulate the amount of sodium hypochlorite and ammonia dosed based on a pre-established set point as follows:

QUANTITY	CAPACITY (GPH)	DISCHARGE PRESSURE (PSI)	HP	POWER
Two (2) Ammonia Dosing Pumps	6	175	1/2	230V/3PH/60HZ
Two (2) Hypochlorite Dosing Pumps	165	45	1.0	230V/3PH/60HZ

- C. The metering pump shall be a diaphragm metering pump with a TEFC inverter-duty motor. Where multiple pumps are provided, all pumps shall be manufactured by a single manufacturer.
- D. The metering pump shall be suitable to operate 24-hours per day.
- E. The solution metering pump shall be able to operate with a 10 :1 turn down ratio in conjunction with the VFDs.
- F. The metering pump shall be provided with a PVC pump stand.



- G. The following accessories for the chemical metering pump:
1. PVC calibration column.
  2. PVC chargeable pulsation dampener.
  3. PVC backpressure relief valve.
  4. PVC pressure relief valve.
  5. Wye strainer.
  6. Pressure gauge with PVC isolator using a Teflon membrane.
- H. The OSHGS Supplier shall provide a VFD as part of the control package to control the metering pump. The VFD shall be provided with an epoxy coated NEMA 4X enclosure and an easily replaceable cooling fan. An elapsed timer is required to assist in preventative maintenance. The VFD shall have an LED five-digit display. VFD shall be V1000-4X by Yasakawa or equal.
- I. Metering pumps shall be Encore® 700 by UGSI Chemical Feed, Inc. No Equal.
- J. Chemical Metering Pumps contain chemical dosing controllers which provide feedback to and receives commands from the Smart Control Center.
- K. Chemical Dosing Controller
1. Pump Control Options: Digital relay, analog (4-20mA), or power switch
  2. Power Requirements: 115 VAC, 60 Hz
  3. SCC Communication: Modbus RS-485

**END OF SECTION**

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## **SECTION 46 41 00 TANK MIXING SYSTEM**

### **PART 1 GENERAL**

#### **1.01 SCOPE**

- A. This section covers submersible tank mixing systems up to 0.5 HP in size intended for continuous use while submersed in potable water storage tanks. Each mixer shall have the ability to function continuously on a year-round basis, regardless of drain and fill cycles. Each mixer shall consist of a water-filled submersible motor, an impeller and a non-submersible control center that houses all control electronics.

#### **1.02 THE REQUIREMENTS**

- A. CONTRACTOR shall furnish a PWM400V3 PAX Water Mixer with a PCC405V3 PAX Control Center and install submersible mixing system together with controls and accessories necessary for a complete and operable system.
- B. UTILITY shall furnish electrical conduit with either 115VAC or 230VAC Single Phase voltage based on System configuration, a Safety disconnect switch and a 20 Amp non-GFCI circuit breaker up to the point of installation of the mixing system control center.
- C. UTILITY shall also provide conduit from control center to tank penetration for submersible motor cable and penetration through tank for same cable.

#### **1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS**

- A. Comply with the applicable reference specifications as specified in the General Requirements
- B. Occupational Safety and Health Administration, OSHA
- C. NSF/ ANSI Standard 61 D.
- D. Underwriters Laboratories Inc., UL 508

#### **1.04 CONTRACTOR SUBMITTALS**

- A. NSF Certification
  - 1. Copies of the NSF-61 certified listing for all submersible mixer material being placed inside the tank and headspace, including the motor and power cable.
- B. Installation, Operations, and Maintenance Manuals shall be obtained from the equipment manufacturer and submitted. The following sections shall be included:
  - 1. General equipment specifications and data sheets
  - 2. Installation, start-up, operation, and maintenance instructions
  - 3. Factory-recommended maintenance schedule

4. Wiring diagrams specifying what electrical wiring needs to be done onsite during and prior to the installation, and by which responsible party
5. List of equipment or tooling necessary for diagnostics, troubleshooting, repair or general maintenance

#### **1.05 QUALITY ASSURANCE**

- A. Each mixing system shall be tested prior to deployment according to the manufacturer's standard factory testing practices at the factory testing facilities.
- B. Complete mixing system is NSF/ANSI Standard 61 certified by NSF

#### **1.06 WARRANTY**

- A. For the period beginning with installation or 3 months after shipment to Buyer, whichever is earlier and ending on the time periods listed below, the Product is warranted to be substantially free from defects in material and workmanship and to conform to Seller's specifications applicable to the Product
  1. Two (2) years on all supplied parts
  2. One hundred twenty (120) days labor

### **PART 2 PRODUCTS**

#### **2.01 PERFORMANCE**

- A. Mixing system shall completely mix reservoir according to the following minimum performance requirements. These requirements can be measured and validated after installation by operators with readily available tools such as temperature probes and total chlorine grab samplers.
  1. Temperature Uniformity

For tanks up to 4,000,000 gallons in volume: All temperatures shall converge to within 0.50°C (0.9°F) within 24 hours after mixer is installed and activated.
  2. Disinfectant Residual Uniformity

For tanks up to 4,000,000 gallons in volume: Disinfectant residual within top five feet of tank and bottom five feet of tank will converge to within 0.20 ppm within 24 hours after mixer is installed and activated. During continuous operation of the mixer, under normal disinfectant dosing parameters, disinfectant residual will converge to within 0.20 ppm at least once every 24 hours.

#### **2.02 GENERAL**

- A. Mixing system consists of an impeller mounted on a submersible motor and supported approximately three feet in height from the tank floor in order for it to launch a jet of water from the bottom of the tank up toward the surface of the water. Mixer control and operation shall be independent of tank drain and fill cycles to ensure constant mixing. Wet-side of Mixer shall weigh

less than 75 pounds (~34 kg) and dry-side shall weigh less than 56 pounds (~25 kg). Both wet-side and dry-side shall be able to be hoisted, installed, and/or removed by on-site personnel without additional equipment needed, and so that there is no crush hazard or entanglement hazard present, and so that weight of mixer on tank floor does not cause damage to interior coating.

- B. Mixing system active components shall be elevated at a minimum of 18 inches above tank floor to avoid disturbing accumulated tank sediment or entraining particles and causing accelerated wear of moving parts.
- C. Mixers using submersible pump with slit or “water sheet” or horizontal motor mounting designs are not acceptable.
- D. Mixer provider must have more than 1000 installation of similar equipment in potable water tanks or reservoirs.
- E. Mixers shall have no oil-filled parts
- F. All wet-side mixer components shall be certified by NSF to the NSF/ANSI Standard 61
- G. Dry-side mixer components shall include sine filter to prolong motor life and reduce noise level.
- H. Power source for mixer shall be 115VAC or 230VAC single phase grid power to allow unit to continue 24/7 operation where necessary.
- I. No regular, periodic maintenance required on the wet-side components in typical potable water application
- J. No passive mixing system allowed.

### **2.03 CONSTRUCTION**

- A. Components – wet-side: shall be NSF/ANSI Standard 61 certified.

Equipment entering tank shall not adhere to, scratch or otherwise cause damage to internal tank coating or put undue stress on the materials of the tank construction. Equipment shall fit through a standard hatch of size 12-inch x 12-inch or larger. UTILITY may prefer to puncture sidewall or ceiling of tank (in place of puncturing the hatchway) to allow motor cable entry into the tank for ease of installation and protection against freezing/ice damage.

Each submersible mixer shall consist of the following components, regardless of the power source selected:

#### **1. Impeller**

- a. AISI Type 316 Stainless Steel
- b. Balanced to within 0.5 gram-inches
- c. Passivated per ASTM A380 to minimize corrosion
- d. Not more than 8 inches in overall height
- e. Not more than 4.7 inches in diameter
- f. Not more than 2.4 lbs. in weight
- g. Shall not create cavitation at any rotational speed up to 2500 RPM

## 2. Motor

- a. AISI Type 304 Stainless Steel body
- b. Chlorine/Chloramine resistant rubber seals
- c. Fully submersible
- d. Low power (0.5 HP maximum)
- e. Water-filled motor
- f. Water-lubricated motor

## 3. Mounting

- a. AISI Type 316 Stainless Steel
- b. Three detachable legs or pedestal mount
- c. NSF/ANSI Standard 61 certified EPDM rubber, non-skid, non-scratch feet or insulating pad
- d. Attachments secure motor cable away from impeller
- e. Overall weight of wet-side unit not to exceed 75 lbs. to avoid damaging tank floor
- f. Overall height of unit not to exceed 5 ft.

## B. Components – Dry-Side: Each 115VAC or 230VAC control center shall consist of the following components:

### 1. Enclosure

- a. Type 4 (NEMA 4) Lockable
- b. Weather Resistant
- c. Overall weight of control center not to exceed 50 lbs.
- d. Green and Red LED Indicator lights show motor status
- e. White Power Indicator Led
- f. Cooling Fan

### 2. Motor Controller/VFD

- a. Rated to 1.0 HP
- b. Operating temperature range -4 °F to 129 °F (-20 °C to 54 °C)
- c. HOA Switch
- d. Manual speed control
- e. Thermal shut-off protection built-in
- f. Current overload protection built-in
- g. SCADA outputs included:
  - 1) Digital Output signal indicating motor running
  - 2) Digital Output signal indicating fault
  - 3) Digital Input/output signal allowing remote motor on/off
  - 4) RS-485 or Dry Contact connections
  - 5) 4-20mA Signal

### 3. GFCI-protection

- a. 115/230VAC, single-phase, with a 300mA trip level GFCI included inside control center
- 4. Branch Circuit Protection Panel equipped with a 115/230VAC 20-Amp main breaker
- 5. Sine Filter

## **2.04 CONTROLS**

- A. Each unit shall be equipped with all necessary controls, inter-wired, to provide the following minimum functions:
  - 1. On/Off switch to control power to mixer.
  - 2. Automatically activated motor shut-off if water level drops below motor height in tank.
  - 3. Sine filter
  - 4. Any other controls shown on electrical and instrumentation drawings.

## **2.05 ACCEPTABLE MANUFACTURERS:**

- A. PSI Water Technologies, Inc. No Equal

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. The CONTRACTOR shall furnish services of a factory-trained installation contractor or crew having experience with installation procedures and operation and maintenance requirements for the type of equipment installed under these specifications. Mixer must be able to be installed through a 12"x12" hatch. Mixer must be able to be installed without draining tank or taking tank out of service. Wet-side of Mixer shall weigh less than 75 pounds (~34 kg) and dry-side shall weigh less than 55 pounds (~25 kg). Both wet-side and dry-side shall be able to be hoisted, installed, and/or removed by on-site personnel without additional equipment needed, and so that there is no crush hazard or entanglement hazard present, and so that weight of mixer on tank floor does not cause damage to interior coating.
- B. Tank penetration is recommended to be above tank water line, typically through the hatch sidewall.
  - 1. Fitting will prevent moisture intrusion into tank and ideally be horizontally oriented.
  - 2. Fitting shall be 1" diameter fitting to allow cable to pass through.
  - 3. Strain relief for power cable shall be part of the contractor-supplied fitting for tanks more than 30' in depth.
  - 4. For tanks more than 70' in depth, or at customer's discretion, a water-tight penetration may be installed under the water-line.

- C. Installation of the in-tank (“wet-side”) components may be performed in any of the following ways:
  1. Installation by a factory-trained and drinking-water-certified potable water tank diver.
  2. Installation by personnel with confined space training while the tank is drained and empty.
  3. Installation by tank manufacturer personnel during tank manufacture.
  4. Installation below a hatch opening in a full tank utilizing a chain.
- D. Installation of the outside-of-tank (“dry-side”) components may be performed by:
  1. Third party representatives or CONTRACTORS according to the manual provided.
  2. UTILITY personnel according to the manual provided
- E. The mixer and control center shall be installed in accordance with approved procedures submitted and Manufacturer’s instructions supplied, unless otherwise approved in writing from the Manufacturer.

**3.02 TRAINING**

- A. PAX Water Technologies staff (or their representatives) will instruct designated UTILITY personnel in the safe and proper operation of the PAX Water Mixer. This training will reference the operations manual provided with equipment and show how to check for proper functioning of the equipment.

**3.03 FACTORY ASSEMBLY AND TESTING**

- A. The RCS shall be pre-assembled at the manufacturing location.
- B. The on-site sodium hypochlorite generator shall be tested for a minimum of eight hours at the location of assembly to assure it is in full compliance with the requirements of the specific design for the project and this specification. The balance of the RCS shall be inspected at the location of assembly to assure it is in full compliance with the requirements of the specific design for the project and this specification.
- C. Factory testing shall include visual inspection of all equipment, complete assembly, and functional testing of equipment including leak testing, piping and instrumentation check, verification of control panel wiring and operation, and confirmation of proper operating parameters.
- D. Engineer and/or Owner reserve the right to be present at the RCS Supplier’s manufacturing facility to witness factory inspection. Engineer and/or Owner shall provide intent to witness factory inspection at the time of the design submittal review and approval, and RCS Supplier shall provide notice to Engineer and/or Owner regarding the scheduled time of the factory inspection at least five business days in advance of the proposed factory inspection.
- E. The RCS Supplier shall maintain Quality Control documentation that includes system test settings and measured performance.



### **3.04 DELIVERY, STORAGE, AND HANDLING**

- A. The RCS shall be packaged and shipped so as not to incur damage to any portion of the equipment through handling and installation of the system itself.
- B. The Contractor shall be responsible for the delivery, storage, and handling of products in accordance with the RCS Supplier's recommendations.
- C. The Owner shall inspect all equipment and materials against approved Shop Drawings at time of delivery. Equipment and materials damaged or not meeting requirements of the approved Shop Drawings shall be immediately returned to the RCS Supplier for replacement or repair.
- D. Equipment and materials shall be stored in a dry, chemical-free location and protected from the elements according to the RCS Supplier's instructions.
- E. Equipment and materials shall be handled in an approved manner according to the RCS Supplier's instructions.

### **3.05 INSTALLATION**

- A. Installation of the OSHG, tank mixer, chemical metering system, SCC, WQS, FRP Shed and appurtenances shall be performed by the Contractor and shall be in accordance with the Drawings and with the RCS Supplier's instructions and recommendations. Conflicts of information shall be called to the attention of the Engineer. It is the Contractor's (or Owner's) responsibility to provide:
  - 1. Water piping and valves from source to water softener, if applicable, and from softener to brine tank and electrolytic cell skid.
  - 2. Brine piping and valve from brine tank to electrolytic cell skid.
  - 3. Sodium hypochlorite piping and valves from electrolytic cell skid to sodium hypochlorite storage tank, from sodium hypochlorite storage tank to metering pump.
  - 4. Ammonia piping and valves from ammonia storage tank to metering pump.
  - 5. Tubing connections between the tank mixer and the reservoir access hatch. Tubing itself to be provided by system manufacturer.
  - 6. PVC piping, including fiberglass unistrut supports with fiberglass or 316 stainless steel hardware, for water between water source, booster pump (if applicable), and access hatch connections.
  - 7. PVC piping, including fiberglass unistrut supports with fiberglass or 316 stainless steel hardware, for chemical from feed system to access hatch connection, if necessary.
  - 8. Vent piping, valves, and stack from hydrogen dilution blower to electrolytic cell skid vent connection and onwards.
  - 9. Vent piping, valves, and stack from hydrogen dilution blower to sodium hypochlorite storage tank and onwards.
  - 10. All overflow and drain piping and valves.

11. Electrical connections, wiring, and conduits to/from system control panel for power, control, and alarm interfaces with remote located equipment and instruments (booster pump, tank pressure transmitters, etc.), plant SCADA, etc.
    - a. All wiring to be TTHN stranded wiring and will conform to the most current version of the National Electric Code.
    - b. All 4-20 mA instrumentation wiring will be 2- or 4-conductor shielded cable.
    - c. Instrumentation and signal/control wiring will be run in conduits separated from all other AC wiring systems.
  12. Gaskets, seals, and O-rings for hypochlorite service shall be constructed of Hypalon, PTFE, or FKM. Santoprene or neoprene shall be used for brine service. EPDM shall be used for water and ammonia.
  13. Any necessary unistrut, hangers, supports, etc. for Contractor-supplied piping and conduits.
  14. Anchor bolts, suitable concrete mounting pads and other incidentals as necessary to complete the installation.
  15. Hydrostatic leak testing of brine and sodium hypochlorite storage tanks.
  16. Pressure testing of all interconnecting piping as is practical or directed by the Owner.
  17. Flushing of all piping with potable water prior to system start-up and commissioning to remove materials that may have entered as a result of the installation process.
- B. Equipment units or assemblies shall be installed on concrete bases and secured with anchor bolts in accordance with the RCS Supplier's recommendations and as shown. Contractor shall be responsible for the design of the equipment pads. The contractor shall coordinate with RCS supplier for equipment placement and anchoring.
  - C. Contractor shall inspect all concrete pads for proper elevation, dimensions, cutouts, evenness and anchor bolt locations and correct if necessary.
  - D. The Contractor shall inspect all equipment before installation, if damaged; notify the Engineer and RCS Supplier promptly. Do not install damaged equipment until the RCS Supplier makes repairs in accordance with RCS Supplier's written instruction and approval.
  - E. The Contractor shall, after installation of storage tanks is complete but before piping connections are made, block all outlets and fill each tank with potable water and tested for leakage for a minimum of 24 hours prior to system start-up and commissioning. Any leaks that are observed will be repaired and the tank re-tested.
  - F. Contractor shall provide a drain for each piece of equipment, according to the RCS Supplier's instructions.
  - G. Power shall be provided by the Contractor to the system control panel and equipment as shown on the RCS drawings. The Contractor shall be responsible for providing all necessary conduit and wiring necessary for a complete electrical service to this location.

