Humboldt Bay Municipal Water District

Samoa Reservoir Seismic Retrofit Project

Contract Documents and Technical Specifications
May 2024

www.ghd.com

GHD Inc: 12627733

Humboldt Bay Municipal Water District

Samoa Reservoir Seismic Retrofit Project

May 2024

Prepared for

Humboldt Bay Municipal Water District
828 7th Street
Eureka, California 95501

BOARD OF DIRECTORS

Neal Latt, President
Michelle Fuller, Vice-President
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Prepared by

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Humboldt Bay Municipal Water District
Owner

828 Seventh Street
Eureka, CA 95501
Address

Separate sealed bids will be received for the Samoa Reservoir Seismic Retrofit Project.

A conditional or qualified bid will not be accepted if it modifies the Plans or Specifications or method of work.

A non-mandatory, but highly recommended, pre-bid meeting will be held to familiarize potential bidders with the project and is scheduled for 10:00 a.m., May 9, 2024 at the HBMWD Essex Office, 7270 West End Road, Arcata, California. A site overview outside of this meeting time can be arranged by contacting Nathaniel Steen at Ghirardelli Associates by telephone at (707) 382-8931 or by email at nsteen@ghirardelliassoc.com.

The Humboldt Bay Municipal Water District (HBMWD or District) is a wholesale water supplier in Humboldt County, CA that owns multiple welded steel reservoirs/tanks. The work for this project consists of furnishing all labor, materials, equipment, and supervision required for the seismic retrofit of the Samoa 1 million-gallon (MG) tank, as well as other related work. The Samoa 1 MG tank stores untreated surface water that is used for industrial purposes. The work will generally consist of the following:

- New pipe couplers to allow for deflection in response to a seismic event.
- New roof and associated center column designed to resist sloshing wave as a result of a seismic event.
- New anchorage including anchor chairs with helical anchors.
- Preparing and coating the entire interior and exterior of the tank, new roof, and other appurtenances.
- Other miscellaneous work as outlined in the Contract Documents.

Each coating contractor or subcontractor shall submit a Qualifications Statement as a part of their bid, which shall include the following:

- Copy of California Contractor's license
- Department of Industrial Relations registration number
- List of a minimum of three completed projects over the last ten years of similar size and complexity to the coating portion of this work. Include the following for each project:
    a. Project name and location.
    b. Name of owner with contact number.
    c. Name of prime contractor with contact number.
    d. Name of engineer with contact number.
    e. Name of coating manufacturer with contact number.
    f. Approximate area (square footage) of coatings applied.
    g. Date of completion.

Bids will be received by the General Manager of the Humboldt Bay Municipal Water District at the District Office, 828 Seventh Street, Eureka, California, 95501 until 3:00 p.m. Pacific Time, May 31, 2024, and then at said office publicly opened and read aloud. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed to the Owner at Humboldt Bay Municipal Water District, PO Box 95, Eureka, CA 95502-0095 and must be delivered to the District office by the above referenced time and date.

The Contract Documents are available and can be examined at the following locations:

HBMWD Website: www.hbmwd.com
Humboldt Builders Exchange, Eureka
North Coast Builders Exchange, Santa Rosa
Shasta Builders Exchange, Redding
Sacramento Builders Exchange, Sacramento

Contractors may obtain an electronic copy of the Contract Documents for free by emailing a request to Justin Palmaymesa (justin@albat.co).

Each proposal must be submitted on the prescribed form and accompanied by a certified check or Bid Bond in an amount of not less than 10 percent of the amount bid. Successful bidders will be required to furnish both a Payment Bond and Performance Bond in the full amount of the Contract Price. In accordance with Public Contract Code Section 10263, the Contractor will be allowed to substitute securities for monies normally withheld by the owner to insure performance under this contract.

This is a Public Works Project funded with Federal (FEMA) and HBMWD funds. Therefore, both Federal prevailing wage rates and California State prevailing wage rates will be required on this project, whichever wages are higher. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations, State of California. The general prevailing wage rates applicable to the work are set by the Director of the Department of Industrial Relations.

Humboldt Bay Municipal Water District requires that all contractors and subcontractors working on this project keep certified payroll records in accordance with Labor Code 1776 and submit copies to the District. All contractors and subcontractors must also furnish electronic certified payroll records directly to the Labor Commissioner (Division of Labor Standards Enforcement).

It shall be mandatory upon the contractor herein and upon any subcontractors to pay not less than the said specified rates