1. All wiring shall comply with the National Electrical Code.
  2. Make all electrical connections in conformance with the requirements of the electrical specifications.
- H. Installation shall include furnishing and applying an initial supply of lubricants, as provided by the RCS Supplier.
- I. Contractor shall support piping independent of equipment. Equipment shall be free from all loads and stresses induced by the piping.
- J. All equipment including motors, belts, and drives shall be aligned to the best industrial standards. Field check and adjust all equipment alignments in the presence of the Engineer.
- K. Tie-down lugs for tanks shall be grouted or shimmed to prevent excessive loads being transferred to the tank shell.
- 3.06 MANUFACTURER'S SERVICE AND START-UP**
- A. A factory technician from the RCS Supplier shall be present at the jobsite for initial system start-up and commission of equipment as specified in Section 1.04-B. Factory technician will ensure that the system is properly installed, start-up the system, and train the Owner's personnel.
- B. Contractor and RCS Supplier shall make equipment adjustments required to place system in proper operating condition.

**END OF SECTION**

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# **APPENDIX**

## **DEKOVEN TANKS REPLACEMENT**

**A1 – Soil Report – CE&G Geotechnical Design Report June 24, 2020**

**A2 – Chemical Feed Building - Layout**

**A3 – Microcolor on Site Hypochlorite Generation System MC-300**

**A4 – Load Schedule**



# A1-SOIL REPORT



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## GEOTECHNICAL DESIGN REPORT

### MID-PENINSULA WATER DISTRICT DEKOVEN WATER TANKS REPLACEMENT PROJECT 15-89

CE&G DOCUMENT NO.: 190060.001

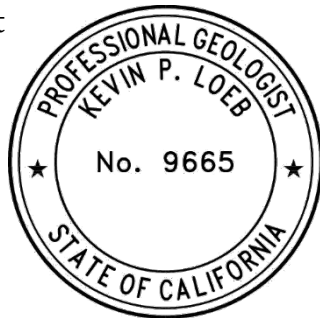
JUNE 24, 2020

Prepared for:

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A handwritten signature in blue ink, appearing to read 'Kevin L.', written over a horizontal line.

Kevin Loeb, PG 9665  
Project Geologist



A handwritten signature in blue ink, appearing to read 'Daniel J. Peluso', written over a horizontal line.

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Principle Engineer







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- Figure 2. Site Plan
- Figure 3. Regional Geology Map
- Figure 4. Fault Activity Map

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- Figures
- Appendix A. Boring Logs
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## 1. INTRODUCTION

### 1.1 GENERAL

Cal Engineering & Geology, Inc. (CE&G) has provided geotechnical design services to Beyaz & Patel, Inc. (B&P) for the Mid-Peninsula Water District (District) Dekoven Tanks Replacement Project 15-89, located in Belmont, California. The work has been completed to provide geotechnical design recommendations for design and construction of the new water tank foundations.

### 1.2 PROJECT DESCRIPTION

The District is located in Belmont, California, as shown on Figure 1. The planned replacement water tanks will be located in the vicinity of the existing water tanks at the site property between 2524 and 2518 Dekoven Avenue. The locations of the existing structures and site features are shown on Figure 2, Site Plan.

The two existing water tanks constructed in 1952 are 52-feet and 60-feet in diameter and have nominal capacities of 0.72 and 1.0 million gallons (MG), respectively. Both tanks are approximately 48-feet tall. Based on the results of a condition assessment conducted in the period 2014 to 2016, it was concluded that the tanks should be replaced; seismic vulnerability was cited as a primary consideration for replacing the tanks. The two tanks will be placed with two new tanks, each with a nominal capacity of 0.8 MG. We understand the elevation of the new tanks will be roughly equivalent to the existing tank pad grades. Therefore, placement and compaction of additional fill soil across the building pads prior to construction of the foundations is not currently planned.

### 1.3 PURPOSE AND SCOPE OF SERVICES

The purpose of CE&G's geotechnical investigation was to assess the surface and subsurface conditions in the immediate vicinity of the planned water tank replacements, develop geotechnical design recommendations, and prepare this geotechnical design report.

The scope of work completed for the geotechnical investigation and report included: consultation and coordination with B&P and District staff; reconnaissance to observe current site conditions and to mark for Underground Service Alert (USA); a subsurface exploration consisting of two exploratory borings using a truck-mounted drill rig; laboratory testing to determine key engineering properties of the site soils; engineering analysis; development of geotechnical design recommendations; and preparation of this report.

## **2. SITE DESCRIPTION**

The project site is located on the eastern side of Dekoven Avenue, approximately 250 feet south of its intersection with East Lincoln Avenue, in Belmont, California, southwest of the San Francisco Bay. The project site is bounded by Dekoven Avenue to the west and by residential properties consisting of single-family homes to the north, east, and south. The site location is currently occupied by two water tanks that take up the majority of the property along with a small pump station structure on the northeastern corner of the property. A fuel/propane tank is adjacent to the west side of the pump station. A small shed is located on the south side of the site. Communication towers are located adjacent to the south side of the eastern and western tanks; these communication towers are likely supported on drilled piers. The portion of the property that is not occupied by structures consists of asphalt pavement and landscaped areas with trees along the property's perimeter. The site elevation generally ranges from approximately 190 to 195 feet above sea level.

Key features of the project site are depicted on the attached Figure 2.

## 3. GEOLOGIC CONDITIONS

### 3.1 REGIONAL SETTING

The project site lies within the Coast Range geomorphic province of California. This province is characterized by northwest-southeast trending mountain ranges and intervening valleys such as that occupied by San Francisco Bay. The site is located on a gently sloping ridge-top in the eastern foothills of the Santa Cruz Mountains, west of San Francisco Bay.

### 3.2 SITE GEOLOGY

The geologic setting is shown on the Regional Geologic Map, Figure 3.

The general vicinity of the project site has been mapped by Brabb and Jones (1998) as various units of the Franciscan Complex (Cretaceous to Jurassic) consisting of cherts, greenstones, siltstones, shales, as well as granitic and volcanic units. The project site itself has been mapped as being underlain by Franciscan chert, which is described as “white, green, red, and orange chert, interbedded with reddish-brown shale.” This chert unit likely overlies the neighboring mapped unit of Franciscan greywacke, which is describe as “greenish-grey to buff, fine- to coarse-grained sandstone, with interbedded siltstone and shale.” Graymer and others (2006) have also mapped the site as being underlain by Early Cretaceous and/or Late Jurassic Franciscan Complex sedimentary rocks.

### 3.3 GEOHAZARD MAPPING

#### 3.3.1 State and Regional Geohazard Mapping

An active fault is generally defined as experiencing fault offset in Holocene time (last approximately 11,000 years). According to the US Geological Survey Quaternary Fault and Fold Database (2006), no active faults are mapped as crossing through the site.

The California Geological Survey (CGS) has prepared a map showing Zones of Required Investigation (e.g., liquefaction, landslide, and earthquake fault zones) for the San Mateo 7.5-minute Quadrangle that encompasses the site. According to CGS (2018), the project site is not located within an Alquist-Priolo earthquake fault zone and is not located within zones of required investigation for liquefaction potential and earthquake induced landsliding.

A map showing liquefaction susceptibility in the San Francisco Bay area by Witter and others (2006) shows the site location in an area of very low liquefaction susceptibility.

### **3.3.2 Local Geohazard Mapping**

The City of Belmont General Plan Update reviews previous geologic hazard maps issued in 1983 and acknowledges that the 1983 hazard maps are largely superseded by more recent information regarding the potential for fault rupture. The General Plan Update indicates that there are no fault rupture hazards mapped by the City in the project vicinity.

## **3.4 REGIONAL GROUNDWATER**

Groundwater within the local hill areas encompassing the site are likely variable, with the water table commonly sloping downhill toward the closest drainage axis. Long-term springs and seeps were not observed in the immediate vicinity of the study area.

CGS (2018) groundwater data for the preparation of the San Mateo Seismic Hazard Zone quadrangle map and report, does not include groundwater data for the project site.

## **3.5 SEISMICITY**

### **3.5.1 Active Faults**

The project site is located within the greater San Francisco Bay Area, which is recognized as one of the more seismically active regions of California. The right-lateral strike-slip San Andreas fault system controls the northwest-southeast structural grain of the Coast Ranges and the Bay Area. The fault system marks the major boundary between two of earth's major tectonic plates, the Pacific Plate to the west and the North American Plate to the east. The Pacific Plate is moving north relative to the North American plate at approximately 40 mm/yr in the Bay Area (WGCEP, 2003).

The transform boundary between these two plates has resulted in a broad zone of multiple, subparallel faults within the North American Plate, along which right-lateral strike-slip faulting predominates. In this broad transform boundary, the San Andreas Fault accommodates less than half of the average total relative plate motion. Much of the remainder in the greater South Bay Area is distributed across faults such as the San Gregorio, Monte Vista-Shannon, Hayward (southern segment), Calaveras, Zayante-Vergeles, and Greenville fault zones.

Since the project site is located in the seismically active San Francisco Bay Area, it will likely experience strong ground shaking from a large (Moment Magnitude [Mw] 6.7) or

greater earthquake along one or more of the nearby active faults during the design lifetime of the project. Table 3-1 shows the approximate distances between the project site and various major surface fault traces. Seismogenic faults (capable of generating significant earthquakes) near the site include the San Andreas, San Gregorio, and the Hayward faults. The location of faults in relation to the project site is presented on Figure 4.

**Table 3-1. Distances to Selected Major Active Fault Surface Traces**

Fault Name	Distance and Direction from Site to Surface Fault Traces
San Andreas	3.9 km southwest
San Gregorio	15.7 km southwest
Hayward (southern segment)	26 km northeast
Calaveras	35 km northeast
Monte Vista-Shannon	42 km southeast

### 3.5.2 Liquefaction and Seismic Densification

Soil liquefaction is a phenomenon in which saturated, cohesionless soils (generally sands) lose their strength due to the build-up of excess pore water pressure during cyclic loading, such as that induced by earthquakes. Soils most susceptible to liquefaction are saturated, clean, loose, fine-grained sands and silts. The primary factors affecting soil liquefaction include: 1) intensity and duration of seismic shaking; 2) soil type and relative density; 3) overburden pressure; and 4) depth to ground water.

Based on subsurface information collected from our borings during this investigation, we judge the potential for liquefaction at the site to be **low** due to the presence of generally moist, hard cohesive soils overlying shallow bedrock and the lack of shallow groundwater.

Seismic densification is the densification of unsaturated, loose to medium dense granular soils due to strong vibration such as that resulting from earthquake shaking. We judge the potential for seismic densification to have a significant effect on the integrity of the water tanks at the site to be low due to the encountered thin layer of cohesive soils overlying relatively shallow weathered Franciscan bedrock.

## 4. FIELD INVESTIGATIONS

### 4.1 SITE RECONNAISSANCE

CE&G performed field reconnaissance of the site on January 23, 2019 in advance of performing subsurface borings. Site reconnaissance consisted of photographic documentation of the project site, determining site access for drilling equipment, and identifying and marking boring locations. The markings were also used for utility clearance through USA.

### 4.2 SUBSURFACE EXPLORATIONS

#### 4.2.1 Exploratory Borings

Two geotechnical borings were drilled in the vicinity of the planned tank footprints as part of our investigation; one on the northwestern corner of the property and one on the southeastern corner of the property. Before drilling, CE&G marked planned boring locations and coordinated utility clearance through USA. District personnel also coordinated with USA to allow utilities on-site to be marked prior to drilling. The approximate boring locations are shown on the attached Figure 2.

The geotechnical borings were drilled by Exploration Geoservices, Inc., on January 30, 2019, using a truck-mounted Mobile B-53 drill rig equipped with 8-inch-diameter hollow-stem augers and a cable-drop hammer. Surface conditions at both boring locations consisted of asphalt pavement.

Upon completion, the borings were backfilled with cement grout in accordance with San Mateo County Environmental Health requirements, and the upper 12 inches were backfilled with quick-setting concrete. Drilling spoils were hauled off-site for proper disposal.

#### 4.2.2 Logging and Sampling

The materials encountered in the borings were logged in the field by a CE&G geologist. The soil was visually classified in the field, office, and laboratory according to the Unified Soil Classification System (USCS) in general accordance with ASTM D2487 and D2488.

During the drilling operations, soil samples were obtained using the following sampling methods:



- California Modified (CM) Sampler; 3.0-inch outer diameter (O.D.), 2.5-inch inner diameter (I.D.) (ASTM D1586)
- Standard Penetration Test (SPT) Split Spoon Sampler; 2.0-inch O.D., 1.375-inch I.D. (ASTM D1586)

The CM and SPT samplers were driven 18 inches (unless otherwise noted on the boring logs) with a 140-pound hammer using a cable drop, dropping 30 inches. The number of blows required to drive the samplers through each 6-inch interval was recorded for each sample. The results are included on the boring logs in Appendix A. The blow counts included on the boring logs are uncorrected and represent the field values.

Soil samples obtained from the borings were packaged and sealed in the field to reduce the potential for moisture loss and disturbance. The samples were taken to CE&G's local office for further analysis and storage.

#### **4.2.3 Soil and Bedrock Conditions Encountered**

Subsurface soil conditions encountered in our borings were generally consistent with regional geologic mapping.

Surface conditions at the two boring locations were relatively uniform and consisted of approximately five inches of asphalt pavement, which was underlain by up to two feet of fill, which consisted of medium dense, silty sand with varying amounts of gravel. Beneath the fill was residual soil consisting of moist, hard, lean clay with sand to depths of approximately 5 feet below the existing ground surface. This residual soil was underlain by Franciscan bedrock, which extended to the maximum depth explored of approximately 25 feet bgs. The Franciscan bedrock generally consisted of very soft to soft, extremely weak, completely weathered, interbedded claystone/siliceous claystone with chert, siltstone, and greywacke.

For a more detailed description of the soils encountered in the borings, the boring logs and laboratory test results are included in Appendix A and B.

#### **4.2.4 Groundwater Conditions Encountered**

Groundwater was not encountered during our subsurface investigation to the maximum depth explored of 25 feet bgs.

## 4.3 GEOTECHNICAL LABORATORY TESTING

Testing was performed to obtain information concerning the qualitative and quantitative physical properties of the samples recovered during the subsurface exploration program. Tests were performed by Cooper Testing Laboratory in Palo Alto, California and the CE&G Testing Laboratory in Hayward, California, in general conformance with applicable ASTM standards. The following tests were performed:

- Moisture Content and Dry Unit Weight (ASTM D2216)
- Particle Size Analysis (ASTM D422)
- Atterberg Limits (ASTM D4318; dry method)
- Unconsolidated Undrained Triaxial Compression (ASTM D2850)
- Minimum Resistivity (Caltrans 643)
- pH (Caltrans 643)
- Sulfate (Caltrans 417)
- Chloride (Caltrans 422)

The results of the laboratory testing program are presented in Appendix B and are summarized below.

### 4.3.1 Index Tests

Moisture and density tests were performed on select samples at various depths from the borings. The soil samples tested had moisture contents between 11.5 and 39.6 percent with one dry density of 92.3 pcf.

### 4.3.2 Particle Size Analysis

Grain size distribution was determined by performing a sieve analysis with a -200 wash on one sample. The results of the analysis indicates the fill material tested indicated a fines content of 76.5 percent.

### 4.3.3 Atterberg Limits

Atterberg Limits testing was performed on one sample to determine the plasticity of fine-grained materials. The fill material tested had a liquid limit of 33 percent, with plasticity index of 6 percent, which is considered low. A figure plotting liquid limit versus plasticity index is presented in Appendix B.

#### **4.3.4 Shear Strength Testing**

Shear strength testing was performed on one clay soil sample collected from a depth of 2 feet, which was tested for unconsolidated-undrained triaxial strength. Strength testing produced reasonable shear strengths for the soil type encountered. The results including the shear stress curve are presented in Appendix B.

#### **4.3.5 Corrosion Testing**

Corrosion testing was performed to estimate the corrosivity of the soil. Corrosion testing was performed using the Caltrans standard method of tests. One sample was tested for resistivity, chloride, sulfate, and pH. The results of the test are summarized in Section 5.3 and are presented in Appendix B.

## 5. CONCLUSIONS AND DISCUSSION

### 5.1 GENERAL SUMMARY

Based on the results of our investigation, it is our opinion the site is geologically and geotechnically suitable for the proposed replacement water tanks and associated improvements, provided the recommendations presented in this report are incorporated in the design and construction of the project. Geotechnical recommendations for design and construction of the proposed improvements are presented in the “Recommendations” section of this report.

The soils encountered primarily consisted of a mixture of fine-grained and coarse-grained fill and residual soil materials in the upper approximately 5 feet, which is underlain by weathered bedrock. It is our professional opinion that the planned tanks may be designed to be supported on conventional shallow spread foundations bearing directly on the weathered bedrock, provided the recommendations presented in this report are followed.

Some important geotechnical issues to note during project design and construction are:

### 5.2 SEISMIC HAZARDS

Large magnitude earthquakes and strong ground shaking are likely to affect the project area within the design lifetime of the proposed improvements. Peak ground shaking parameters are presented below in Section 6.3 and should be considered in the design of the proposed improvements. Local ground-modifying effects of high intensity ground shaking are considered secondary seismic effects. Our review of these processes is presented below.

- In our judgment the potential for fault ground rupture or coseismic faulting to significantly affect the proposed improvements is low.
- In our judgment the potential for ridgetop fissuring, ridgetop shattering, ridgetop spreading or other seismically induced ground deformation to significantly affect the proposed improvements is low.

### 5.3 CORROSION

Corrosion testing was performed on one soil sample at this location in general accordance with Caltrans methods. Testing results are presented below:

**Table 5-1: Corrosion Testing Results**

<b>Boring (depth in feet)</b>	<b>Resistivity (Ohm-cm)</b>	<b>Chloride (mg/kg)</b>	<b>Sulfate (mg/kg)</b>	<b>pH</b>
B-2 (0.5-4)	2290	43	282	7.2

Caltrans Corrosion Guidelines, January 2015, identifies a site to be corrosive for structural elements if one or more of the following conditions exist:

- Chloride concentration is 500 ppm or greater;
- Sulfate concentration is 2000 ppm or greater;
- pH is 5.5 or less.

A minimum resistivity value for soil and/or water less than 1000 ohm-cm indicates the presence of high quantities of soluble salts and a higher propensity for corrosion. Based on the results of the laboratory testing performed, the soil sample tested had values for Chloride, Sulfate, pH that do not meet the Caltrans criteria for a corrosive site. The resistivity of the tested soil sample was above the 1000 ohm-cm threshold defined.

According to ACI 318 Section 4.3, Table 4.3.1:

- Sulfate concentration below 0.10 percent by weight (1,000 ppm) is negligible (no restrictions on concrete type)
- Water-soluble chloride content of less than 500 ppm is generally considered non-corrosive to concrete.

Based on the results of the laboratory testing performed, the soil sample tested had values for Sulfate and Chloride that do not meet ACI criteria and is considered non-corrosive to concrete.

Corrosion results are to be considered preliminary and are an indicator of potential soil corrosivity for the sample tested. Other soils found onsite may be more, less, or of similar corrosive nature. Our scope of services does not include corrosion engineering; therefore, a detailed analysis of the corrosion tests is not included.

## 6. DESIGN AND CONSTRUCTION CONSIDERATIONS

Detailed recommendations for the geotechnical aspects of the proposed improvements are presented in the subsequent sections of this report. Our evaluations and recommendations are based upon the previously discussed information that has been provided to us. The following recommendations may need to be modified if there are any changes in the proposed improvements, their layout or location, or the proposed grading.

### 6.1 EARTHWORK

#### 6.1.1 Demolition and Clearing

Existing improvements will be demolished from the project site prior to the planned improvements, including the two existing steel water tanks. In addition, existing underground utilities that may be present in the areas of the planned improvements will require removal or relocation. The communication towers and tower foundations adjacent to the south sides of both existing tanks will need to be considered in the design and construction of the new tanks.

Site clearing should include removal of deleterious materials, debris, obstructions that are designated for removal. Depressions, voids and holes that extend below proposed finish grade should be cleaned and backfilled with engineered fill compacted to the recommendations in this report.

#### 6.1.2 Excavations

Excavations for this project will include excavation to remove existing underground facilities designated for removal, general cuts to achieve design grades, subexcavation of soft and disturbed soil under the areas of the existing tanks, trenching for underground utilities, and foundation excavations.

Based on our boring logs, it is our judgement that the walls of temporary excavations should be capable of remaining vertical to facilitate construction of foundations, for excavations up to 5 feet in depth. However, it may be necessary to lay back the upper 2 feet of the excavation to a 1:1 (horizontal to vertical) temporary slope to prevent the more granular soils from caving. Excavations should be constructed in accordance with the current CAL-OSHA safety standards and local jurisdiction. The stability and safety of excavations, braced or unbraced, is the responsibility of the contractor.

If the temporary shoring will be braced, a rectangular or trapezoidal loading diagram such as those recommended by Terzaghi & Peck, Tschebortarioff, and others (Caltrans Trenching and Shoring Manual and FHWA GEC No. 4) should be used. These methods generally correlate the earth pressure load to a percentage of the unit weight of the soil times the height of the excavation. The method and loading should be determined by the contractor and provided to the Engineer for review.

Trench excavations adjacent to existing or proposed foundations should be above an imaginary plane having an inclination of 1½:1 (horizontal to vertical) extending down from the bottom edge of the foundations.

### **6.1.3 Subgrade Preparation**

Because of likely significant disturbance of the upper 3 to 4 feet of soil at the site from demolition and removal of the existing site improvements as well as past earthwork activities in the area, subgrade soil in areas to receive engineered fill, concrete slabs-on-grade or pavements should be scarified to a minimum depth of 24 inches, moisture conditioned and compacted to the recommendations given under Section 6.1.5, Engineered Fill Placement and Compaction.

Subgrade preparation should extend a minimum of 5 feet beyond the outermost limits of the fills, foundations, slabs or pavements, unless it is restricted. Prepared soil subgrades should be non-yielding when proof-rolled by a fully loaded water truck or equipment of similar weight. Moisture conditioning of subgrade soils should consist of adding water if the soils are too dry and allowing the soils to dry if the soils are too wet. After the subgrades have been prepared, the areas may be raised to design grades by placement of engineered fill.

If unstable, wet or soft soil is encountered, the soil will require processing before compaction can be achieved. When construction schedule does not allow for air-drying, other means such as lime or cement treatment, over-excavation and replacement, geotextile fabrics, etc. may be considered to help stabilize the subgrade. The method to be used should be determined at the time of construction based on the actual site conditions. We recommend obtaining unit prices for subgrade stabilization during the construction bid process.

### **6.1.4 Material for Engineered Fill**

In general, on-site soils with an organic content of less than 3 percent by weight, free of any hazardous or deleterious materials, and meeting the gradation requirements below may be

used as general engineered fill to achieve project grades, except when special material (such as or capillary break material) is required.

In general, engineered fill material should not contain rocks or lumps larger than 3 inches in greatest dimension, should not contain more than 15 percent of the material larger than 1½ inches, and should contain at least 20 percent passing the No. 200 sieve. In addition to these requirements, import fill should have a low expansion potential as indicated by Plasticity Index of 15 or less, or Expansion Index of less than 20.

All import fills must be approved by the project geotechnical engineer prior to delivery to the site. At least five (5) working days prior to importing to the site, a representative sample of the proposed import fill should be delivered to our laboratory for evaluation.

#### **6.1.5 Engineered Fill Placement and Compaction**

Engineered fill should be placed on soil subgrades that are prepared as recommended in this report. Engineered fill should be placed in horizontal lifts each not exceeding 8 inches in thickness and mechanically compacted to the recommendations below at the recommended moisture content. Relative compaction or compaction is defined as the in-place dry density of the compacted soil divided by the laboratory maximum dry density as determined by ASTM Test Method D1557, latest edition, expressed as a percentage. Moisture conditioning of soils should consist of adding water to the soils if they are too dry and allowing the soils to dry if they are too wet.

Engineered fills consisting of on-site soils and imported soils should be compacted to a minimum of 90 percent relative compaction with moisture content between about 1 and 3 percent above the laboratory optimum value. In pavement areas, the upper 12 inches of subgrade soil and the full section of aggregate base should be compacted to a minimum of 95 percent relative compaction with moisture content slightly above the optimum value. Aggregate base in vehicle pavement areas should be compacted at slightly above the optimum moisture content to a minimum of 95 percent relative compaction.

#### **6.1.6 Utility Trench Excavation and Backfill**

Utility trenches less than 5 feet in depth in the mostly silty sand and lean clay soil material should be able to stand near vertical with minimal bracing. Sandy soils were encountered in the upper 2 feet and may need to be laid back at a 1:1 (horizontal to vertical) temporary slope or provided with additional bracing to prevent caving of the granular soils. We estimate that excavations should be able to be accomplished with conventional excavating equipment, such as backhoes and excavators, and that jack-hammers and/or blasting



should not be necessary. Excavations should be constructed in accordance with the current CAL-OSHA safety standards and local jurisdiction. The stability and safety of excavations, braced or unbraced, is the responsibility of the contractor.

Pipe zone backfill, extending from the bottom of the trench to about 1 foot above the top of pipe, should consist of free-draining sand (at least 90% passing a No. 4 sieve and less than 5% passing a No. 200 sieve) compacted to a minimum of 90 percent relative compaction unless concrete or cement slurry is specified.

Above the pipe zone, underground utility trenches may be backfilled with free-draining sand, on-site soil or imported soil that is free of deleterious and hazardous material. The trench backfill should be compacted to the requirements given in Section 6.1.5, "Engineered Fill Placement and Compaction." Trench backfill should be capped with at least 12 inches of compacted, on-site soil similar to that of the adjoining subgrade. The upper 12 inches of trench backfill in areas to be paved should be compacted to a minimum of 95 percent relative compaction. Compaction should be performed by mechanical means only. Water jetting or flooding to attain compaction of backfill should not be permitted.

Trench excavations that extend below an imaginary plane inclined at 1½:1 (h:v) below the bottom edge of foundations should be properly shored to maintain support of the existing facilities. Trenches that run parallel to the proposed foundations should not be excavated within the imaginary plane inclined at 1½:1 (h:v) below the bottom of the footing.

### **6.1.7 Considerations for Soil Moisture and Seepage Control**

Subgrade soil and engineered fill should be compacted at moisture content meeting our recommendations. Once compacted, soils should be protected from drying and wetting.

Consideration should be given to reducing the potential for water infiltration from the exterior to under the tanks through utility lines crossing the building perimeter. In utility lines crossing beneath foundations, permeable backfill should be terminated at least 1 foot outside of the perimeter foundation. Impermeable material, such as concrete or clay soil, should be used for the entire trench depth to act as a seepage cutoff.

Where concrete slabs or pavements abut against landscaped areas, the base rock layer and subgrade soil should be protected against saturation. Water if allowed to seep into the subgrade soil or pavement section could reduce the service life of the improvements. Methods that may be considered to reduce infiltration of water include: 1) subdrains installed behind curbs and slabs in landscape areas; 2) vertical cut-offs, such as a deepened

curb section, or equivalent, extending at least 2 inches into the subgrade soil; and 3) use of drip irrigation system for landscape watering.

### **6.1.8 Wet Weather Construction**

If site earthwork and construction is to be performed during the winter rainy months, the owner and contractors should be fully aware of the potential impact of wet weather. Rainstorms can cause delay to construction and damage to previously completed work by saturating compacted pads or subgrades, or flooding excavations.

Earthwork during rainy months will require extra effort and caution by the contractors. The grading contractor should be responsible to protect his work to avoid damage by rainwater. Standing pools of water should be pumped out immediately. Construction during wet weather conditions should be addressed in the project construction bid documents and/or specifications. We recommend the grading contractor submit a wet weather construction plan outlining procedures they will employ to protect their work and to minimize damage to their work by rainstorms.

## **6.2 FOUNDATIONS**

We recommend the replacement tanks be supported by reinforced concrete ring foundations bearing directly on competent, undisturbed Franciscan bedrock, which was encountered in our borings between approximately 4.7 and 5.5 feet below the existing ground surface. With this depth, the ring foundation may be designed to impose an allowable bearing pressure of 9,000 pounds per square foot. This value may be increased by 1/3 when designing for transient loads, such as wind and seismic loading. The ring footings should be embedded at least 5 feet below pad grade or lowest adjacent grade, whichever provides a deeper embedment. We recommend using Site Class C (Very dense soil and soft rock).

Ring walls should be reinforced to resist hoop stresses within the foundations. Hoop stresses may be calculated by assuming an outward lateral pressure equal to one-half the vertical pressure acting on the adjacent subgrade inside the ring wall.

Concrete should be placed only in excavations that are clean and free of loose soil and debris. All foundation excavations should be observed by a member of our staff to verify that adequate foundation bearing soils have been reached.

Soil resistance to lateral loads for the foundation will be provided by a combination of frictional resistance between the bottom of the footing and underlying soils and by passive

pressures acting against the embedded sides of the footing. For frictional resistance, an ultimate coefficient of friction of 0.40 may be used for design. In addition, an ultimate passive lateral bearing pressure equal to an equivalent fluid pressure of 400 pcf may be used, provided the footings are poured tight against undisturbed competent bedrock. These values may be used in combination without reduction. The passive pressure can be assumed to act from the top of the lowest adjacent grade if the ring foundation is surrounded by pavements or concrete or at a depth of 1 foot below grade in unpaved areas. Total post-construction settlement of the tank foundation is expected to be less than 1/2 inch.

Ring foundations should be constructed and backfilled in consideration of the tank manufacturer's specifications. Our firm should be commissioned to review the foundation plans to determine if our recommendations are incorporated in the design. Our representative should observe the foundation excavations to determine if the excavations extend into suitable bearing material.

We request the opportunity to review the foundation plans and to provide supplemental recommendations as necessary.

### **6.3 SEISMIC DESIGN PARAMETERS**

Due to the proximity of the site to the numerous active fault systems which traverse the greater San Francisco Bay Area, it is likely that the project site will be subjected to the effects of a major earthquake during the design life of the proposed improvements. The effects are likely to consist of significant ground accelerations. These ground type movements may cause damage to the proposed improvements. We therefore recommend that at a minimum the structural systems for the proposed improvements be designed in accordance with the requirements of AWWA D100-11 and ASCE 7-10 for Site Class C type soils. The recommended seismic design parameters for the site are included in Table 6-1. The design parameters utilize a PGA of 0.841 g. According to CGS (2018), the upper 30 meters of Franciscan bedrock materials, underlying the site vicinity, generally contain a shear-wave velocity of approximately 733 m/s.

**Table 6-1. Recommended Seismic Design Parameters**

Item	Design Value
Site Class Definition	C
0.2 Second Spectral Response Acceleration, $S_s$	2.163
1.0 Second Spectral Response Acceleration, $S_1$	1.029
Values of Site Coefficient, $F_a$	1.0
Value of Site Coefficient, $F_v$	1.3
Designed Spectral Response Acceleration for Short Periods, $S_{DS}$	1.442
Designed Spectral Response Acceleration for 1-Sec Periods, $S_{D1}$	0.892

## 6.4 CONCRETE SLABS-ON-GRADE

The use of concrete slabs-on-grade are anticipated for exterior walkways, driveways, pavements, etc. Soil subgrade should be maintained in a moist condition prior to pouring the concrete slab.

To reduce the potential for cracking of the concrete slabs, we recommend that the slabs be a minimum of 5 inches thick. The slabs should include minimum reinforcement of #3 bars in both directions at 12-inch centers or #4 bars in both directions at 18-inch centers. The steel should be placed in the middle of the slab and should be held in place by dobie blocks or other suitable means. Actual dimensions and reinforcement should be determined by the project Structural Engineer.

Even with the steel reinforcement and base rock, it should be recognized that some cracking and differential movement of the slabs will likely occur and should be expected. Exterior concrete slabs-on-grade should be cast free from adjacent footings or other non-heaving edge restraints. This may be accomplished by using a strip of 1/2-inch asphalt-impregnated felt divider material between the slab edges and the adjacent structure. Construction and/or control joints should be provided in concrete slabs.

## 6.5 SURFACE DRAINAGE

The areas adjacent to the proposed improvements should be positively sloped away from the tanks, building and associated improvements to provide for rapid removal of surface water runoff. Ponding of water adjacent to structure or seepage toward foundation

systems at any time during or after construction should be prevented. To reduce the potential for ponding of water adjacent to the foundation, we recommend the following be included in the design.

1. The finished surface of the soil and slabs should slope away from the perimeter of the foundation at a gradient of 3 percent for at least 5 feet to provide for rapid removal of surface water runoff.
2. All storm water from roof downspouts should be collected in a solid pipe drain system and discharged into an appropriate discharge facility.
3. Planted areas should be avoided immediately adjacent to the building or tanks. If planting adjacent to the building is desired, the use of plants that require very little moisture is recommended. Irrigation of landscape areas should be limited strictly to that necessary for plant growth. Sprinkler systems should not be installed where they may cause ponding or saturation of foundation soils within 5 feet from walls or under the structures.

## **6.6 TECHNICAL REVIEW AND CONSTRUCTION OBSERVATION**

Prior to construction the geotechnical engineer should review the project plans and specifications for conformance with the intent of the recommendations presented in this report. The geotechnical engineer should be contacted a minimum of 48 hours in advance of excavation operations to observe the subsurface conditions

## 7. LIMITATIONS

The conclusions and recommendations presented in this report are based on the information provided regarding the planned construction, and the results of the site reconnaissance, subsurface exploration, and laboratory testing, combined with interpolation of the subsurface conditions between boring locations. Site conditions described in the text of this report are those existing at the time of our last field reconnaissance and are not necessarily representative of the site conditions at other times or locations. This information notwithstanding, the nature and extent of subsurface variations between borings may not become evident until construction. If variations are encountered during construction, Cal Engineering & Geology, Inc. should be notified promptly so that conditions can be reviewed, and recommendations reconsidered, as appropriate.

It is District's responsibility to ensure that recommendations contained in this report are carried out during the construction phases of the project. This report was prepared based on preliminary design information provided which is subject to change during the design process. At approximately the 90 percent design level, Cal Engineering & Geology, Inc. should review the design assumptions made in this report and prepare addenda or memoranda as appropriate. Any modifications included in these addenda or memoranda should be carefully reviewed by the project designers to make sure that any conclusions or recommendations that are modified are accounted for in the final design of the project.

The findings of this report should be considered valid for a period of three years unless the conditions of the site change. After a period of three years, CE&G should be contacted to review the site conditions and prepare a letter regarding the applicability of this report.

This report presents the results of a geotechnical and geologic investigation only and should not be construed as an environmental audit or study.

The conclusions and recommendations contained in this report are valid only for the project described in this report. We have employed accepted geotechnical engineering procedures, and our professional opinions and conclusions are made in accordance with generally accepted geotechnical engineering principles and practices. This standard is in lieu of all other warranties, either expressed or implied.

## 8. REFERENCES

- ASCE 7 Hazard Tool, Online, Accessed June 24, 2020, Data Source: USGS Seismic Design Maps based on ASCE/SEI 7-10 and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS .
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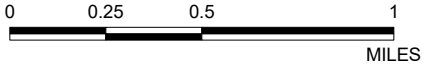
## **Figures**





**BASEMAP REFERENCE**

1. BASEMAP FROM DIGITALGLOBE (2017).
2. STREET CENTERLINES FROM CALTRANS CALIFORNIA ROAD SYSTEM, DOWNLOADED ON 20 NOV 2017.



\\granite\CEG\_Master\_Files\2018\190060-Dehoven\GIS\ArcGIS\190060-Fig1-Site-Location.mxd: 2/27/2019: kdnozynska



6455 Almaden Expwy.  
Suite 100  
San Jose, CA 95120  
Phone: (408) 440-4542

DEKOVEN WATER TANKS REPLACEMENT  
DEKOVEN AVENUE  
BELMONT, CALIFORNIA

**SITE LOCATION MAP**

190060	JUNE 2020	FIGURE 1
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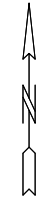




- REFERENCES**
1. TOPOGRAPHIC SURVEY BY TRIAD/HOLMES ASSOC., DATED 11/09/2018. CAD FILE NAMED "DKTEXTOP0.dwg" RECEIVED FROM BEYAZ & PATEL, INC. ON 02/25/2019.
  2. ORTHOIMAGERY FROM SAN MATEO COUNTY, FLOWN OCT 2005.

**LEGEND**

B-2 BORING LOCATION BY CE&G, DRILLED ON 1/30/2019

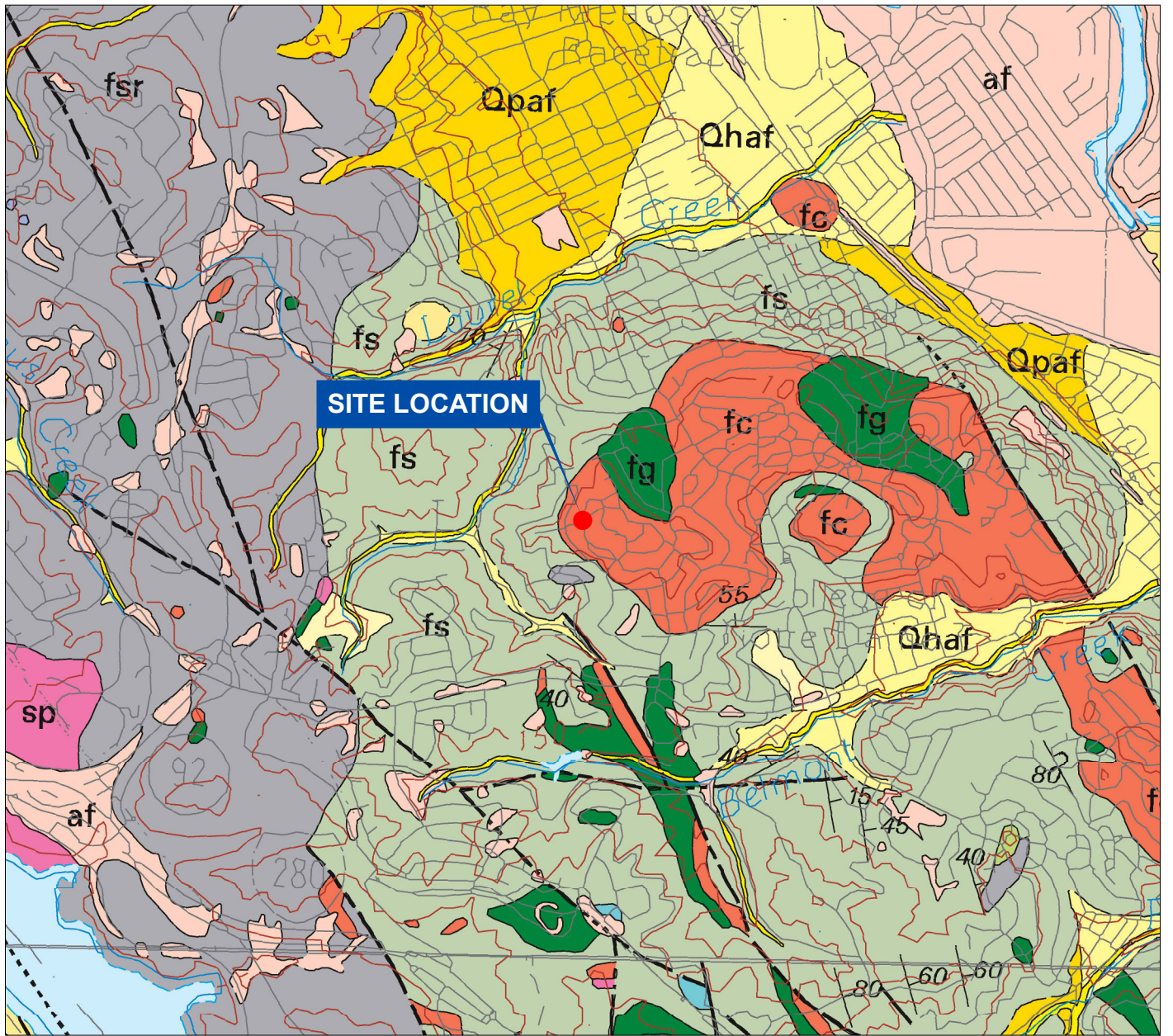


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<b>DEKOVEN WATER TANKS REPLACEMENT</b>		
DEKOVEN AVENUE BELMONT, CALIFORNIA		
<b>SITE PLAN</b>		
190060	JUNE 2020	FIGURE 2

M:\2019\190060-BeyazPatel-DekovenTank\AutoCAD\Figures\FIG-02-SITE-PLAN.dwg 2--25-19 04:05:48 PM katrozynska

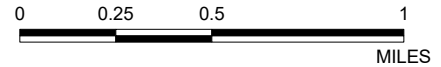




**BASEMAP REFERENCE**

1. REGIONAL GEOLOGY FROM BRABB, (OFR 98-137)

**MAP UNIT DESCRIPTION**



af	ARTIFICIAL FILL (HISTORIC)	Tw	WHISKEY HILL FORMATION (MID. & LOW.EOCENE)
Qhsc	STREAM CHANNEL DEPOSITS (HOLOCENE)	fs	SANDSTONE
Qhbm	BAY MUD (HOLOCENE)	fg	GREENSTONE
Qhb	BASIN DEPOSITS (HOLOCENE)	fc	CHERT
Qhaf	ALLUVIAL FAN AND FLUVIAL DEPOSITS (HOLOCENE)	fm	METAMORPHIC ROCKS
Qcl	COLLUVIUM (HOLOCENE)	fog	CONGLOMERATE
Qpaf	ALLUVIAL FAN AND FLUVIAL DEPOSITS (PLEISTOCENE)	fsr	SHEARED ROCK (MELANGE)
QTsc	SANTA CLARA FORMATION (LOW. PLEISTOCENE AND UP. PLIOCENE)	sp	SERPENTINITE (CRETACEOUS AND/OR JURASSIC)



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DEKOVEN WATER TANKS REPLACEMENT  
DEKOVEN AVENUE  
BELMONT, CALIFORNIA

**REGIONAL GEOLOGY MAP**

190060

JUNE 2020

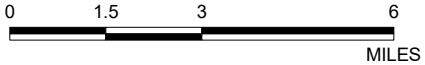
FIGURE 3





**BASEMAP REFERENCE**

1. BASEMAP FROM ESRI (DIGITALGLOBE), 2017.
2. FAULT LOCATIONS FROM US GEOLOGICAL SURVEY QUATERNARY FAULT AND FOLDS DATABASE, ACCESSED ONLINE ON 12 DEC 2017.



**MAP UNIT DESCRIPTION**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li><span style="color: red;">—</span> Historical (&lt;150 years), Well Constrained Location</li> <li><span style="color: red;">- - -</span> Historical (&lt;150 years), Moderately Constrained Location</li> <li><span style="color: red;">. . . . .</span> Historical (&lt;150 years), Inferred Location</li> <li><span style="color: orange;">—</span> Latest Quaternary (&lt;15,000 years), Well Constrained Location</li> <li><span style="color: orange;">- - -</span> Latest Quaternary (&lt;15,000 years), Moderately Constrained Location</li> <li><span style="color: orange;">. . . . .</span> Latest Quaternary (&lt;15,000 years), Inferred Location</li> </ul> | <ul style="list-style-type: none"> <li><span style="color: green;">—</span> Late Quaternary (&lt;130,000 years), Well Constrained Location</li> <li><span style="color: green;">- - -</span> Late Quaternary (&lt;130,000 years), Moderately Constrained Location</li> <li><span style="color: green;">. . . . .</span> Late Quaternary (&lt;130,000 years), Inferred Location</li> <li><span style="color: black;">—</span> Undifferentiated Quaternary (&lt;1.6 million years), Well Constrained Location</li> <li><span style="color: black;">- - -</span> Undifferentiated Quaternary (&lt;1.6 million years), Moderately Constrained Location</li> <li><span style="color: black;">. . . . .</span> Undifferentiated Quaternary (&lt;1.6 million years), Inferred Location</li> </ul> |
|---|--|

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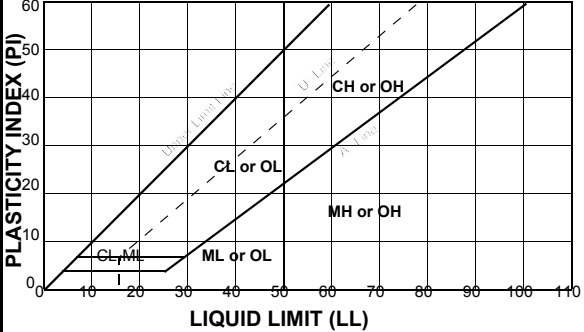
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Phone: (408) 440-4542

DEKOVEN WATER TANKS REPLACEMENT  
DEKOVEN AVENUE  
BELMONT, CALIFORNIA

**FAULT ACTIVITY MAP**



## **Appendix A. Boring Logs**

# UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)





Field Identification		Group Symbols	Typical Names	Laboratory Classification Criteria		
<b>Coarse-Grained Soils</b> More than 50% of material is retained on the No. 200 sieve.	<b>Gravels</b> More than 50% coarse fraction retained on the No. 4 sieve	Clean Gravels < 5% Fines	<b>GW</b>	Well-graded gravels, gravel-sand mixtures, little or no fines	<b>CLASSIFICATION OF GRAVELS &amp; SANDS WITH 5% TO 12% FINES REQUIRES DUAL SYMBOLS</b> Gravel/Silty Gravel Gravel/Clayey Gravel Sand/Silty Sand Sand/Clayey Sand	
		Gravels with Fines >12% Fines	<b>GP</b>	Poorly graded gravels, gravel-sand mixtures, little or no fines		
		<b>GM</b>	Silty gravels, poorly graded gravel-sand-silt mixtures			
		<b>GC</b>	Clayey gravels, poorly graded gravel-sand-clay mixtures			
	<b>Sands</b> More than 50% coarse fraction passes the No. 4 sieve	Clean Sands < 5% Fines	<b>SW</b>	Well-graded sands, gravelly sands, little or no fines		$C_u = D_{60} \div D_{10} \geq 4$ and $C_c = (D_{30})^2 \div (D_{10} \times D_{60}) \geq 1 \text{ \& } \leq 3$
		Sands with Fines >12% Fines	<b>SP</b>	Poorly graded sands, gravelly sands, little or no fines		$C_u = D_{60} \div D_{10} < 4$ and/or $C_c = (D_{30})^2 \div (D_{10} \times D_{60}) < 1 \text{ \& } > 3$
		<b>SM</b>	Silty sands, poorly graded sand-silt mixtures	Fines classify as <b>ML</b> or <b>MH</b>		If fines classify as <b>CL-ML</b> , use dual symbol <b>GC/GM</b>
		<b>SC</b>	Clayey sands, poorly graded sand-clay mixtures	Fines classify as <b>CL</b> or <b>CH</b>		
		<b>SW</b>	Well-graded sands, gravelly sands, little or no fines	$C_u = D_{60} \div D_{10} \geq 6$ and $C_c = (D_{30})^2 \div (D_{10} \times D_{60}) \geq 1 \text{ \& } \leq 3$		
		<b>SP</b>	Poorly graded sands, gravelly sands, little or no fines	$C_u = D_{60} \div D_{10} < 6$ and/or $C_c = (D_{30})^2 \div (D_{10} \times D_{60}) < 1 \text{ \& } > 3$		
<b>SM</b>	Silty sands, poorly graded sand-silt mixtures	Fines classify as <b>ML</b> or <b>MH</b>	If fines classify as <b>CL-ML</b> , use dual symbol <b>SC/SM</b>			
<b>SC</b>	Clayey sands, poorly graded sand-clay mixtures	Fines classify as <b>CL</b> or <b>CH</b>				
<b>Fine-Grained Soils</b> More than 50% of material passes the No. 200 sieve.	<b>Identification Procedures on Percentage Passing the No. 40 Sieve</b>			<b>PLASTICITY CHART</b> <b>For Classification of Fine-Grained Soils and Fine-Grained Fraction of Coarse-Grained Soils</b> Equation of "A"-Line: $PI = 4 @ LL = 4 \text{ to } 25.5$ , then $PI = 0.73 \times (LL - 20)$ Equation of "U"-Line: $LL = 16 @ PI = 0 \text{ to } 7$ , then $PI = 0.9 \times (LL - 8)$ 		
	<b>Silts &amp; Clays</b> Liquid Limit less than 50%	<b>ML</b>	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands with slight plasticity			
		<b>CL</b>	Inorganic clays of low to medium plasticity, gravelly, sandy, and/or silty clays, lean clays			
		<b>OL</b>	Organic silts, organic silty clays of low plasticity			
	<b>Silts &amp; Clays</b> Liquid Limit greater than 50%	<b>MH</b>	Inorganic silts, micaceous or diatomaceous fine sandy/silty soil, elastic silts			
		<b>CH</b>	Inorganic clays of high plasticity, fat clays			
		<b>OH</b>	Organic clays of medium to high plasticity			
<b>HIGHLY ORGANIC SOILS</b>			<b>PT</b>	Peat and other highly organic soils		



## KEY TO SAMPLER TYPES AND OTHER LOG SYMBOLS

<b>CS</b>	California Standard Sampler
<b>CM</b>	California Modified Sampler
<b>SPT</b>	Standard Penetration Test Sampler
<b>SHL</b>	Shelby Tube Sampler
<b>BU</b>	Bulk Sample
<b>LL</b>	Liquid Limit of Sample (ASTM D-4318)
<b>PI</b>	Plasticity Index of Sample (ASTM D-4318)
<b>Q<sub>u</sub></b>	Unconfined Compression Test (ASTM D-2166)

	Depth at which Groundwater was Encountered During Drilling
	Depth at which Groundwater was Measured After Drilling
<b>PP</b>	Pocket Penetrometer Test
<b>PTV</b>	Pocket Torvane Test
<b>-#200</b>	% of Material Passing the No. 200 Sieve Test (ASTM D-1140)
<b>PSA</b>	Particle-Size Analysis (ASTM D-422 & D-1140)
<b>C</b>	Consolidation Test (ASTM D-2435)
<b>TXUU</b>	Unconsolidated Undrained Compression Test (ASTM D-2850)

## KEY TO SAMPLE INTERVALS

	Length of Sampler Interval with a CS Sampler
	Length of Sampler Interval with a CM Sampler
	Length of Sampler Interval with a SPT Sampler
	Length of Sampler Interval with a SHL Sampler

	Bulk Sample Recovered for Interval Shown (i.e., cuttings)
	Length of Coring Run with Core Barrel Type Sampler
<b>NR</b>	No Sample Recovered for Interval Shown

## Rock Hardness Descriptions

<b>Very Hard</b>	Cannot be scratched with knife or sharp pick. Breaking of hand specimen requires several hard blows of geologist's pick.
<b>Hard</b>	Can be scratched with knife or pick only with difficulty. Hard blow of hammer required to detach hand specimen.
<b>Moderately Hard</b>	Can be scratched with knife or pick. Gouges or grooves to 1/4-inch deep can be excavated by hard blow of geologist's pick. Hand specimens can be detached by moderate blow.
<b>Medium</b>	Can be grooved or gouged 1/16-inch deep by firm pressure of knife or pick point. Can be excavated in small chips to pieces about 1-inch maximum size by hard blows of the point of a geologist's pick.
<b>Soft</b>	Can be gouged or grooved readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows of a pick point. Small tin pieces can be broken by finger pressure.
<b>Very Soft</b>	Can be carved with knife. Can be excavated readily with point of pick. Pieces 1-inch or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.

## Bedding Thickness & Joint/Fracture Spacing Descriptions

Centimeters	Inches	Bedding	Joints/Fractures
< 2	< 3/4	Laminated	Extremely Close
2-5	3/4-2	Very Thin	Very Close
5-30	2-12	Thin	Close
30-90	12-36	Medium	Moderate
90-300	36-120	Thick	Wide
> 300	> 120	Very Thick	Very Wide

## Rock Weathering Descriptions

<b>Fresh</b>	Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer if crystalline.
<b>Very Slight</b>	Rock generally fresh, joints may show thin clay coatings, crystals in broken face show bright. Rock rings under hammer if crystalline.
<b>Slight</b>	Rock generally fresh, joints stained, and discoloration extends into rock up to 1 inch. Joints may contain clay. In granitoid rocks some occasional feldspar crystals are dulled and discolored. Crystalline rocks ring under hammer.
<b>Moderate</b>	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some show clayey. Rock has dull sound under hammer and shows significant loss of strength as compared with fresh rock.
<b>Moderately Severe</b>	All rock except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick. Rock goes "clunk" when struck.
<b>Severe</b>	All rock except quartz discolored or stained. Rock "fabric" clear and evident, but reduced in strength to strong soil. In granitoid rocks, all feldspars kaolinized to some extent. Some fragments of strong rock usually left.
<b>Very Severe</b>	All rock except quartz discolored or stained. Rock "fabric" discernible. But mass effectively reduced to "soil" with only fragments of strong rock remaining.
<b>Complete</b>	Rock reduced to "soil." Rock "fabric" not discernible or discernible only in small scattered locations. Quartz may be present as dikes or stringers.

The above Bedrock Characteristics are based on the ASCE Manual No. 56, "Subsurface Investigation For Design And Construction Of Foundations Of Buildings," 1976.









CLIENT Beyaz & Patel, Inc. Consultants

PROJECT NAME Dekoven Tanks Replacement Project






PROJECT NUMBER 190060

PROJECT LOCATION Belmont, CA

**LITHOLOGIC SYMBOLS**  
*(Unified Soil Classification System)*

-  CH: USCS High Plasticity Clay
-  CL: USCS Low Plasticity Clay
-  GM: USCS Silty Gravel
-  GP-GC: USCS Poorly-graded Gravel with Clay
-  ML: USCS Silt
-  SC: USCS Clayey Sand
-  SM: USCS Silty Sand
-  SP: USCS Poorly-graded Sand




**SAMPLER SYMBOLS**

-  California Modified Sampler
-  Grab Sample
-  Shelby Tube
-  Standard Penetration Test
-  Shelby Tube

**WELL CONSTRUCTION SYMBOLS**

**ABBREVIATIONS**

- LL - LIQUID LIMIT (%)
- PI - PLASTIC INDEX (%)
- W - MOISTURE CONTENT (%)
- DD - DRY DENSITY (PCF)
- NP - NON PLASTIC
- 200 - PERCENT PASSING NO. 200 SIEVE
- PP - POCKET PENETROMETER (TSF)

- TV - TORVANE
- PID - PHOTOIONIZATION DETECTOR
- UC - UNCONFINED COMPRESSION
- ppm - PARTS PER MILLION
-  Water Level at Time Drilling, or as Shown
-  Water Level at End of Drilling, or as Shown
-  Water Level After 24 Hours, or as Shown





CAL ENGINEERING & GEOLOGY

CLIENT Beyaz & Patel, Inc.  
 PROJECT NUMBER 190060  
 DATE STARTED 1/30/2019 COMPLETED 1/30/2019  
 DRILLING CONTRACTOR Exploration Geoservices Inc.  
 DRILLING RIG/METHOD Moble B-53/8-in. Hollowstem Auger  
 LOGGED BY K. Loeb CHECKED BY D. Peluso  
 HAMMER TYPE 140 lb hammer with 30 in. cable drop

PROJECT NAME Devoken Tanks Replacement Project  
 PROJECT LOCATION Belmont, CA  
 GROUND ELEVATION 590 ft DATUM WGS84 HOLE SIZE 8" in.  
 COORDINATES: LATITUDE 37.52018 LONGITUDE -122.30754  
 GROUNDWATER AT TIME OF DRILLING --- Not Encountered  
 GROUNDWATER AT END OF DRILLING ---  
 GROUNDWATER AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
								LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	
0		Asphalt Pavement (approximately 5")									
		Silty SAND w/ Gravel (SM): dark reddish brown, dry, medium dense, fine to coarse sand, angular gravel up to 1", some roots [Fill] [TXUU @ 2 feet]	CM	27-16-18		92	22				77
		Lean CLAY w/ Sand (CL): brown, moist, hard, low plasticity, trace fragments of completely weathered chert and shale [Residual Soil]	CM	17-24-39	>4.5 >4.5		34				
5		Sandy Claystone: light yellowish brown w/ green chert fragments, moist, very soft to soft, low plasticity, completely weathered to sandy lean clay, fabric still intact, some roots, clay infilled fractures [Franciscan Bedrock]	SPT	14-14-16							
		becomes reddish brown to light yellowish brown	CM	12-22-29	3.75		40				
		muddy matrix with fragments of shale, greywacke, and chert of various colors, some oxidation	SPT	12-16-18							
		Siltstone: brown, moist, very soft to soft, completely weathered to silt w/ sand, extremely weak rock, contains white carbonate filaments	CM	22-39-50							
15		Meta-Greywacke/Sandy Siltstone: olive yellow, moist, very soft to soft, completely weathered to clayey/silty sand and sandy silt, extremely weak rock	SPT	16-29-30							
		Lean CLAY (CL): reddish brown, moist, low plasticity, weathered mudstone bed?	CM	17-42-50/5"	3.5						
		Interbedded Greywacke, Claystone, and Siltstone: moist, completely weathered to silt/clayey sand, clay infilling along shears	SPT	29-33-50							
25		Greywacke: olive yellow, moist, very soft to soft, very fine sand, completely weathered	CM	23-30-44							

Bottom of borehole at 25.0 ft. Borehole backfilled with cement grout.



CAL ENGINEERING & GEOLOGY

CLIENT Beyaz & Patel, Inc.  
 PROJECT NUMBER 190060  
 DATE STARTED 1/30/2019 COMPLETED 1/30/2019  
 DRILLING CONTRACTOR Exploration Geoservices Inc.  
 DRILLING RIG/METHOD Moble B-53/8-in. Hollowstem Auger  
 LOGGED BY K. Loeb CHECKED BY D. Peluso  
 HAMMER TYPE 140 lb hammer with 30 in. cable drop

PROJECT NAME Devoken Tanks Replacement Project  
 PROJECT LOCATION Belmont, CA  
 GROUND ELEVATION 593 ft DATUM WGS84 HOLE SIZE 8" in.  
 COORDINATES: LATITUDE 37.51994 LONGITUDE -122.30709  
 GROUNDWATER AT TIME OF DRILLING --- Not Encountered  
 GROUNDWATER AT END OF DRILLING ---  
 GROUNDWATER AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
								LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	
0		Asphalt Pavement (approximately 5")									
		Silty SAND (SM): dark reddish brown, moist, medium dense, fine to coarse sand, little angular gravel [Fill]	CM	18-13-15	>4.5		21	33	27	6	
		Lean CLAY w/ Sand (CL): dark brown, moist, hard, medium plasticity, little fine sand [Residual Soil] [Corrosion @ 4 feet]	CM	13-26-30	4.5		12 25				
		Lean CLAY (CL): dark grayish brown, moist, hard, trace sand, siliceous appearance	SPT	17-27-33	>4.5						
		Sandy Claystone: dark reddish brown, dry, soft, completely weathered to sandy lean clay matrix w/ chert fragments, oxidized matrix [Franciscan Bedrock]									
		Sandy Siltstone: red oxidized silty sand matrix w/ grey chert, dry, soft, highly oxidized	CM	18-34-42							
		some red chert fragments	SPT	16-29-33							
		Greywacke: yellow, dry, soft, extremely weak rock, highly weathered to silty sand	CM	27-30-50							
			SPT	22-38-34							
		becomes yellowish brown, moist	CM	34-50/4"							
			SPT	27-50							
		increase in fines and moisture	SPT	16-18-34							

Bottom of borehole at 25.0 ft. Borehole backfilled with cement grout.

## **Appendix B. Laboratory Testing**



CAL ENGINEERING & GEOLOGY

# SUMMARY OF LABORATORY RESULTS

PAGE 1 OF 1

CLIENT Beyaz & Patel, Inc.

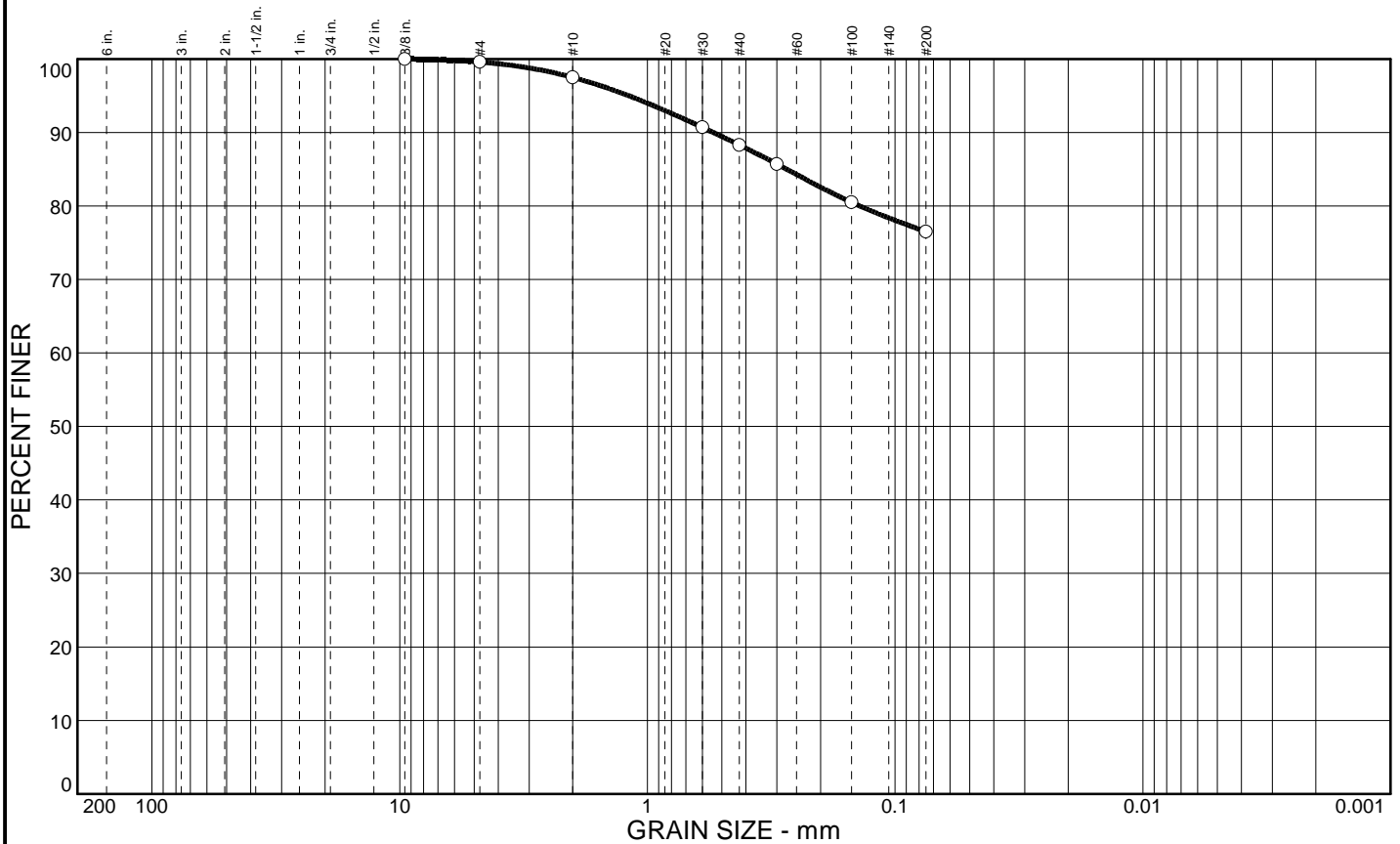
PROJECT NAME Devoken Tanks Replacement Project

PROJECT NUMBER 190060

PROJECT LOCATION Belmont, CA

Borehole	Depth	Date Tested	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Screen Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Saturation (%)	Void Ratio
B-1	4.5	2/4/2019						CL	33.8			
B-1	9.5	2/4/2019						CL	39.6			
B-2	2.0	2/4/2019	33	27	6			SM	20.8			
B-2	4.5	2/4/2019						CL	25.4			

# Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
0	0.4	23.1	76.5					

SIEVE inches size	PERCENT FINER			SIEVE number size	PERCENT FINER			SOIL DESCRIPTION
3/8"	○	100.0			○			○ Reddish Brown CLAY w/ Sand
				#4	99.6			
				#10	97.5			REMARKS: ○
				#30	90.7			
				#40	88.3			
				#50	85.7			
				#100	80.5			
				#200	76.5			
GRAIN SIZE								
COEFFICIENTS								

○ Source: 1-2

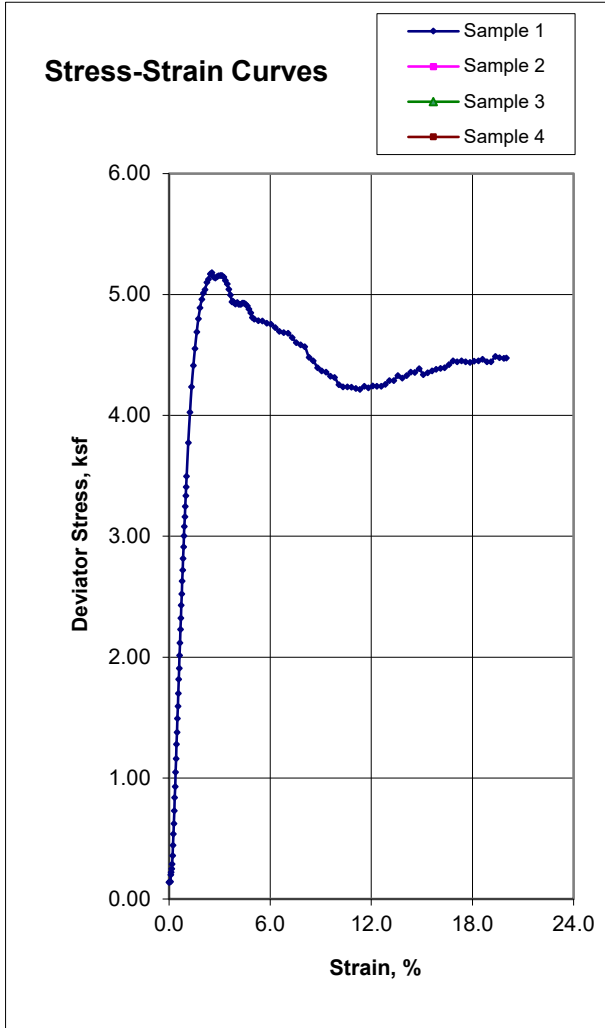
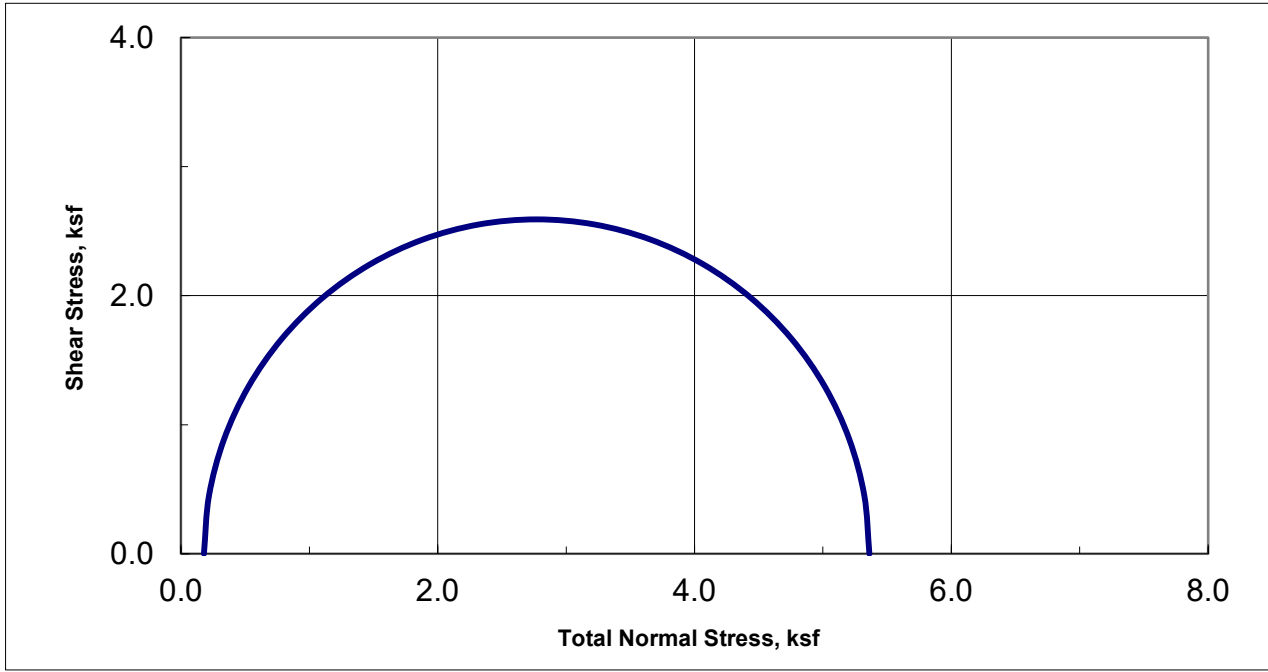
Elev./Depth: 2.0'

<b>COOPER TESTING LABORATORY</b>	Client: Cal Engineering & Geology Project: Dekoven Tank - 190060 Project No.: 471-241	Figure
----------------------------------	---	--------





**Unconsolidated-Undrained Triaxial Test**  
 ASTM D2850



Sample Data				
	1	2	3	4
Moisture %	21.7			
Dry Den,pcf	92.3			
Void Ratio	0.827			
Saturation %	70.8			
Height in	5.00			
Diameter in	2.43			
Cell psi	1.2			
Strain %	2.54			
Deviator, ksf	5.182			
Rate %/min	1.00			
in/min	0.050			
Job No.:	471-241			
Client:	Cal Engineering & Geology			
Project:	190060			
Boring:	1-2			
Sample:				
Depth ft:	2.0			
Visual Soil Description				
Sample #	1 Reddish Brown CLAY w/ Sand			
	2			
	3			
	4			
Remarks:				

Note: Strengths are picked at the peak deviator stress or 15% strain which ever occurs first per ASTM D2850.





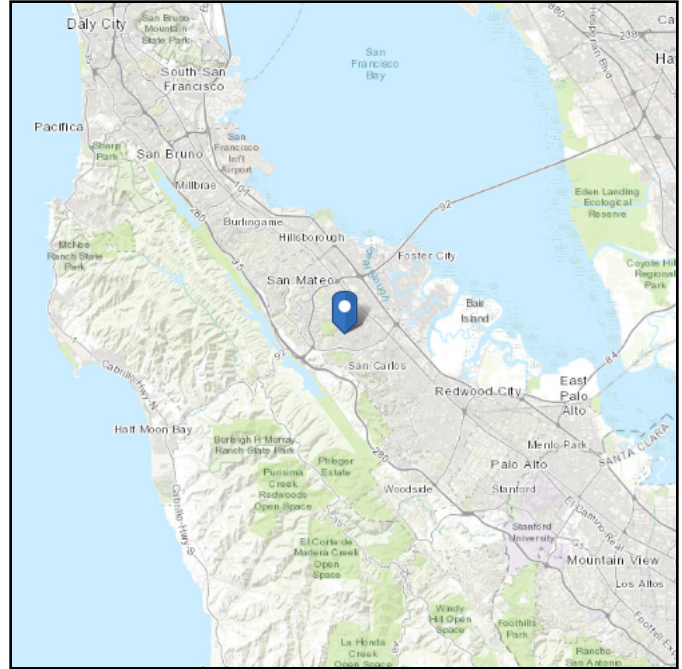
## **Appendix C. Seismic Calculations**

# ASCE 7 Hazards Report

**Address:**  
No Address at This  
Location

**Standard:** ASCE/SEI 7-10  
**Risk Category:** IV  
**Soil Class:** C - Very Dense  
Soil and Soft Rock

**Elevation:** 590.22 ft (NAVD 88)  
**Latitude:** 37.520061  
**Longitude:** -122.307455

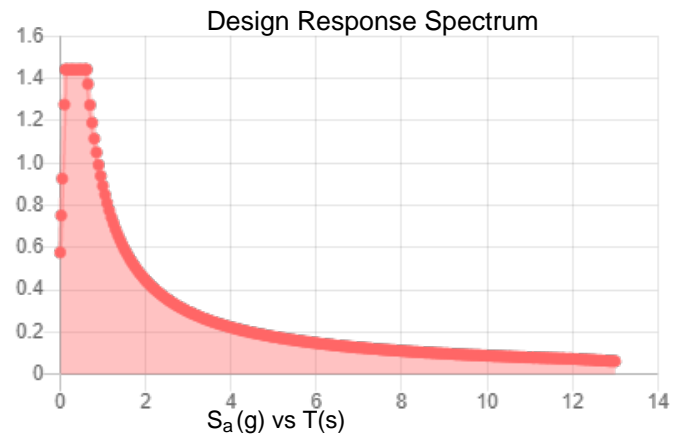
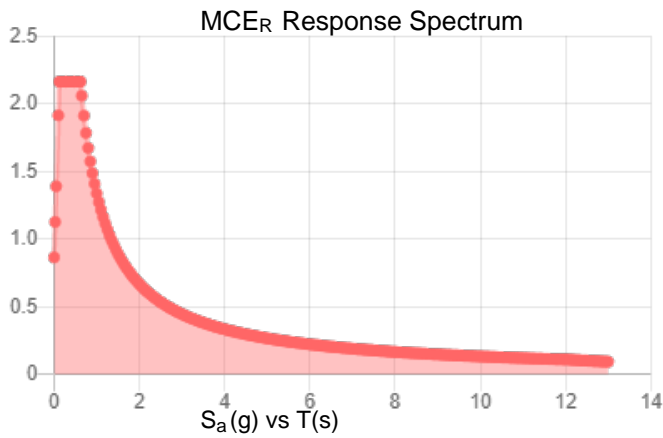


**Site Soil Class:** C - Very Dense Soil and Soft Rock

**Results:**

$S_s$ :	2.163	$S_{DS}$ :	1.442
$S_1$ :	1.029	$S_{D1}$ :	0.892
$F_a$ :	1	$T_L$ :	12
$F_v$ :	1.3	PGA :	0.841
$S_{MS}$ :	2.163	PGA <sub>M</sub> :	0.841
$S_{M1}$ :	1.338	$F_{PGA}$ :	1
		$I_e$ :	1.5

**Seismic Design Category** F



**Data Accessed:**

Wed Jun 24 2020

**Date Source:**

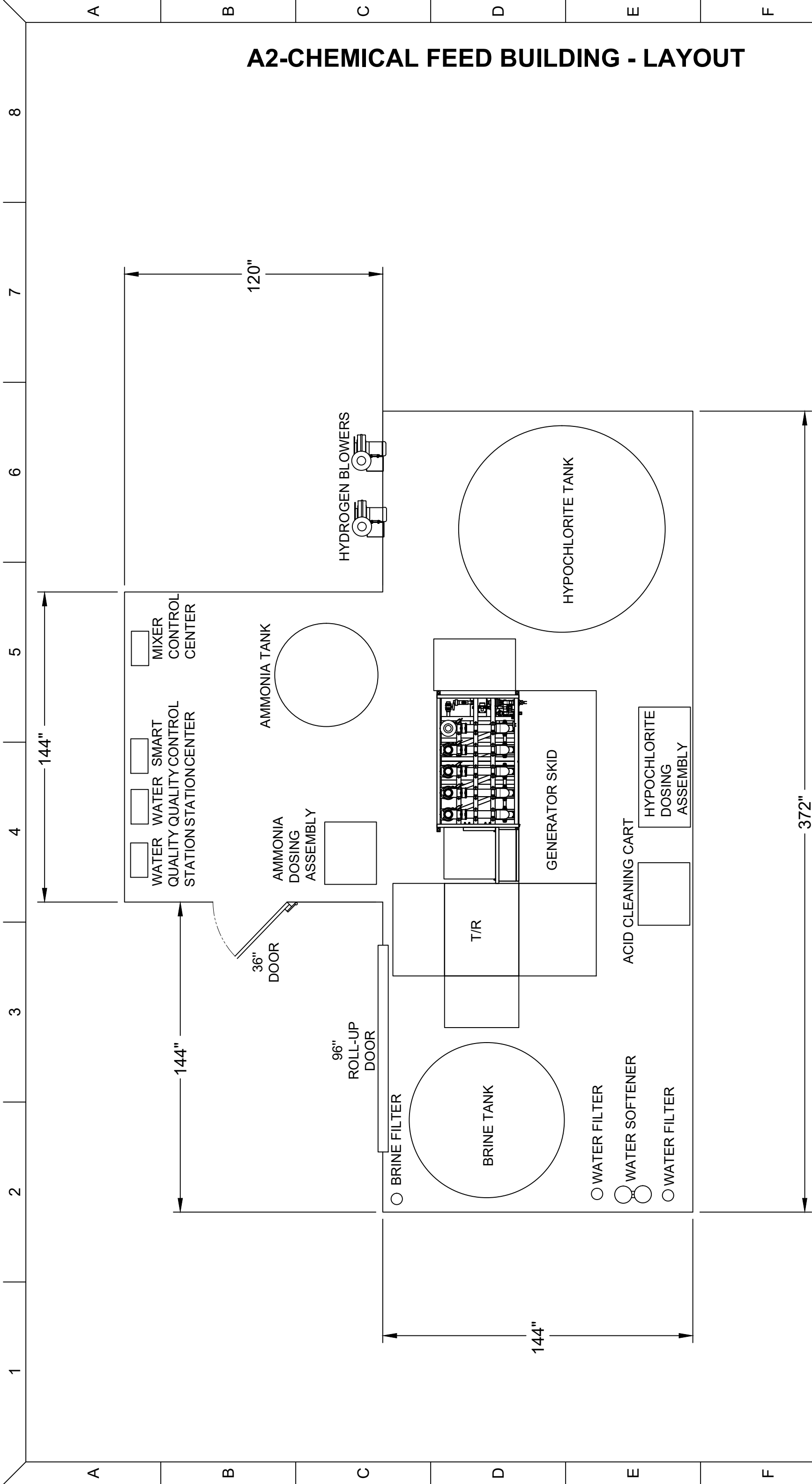
USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.

# A2-CHEMICAL FEED BUILDING - LAYOUT



REV. Δ	DATE	BY	DESCRIPTION	REV. Δ	DATE	BY	DESCRIPTION
Δ A		SU	INITIAL RELEASE	Δ			
Δ B	04/20/21	GA	UPDATED DOORS	Δ			
Δ				Δ			
Δ				Δ			

PROJECT:	Mid-Peninsula
DRAWN BY:	G. AVILES
CHECKED BY:	
DATE:	04/20/2021
SCALE:	1" = 1'
SUBJECT:	MONOCLOR RCS - ON-SITE HYPO
DWG #:	D
LAYOUT	
SHEET 1 OF 1	REV. B

This drawing represents an investment by PSI WATER TECHNOLOGIES, INC. of substantial sums, including our engineering skills and experience. It is, therefore, loaned without consideration other than the agreement and condition that it is not to be used in whole or in part to assist in making or to furnish any information to others for the making of drawings, print apparatus, or parts thereof. The acceptance of this drawing will be construed as an acceptance of the foregoing conditions and as an admission of the exclusive ownership in and to the drawings of PSI WATER TECHNOLOGIES, INC.



# A3 - MICROCOLOR ON SITE HYPOCHLORITE GENERATION SYSTEM MC-300


**PSI WATER TECHNOLOGIES, INC. (PSI)  
STANDARD DRAWING**

**MICROCLOR ON-SITE HYPOCHLORITE GENERATION SYSTEM  
MC-300 (300 PPD)**

**PIPING & INSTRUMENTATION DIAGRAM**

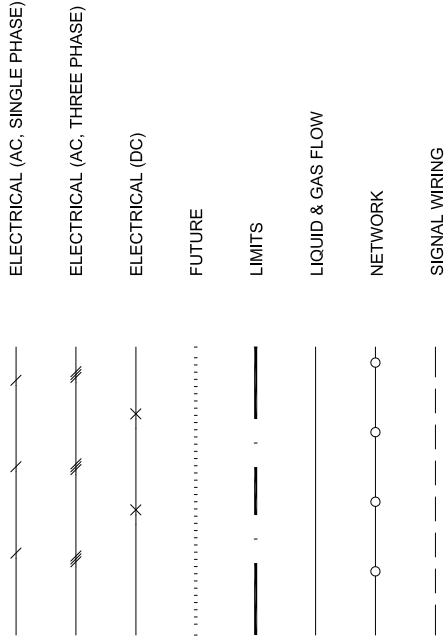
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Δ B	07/11/16	YK	UPDATED TB, HEADER, TANKS	Δ F	06/26/17	MK	REMOVED STANDBY BLOWERS
Δ C	08/24/16	YK	UPDATED SKID, SOFTENERS	Δ G	09/13/17	MK	DRAWN IN NEW STANDARD FORMAT
Δ D	03/13/17	YK/MK	UPDATED BLOWERS, VENTS, LOOPS	Δ H	3/14/18	MK	ADDED FLOW SWITCH

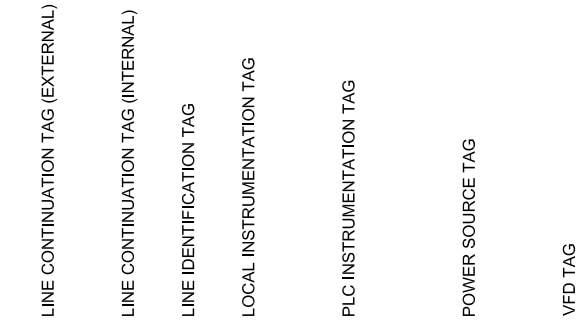
 <b>PSI Water Technologies</b> <small>A UGSI SOLUTIONS COMPANY</small>		<b>PROJECT:</b> PSI WATER TECHNOLOGIES, INC. STANDARD DRAWING
<b>DRAWN BY:</b> F. JAVANSHIR	<b>DATE:</b> 03/12/2009	<b>SUBJECT:</b> MICROCLOR MC-300
<b>CHECKED BY:</b>	<b>DATE:</b>	<b>PIPING &amp; INSTRUMENTATION DIAGRAM</b>
<b>SCALE:</b>	<b>SIZE:</b> N/A	<b>DWG #:</b> 000000-MC0300-PI
		<b>D</b> SHEET 1 OF 6   REV. H

This drawing represents an investment by PSI WATER TECHNOLOGIES, INC. of substantial sums, including our engineering skills and experience. It is, therefore, loaned without consideration other than the agreement and condition that it is not to be used in whole or in part to assist in making or to furnish any information to others for the making of drawings, print apparatus, or parts thereof. The acceptance of this drawing will be construed as an acceptance of the foregoing conditions and as an admission of the exclusive ownership in and to the drawings of PSI WATER TECHNOLOGIES, INC.

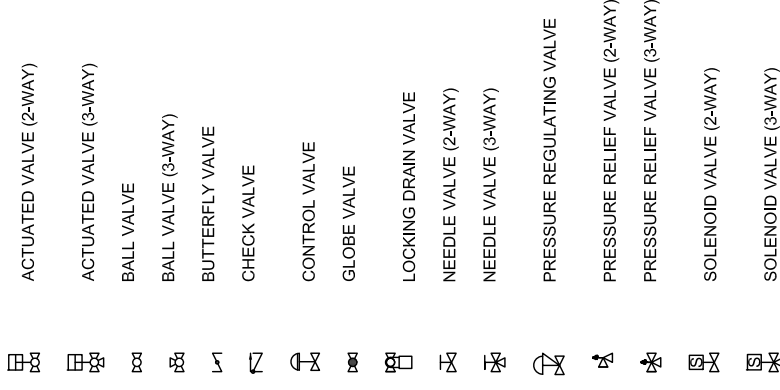
# LINE TYPES



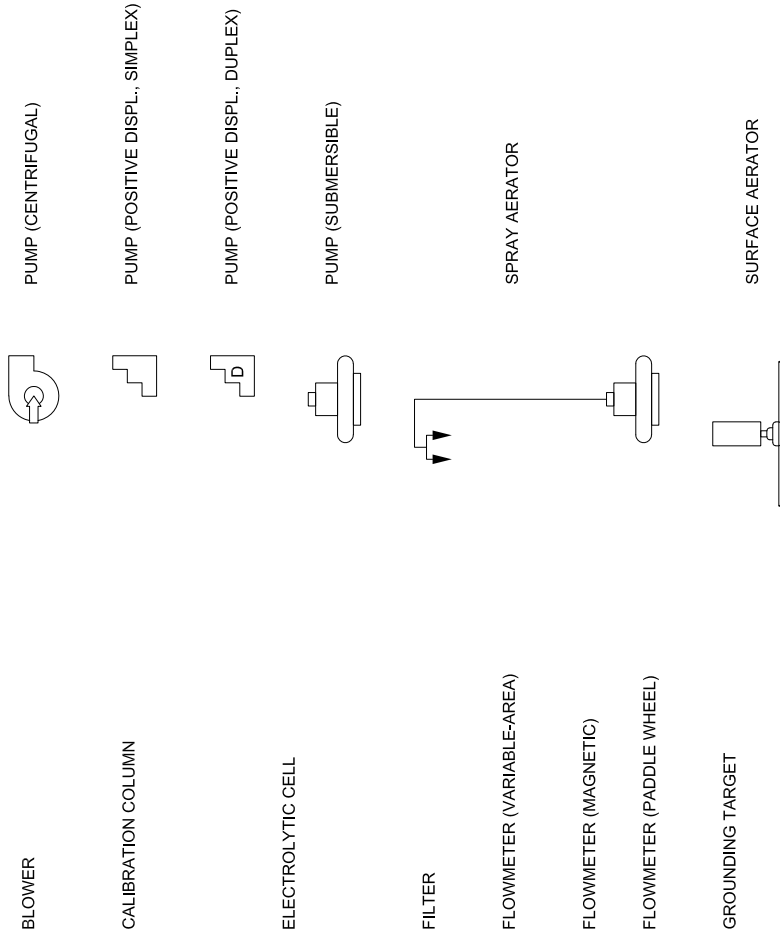
# TAGS



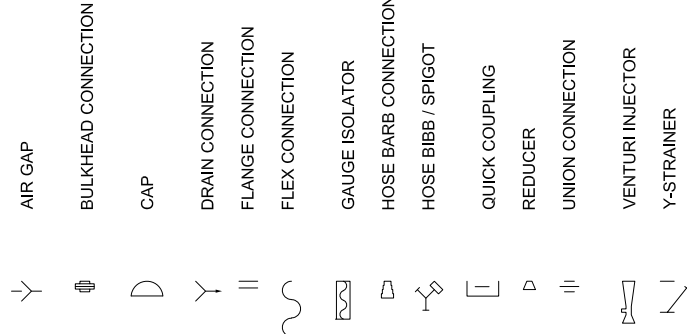
# VALVES



# EQUIPMENT



# FITTINGS



# ISA INSTRUMENT LETTER ID

LETTER	PROCESS VARIABLE	MODIFIER	READOUT/OUTPUT FUNCTION	MODIFIER
A	ANALYZER		ALARM	
B	BURNER		USER'S CHOICE	USER'S CHOICE
C	USER'S CHOICE	CONTROL	CONTROL	CLOSE
D	USER'S CHOICE	DIFFERENTIAL		
E	VOLTAGE		PRIMARY ELEMENT	
F	FLOW			
G	USER'S CHOICE	RATIO	GLASS	HIGH
H	HAND			
I	CURRENT		INDICATE	
J	POWER	SCAN		
K	TIME		CONTROL SITUATION	
L	LEVEL		LIGHT	LOW
M	USER'S CHOICE	MOMENTARY		INTERMEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE	OPEN
P	PRESSURE		POINT (TEST CONNECTION)	
Q	QUANTITY	INTEGRATE, TOTALIZE		
R	RADIATION	RELIEF	RECORD	
S	SPEED	SAFETY	SWITCH	
T	TEMPERATURE		TRANSMIT	
U	MULTI-VARIABLE		MULTI-FUNCTION	MULTI-FUNCTION
V	VIBRATION		VALVE, DAMPER	
W	WEIGHT, FORCE		WELL	
X	UNCLASSIFIED	X-AXIS	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE	Y-AXIS	RELAY, COMPUTE	
Z	POSITION	Z-AXIS	DRIVER, ACTUATOR, UNCL. F.C.E.	

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REV.	△	DATE	BY	DESCRIPTION	REV.	△	DATE	BY	DESCRIPTION
A	△	03/12/09	FJ	CREATED	E	△	06/09/17	MK	UPDATED BLOWERS, VENTS, LOOPS
B	△	07/11/16	YK	UPDATED TB, HEADER, TANKS	F	△	06/26/17	MK	REMOVED STANDBY BLOWERS
C	△	08/24/16	YK	UPDATED SKID, SOFTENERS	G	△	09/13/17	MK	DRAWN IN NEW STANDARD FORMAT
D	△	03/13/17	YK/MK	UPDATED BLOWERS, VENTS, LOOPS	H	△	3/14/18	MK	ADDED FLOW SWITCH

**PSI Water Technologies**  
A UGSI SOLUTIONS COMPANY

PROJECT: PSI WATER TECHNOLOGIES, INC. STANDARD DRAWING

DRAWN BY: F. JAVANSHIR DATE: 03/12/2009

CHECKED BY: DATE: MICROCLOR MC-300

SCALE: N/A SIZE: DWG #: 000000-MC0300-PI SHEET 2 OF 6 REV. H



# NOTES

- 1 PSI IS NOT RESPONSIBLE FOR ANY INTERCONNECTING TUBING, PIPING, FITTINGS, VALVES, ANCHORS, FASTENERS, OR SUPPORTS OF ANY KIND.
- 2 48" MINIMUM VERTICAL SEPARATION BETWEEN VENT HEADER (MEASURED AT LOW POINT) AND HYPOCHLORITE OUTLET (MEASURED AT HIGH POINT). MORE SEPARATION MAY BE NECESSARY IF HYPOCHLORITE OUTLET IS RAISED ABOVE TOP OF SKID, OR SKID IS RAISED ABOVE GROUND LEVEL.
- 3 BLOWER MOUNTED 24" MAXIMUM ABOVE BASE OF GENERATOR SKID.
- 4 BLOWER REQUIRES 39" OF STRAIGHT PIPE BEFORE ANY ELBOWS OR VALVES (FOR THIS SYSTEM'S STANDARD BLOWER).
- 5 METERING PUMPS ARE SHOWN IN DUTY/STANDBY SETUP.

A

B

C

D

E

F

A

B

C


D

E

F

REV. $\Delta$	DATE	BY	DESCRIPTION	REV. $\Delta$	DATE	BY	DESCRIPTION
$\Delta$ A	03/12/09	FJ	CREATED	$\Delta$ E	06/09/17	MK	UPDATED BLOWERS, VENTS, LOOPS
$\Delta$ B	07/11/16	YK	UPDATED TB, HEADER, TANKS	$\Delta$ F	06/26/17	MK	REMOVED STANDBY BLOWERS
$\Delta$ C	08/24/16	YK	UPDATED SKID, SOFTENERS	$\Delta$ G	09/13/17	MK	DRAWN IN NEW STANDARD FORMAT
$\Delta$ D	03/13/17	YK/MK	UPDATED BLOWERS, VENTS, LOOPS	$\Delta$ H	3/14/18	MK	ADDED FLOW SWITCH

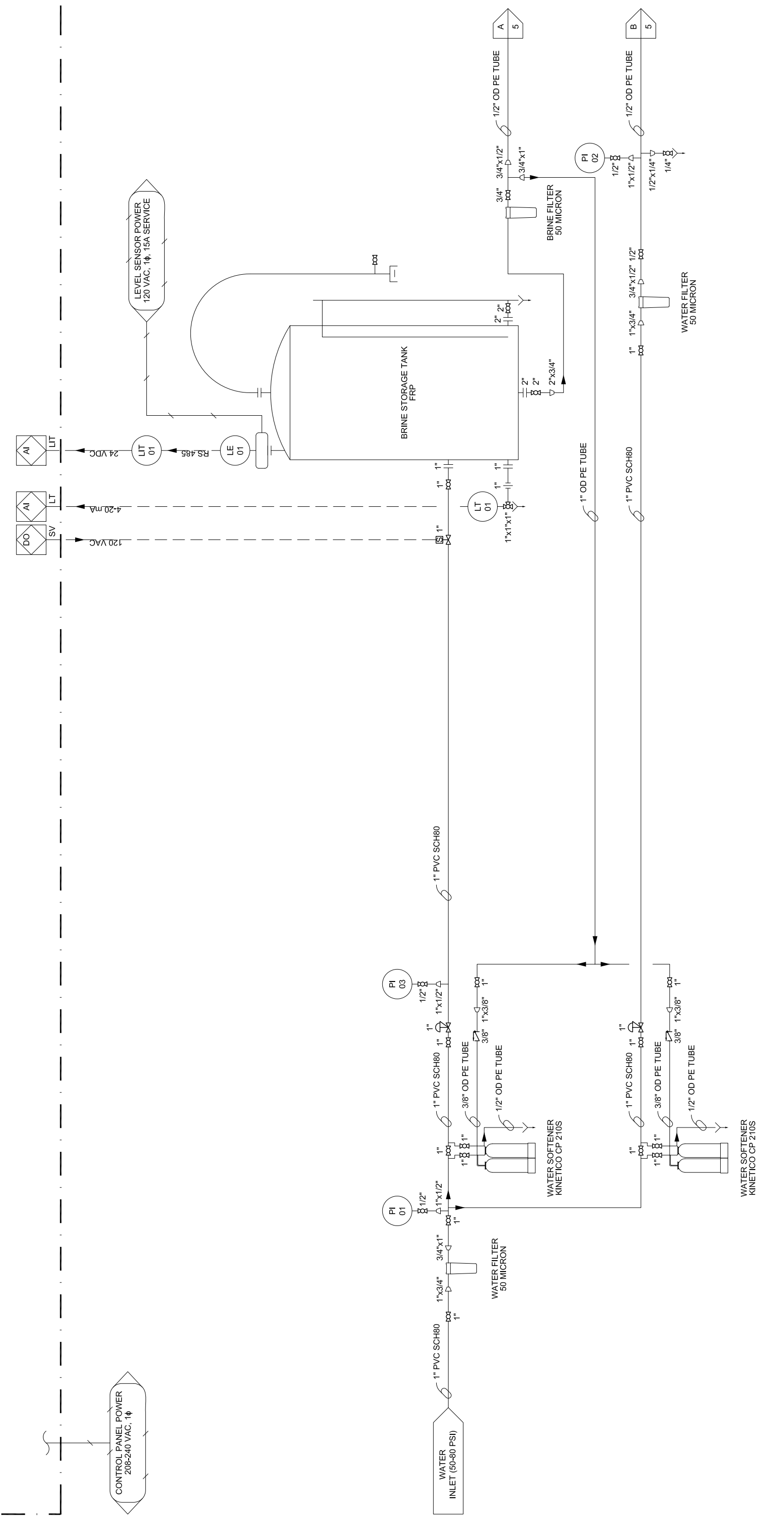
  

 <b>PSI Water Technologies</b> <small>A UGSI SOLUTIONS COMPANY</small>		PROJECT: PSI WATER TECHNOLOGIES, INC. STANDARD DRAWING
DRAWN BY: F. JAVANSHIR	DATE: 03/12/2009	SUBJECT: MICROCLOR MC-300
CHECKED BY:	DATE:	PIPING & INSTRUMENTATION DIAGRAM 000000-MC0300-PI
SCALE:	N/A	DWG #: D

This drawing represents an investment by PSI WATER TECHNOLOGIES, INC. of substantial sums, including our engineering skills and experience. It is, therefore, loaned without consideration other than the agreement and condition that it is not to be used in whole or in part to assist in making or to furnish any information to others for the making of drawings, print apparatus, or parts thereof. The acceptance of this drawing will be construed as an acceptance of the foregoing conditions and as an admission of the exclusive ownership in and to the drawings of PSI WATER TECHNOLOGIES, INC.

1 2 3 4 5 6 7 8

A B C D E F



REV. Δ	DATE	BY	DESCRIPTION	REV. Δ	DATE	BY	DESCRIPTION
Δ A	03/12/09	FJ	CREATED	Δ E	06/09/17	MK	UPDATED BLOWERS, VENTS, LOOPS
Δ B	07/11/16	YK	UPDATED TB, HEADER, TANKS	Δ F	06/26/17	MK	REMOVED STANDBY BLOWERS
Δ C	08/24/16	YK	UPDATED SKID, SOFTENERS	Δ G	09/13/17	MK	DRAWN IN NEW STANDARD FORMAT
Δ D	03/13/17	YK/MK	UPDATED BLOWERS, VENTS, LOOPS	Δ H	3/14/18	MK	ADDED FLOW SWITCH

PROJECT: PSI WATER TECHNOLOGIES, INC.  
STANDARD DRAWING

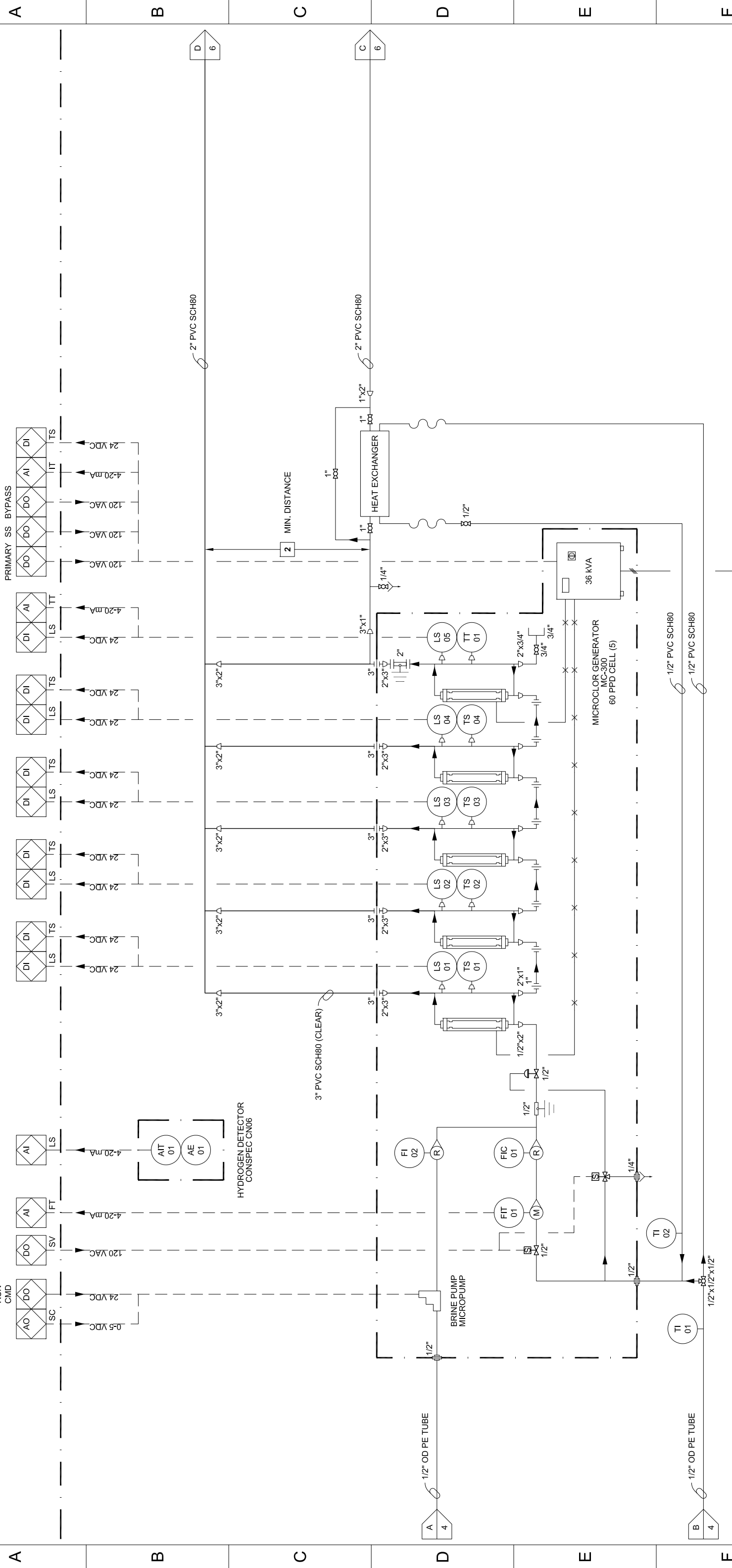
PSI Water Technologies  
A UGSI SOLUTIONS COMPANY

DRAWN BY: F. JAVANSHIR DATE: 03/12/2009

CHECKED BY: DATE: MICROCLOR MC-300

SCALE: N/A SIZE: DWG #: 000000-MC0300-PI SHEET 4 OF 6 REV. H

This drawing represents an investment by PSI WATER TECHNOLOGIES, INC. of substantial sums, including our engineering skills and experience. It is, therefore, loaned without consideration other than the agreement and condition that it is not to be used in whole or in part to assist in making or to furnish any information to others for the making of drawings, print apparatus, or parts thereof. The acceptance of this drawing will be construed as an acceptance of the foregoing conditions and as an admission of the exclusive ownership in and to the drawings of PSI WATER TECHNOLOGIES, INC.

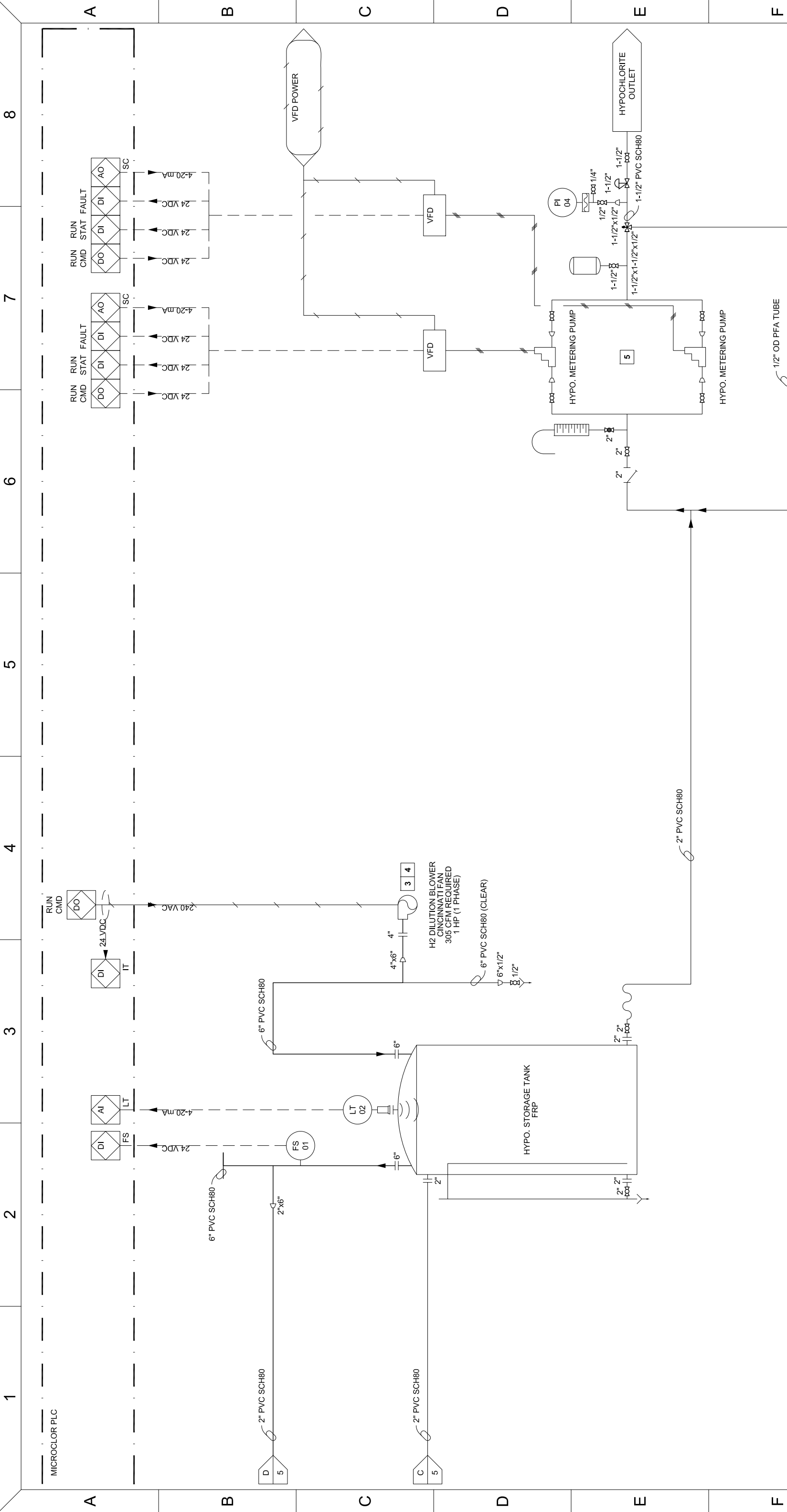


REV. Δ	DATE	BY	DESCRIPTION	REV. Δ	DATE	BY	DESCRIPTION
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B	07/11/16	YK	UPDATED TB, HEADER, TANKS	F	06/26/17	MK	REMOVED STANDBY BLOWERS
C	08/24/16	YK	UPDATED SKID, SOFTENERS	G	09/13/17	MK	DRAWN IN NEW STANDARD FORMAT
D	03/13/17	YK/MK	UPDATED BLOWERS, VENTS, LOOPS	H	3/14/18	MK	ADDED FLOW SWITCH


PROJECT:	PSI WATER TECHNOLOGIES, INC. STANDARD DRAWING		
DRAWN BY:	F. JAVANSHIR	DATE:	03/12/2009
CHECKED BY:		DATE:	
SCALE:	N/A	SIZE:	N/A
SUBJECT:	MICROCLOR MC-300 PIPING & INSTRUMENTATION DIAGRAM		
DWG #:	000000-MC0300-PI	SHEET	5 OF 6
	D		REV. H

This drawing represents an investment by PSI WATER TECHNOLOGIES, INC. of substantial sums, including our engineering skills and experience. It is, therefore, loaned without consideration other than the agreement and condition that it is not to be used in whole or in part to assist in making or to furnish any information to others for the making of drawings, print apparatus, or parts thereof. The acceptance of this drawing will be construed as an acceptance of the foregoing conditions and as an admission of the exclusive ownership in and to the drawings of PSI WATER TECHNOLOGIES, INC.



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REV. Δ	DATE	DESCRIPTION	REV. Δ	DATE	BY	DESCRIPTION
Δ A	03/12/09	CREATED	Δ E	06/09/17	MK	UPDATED BLOWERS, VENTS, LOOPS
Δ B	07/11/16	UPDATED TB, HEADER, TANKS	Δ F	06/26/17	MK	REMOVED STANDBY BLOWERS
Δ C	08/24/16	UPDATED SKID, SOFTENERS	Δ G	09/13/17	MK	DRAWN IN NEW STANDARD FORMAT
Δ D	03/13/17	UPDATED BLOWERS, VENTS, LOOPS	Δ H	3/14/18	MK	ADDED FLOW SWITCH

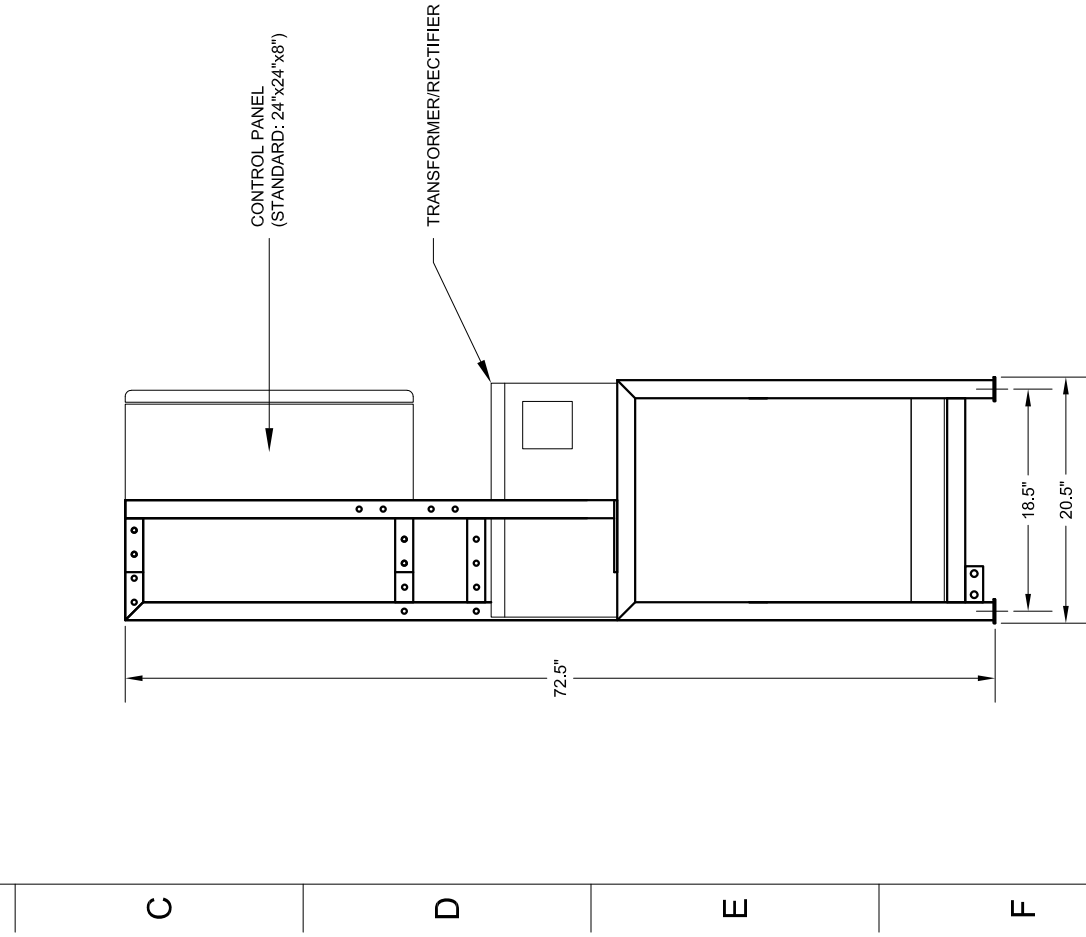
 <b>PSI Water Technologies</b> A UGSI SOLUTIONS COMPANY	
DRAWN BY:	F. JAVANSHIR
CHECKED BY:	
DATE:	03/12/2009
SCALE:	N/A

PROJECT:	PSI WATER TECHNOLOGIES, INC. STANDARD DRAWING
SUBJECT:	MICROCLOR MC-300
DWG #:	000000-MC0300-PI
SHEET	6 OF 6
REV.	H

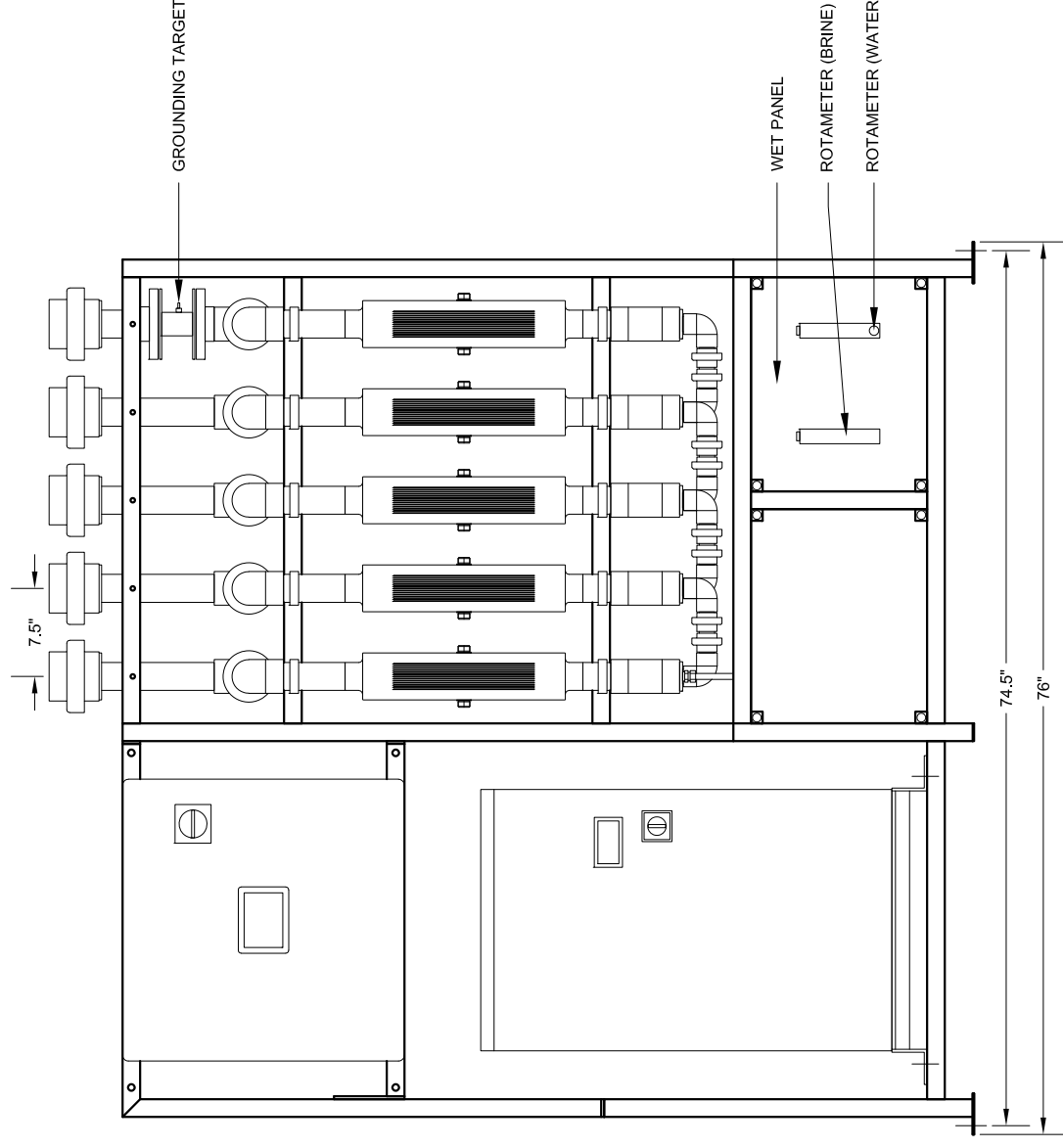
# NOTES

1. WEIGHT OPERATING: 813 LB
2. INLETS AND OUTLETS
  - A. WATER INLET FEED SIZE/MATERIAL: 1/2" PE TUBE
  - B. BRINE INLET FEED SIZE/MATERIAL: 1/2" PE TUBE
  - C. BRINE TANK FILL SIZE/MATERIAL: 1/4" PE TUBE
  - D. VALVE VENT SIZE/MATERIAL: 1/4" PE TUBE
  - E. HYDROGEN VENT RISERS SIZE/MATERIAL: 3" PVC SCH80 (INSTALLED IN FIELD)
  - F. HYDROGEN HEADER SIZE/MATERIAL: 2" PVC SCH80 (INSTALLED IN FIELD)
  - G. HYPO OUTLET (ON RISERS) SIZE/MATERIAL: 2" PVC SCH80 (INSTALLED IN FIELD)
3. FRAME BASE DIMENSIONS: 6'-4"W x 1'-8.5"D
4. RECTIFIER ELECTRICAL REQUIREMENTS: 480VAC, 3Ø, 70A SERVICE
5. CELL ELECTRICAL REQUIREMENTS: 38KVA, 3Ø0VDC, 120ADC
6. CONTROL PANEL ELECTRICAL REQUIREMENTS: 120/240VAC, 1Ø, 30A SERVICE

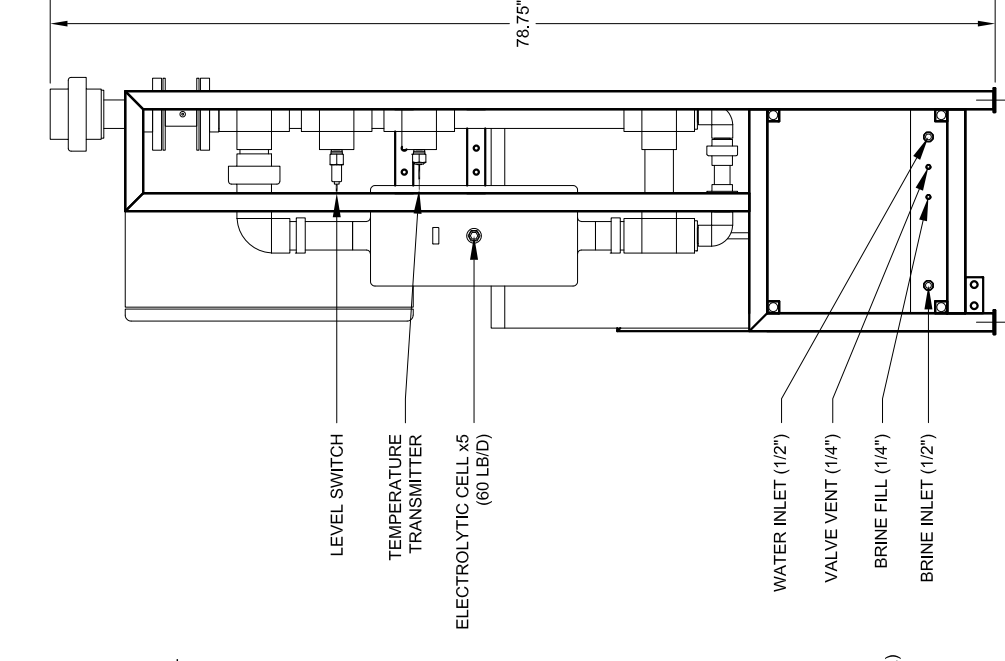
## LEFT ELEVATION



## FRONT ELEVATION




## RIGHT ELEVATION



This drawing represents an investment by PSI WATER TECHNOLOGIES, INC. of substantial sums, including our engineering skills and experience. It is, therefore, loaned without consideration other than the agreement and condition that it is not to be used in whole or in part to assist in making or to furnish any information to others for the making of drawings, print apparatus, or parts thereof. The acceptance of this drawing will be construed as an acceptance of the foregoing conditions and as an admission of the exclusive ownership in and to the drawings of PSI WATER TECHNOLOGIES, INC.

REV.	△	DATE	BY	DESCRIPTION	REV.	△	DATE	BY	DESCRIPTION
△	A	08/22/18	CGS	CHANGED DWG # FROM 000000-MC9030-AB-J	△				
△					△				
△					△				
△					△				

 <b>PSI Water Technologies</b> A UGSI SOLUTIONS COMPANY		PROJECT: PSI WATER TECHNOLOGIES, INC. STANDARD DRAWING
DRAWN BY: C. STOTHERS	DATE: 08/22/2018	SUBJECT: MICROCLOR MC-300
CHECKED BY: M. KUSHMAN	DATE: 08/22/2018	OUTLINE & UTILITY DRAWING
SCALE: 1-1/2"=1'-0"	SIZE: D	DWG #: 000000-MC9030-OU
		SHEET 1 OF 2   REV. A



## A4 – Load Schedule (RCS)

<i>Item</i>	<i>Operating Voltage (VDC/VAC)</i>	<i>Phase</i>	<i>Power (kW)</i>	<i>Motor (HP)</i>	<i>kVA</i>	<i>Amps</i>
Control Panel	120/208-240	1/3	-	-	-	30
T/R	460	3	-	-	36	70
Hydrogen Blower, 163CFM	120	1	0.37	0.5	0.84	7
Hydrogen Blower, 406CFM	120	1	0.75	1	1.42	11.8
WQS1000	120	1	-	-	0.06	0.5
SCC1000	120	1	-	-	0.06	0.5
CFS1000	120	1	-	-	0.22	1.83
AFS1000	120	1	-	-	0.22	1.83
PWS400/405-3.0	120/240	1/3	0.58	0.5	0.58	

**Notes:** T/R: Transformer/Rectifier, WQS: Water Quality Station, SCC: Smart Control Center,

CFS/AFS: Chlorine/Ammonia Feed Skid, PWS400: PAX Mixer

Note that Hydrogen Blowers are available in 240/480V, 3-phase as well

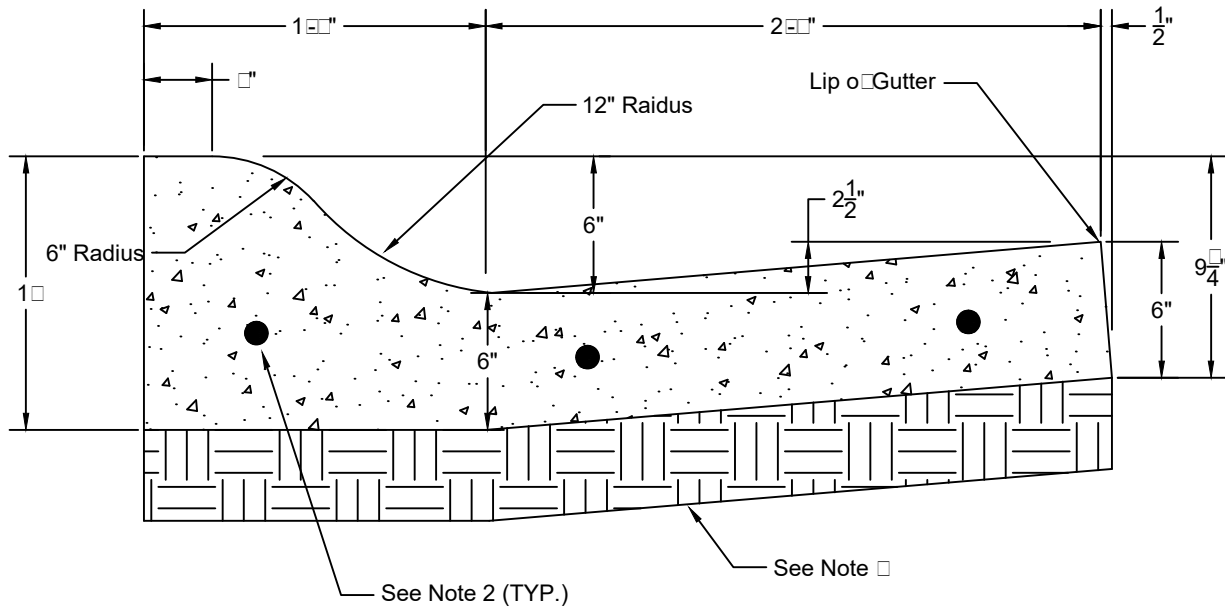
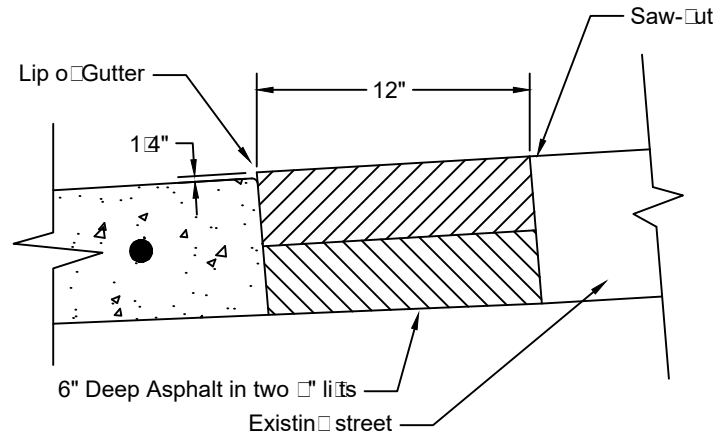
Information Provided by: UGSI Solutions, PSI Water Technologies (9/17/20)











**NOTES:**

1. PRIOR TO BEGINNING ANY WORK, AN ENCROACHMENT PERMIT SHALL BE OBTAINED.
2. 12" #4 REBAR DOWELS, 6" MINIMUM DEPTH INTO EXISTING SIDEWALK, CURB & GUTTER. DO NOT DOWEL PRIVATE IMPROVEMENTS INTO PUBLIC IMPROVEMENTS.
3. 6" MINIMUM CLASS 2 A.B. COMPACTED TO 90%.
4. 1/2" DEEP CONTRACTION JOINTS AT 20', 1/4" DEEP CONTRACTION JOINTS AT 10'.
5. ALL CONCRETE SHALL BE 6 SACK 3/4" WITH ONE POUND LAMP BLACK PER CUBIC YARD. FINISH TO BE UNIFORM FINE BROOMED TEXTURE.
6. ASPHALT TO BE HOT MIX ASPHALT 1/2" FINE.



TYPE A & E CONCRETE  
CURB AND GUTTER

APPROVED BY: L. ALVAREZ      DATE: NOVEMBER 2016

SI-100  
N.T.S.  
SHEET: 2 OF 2

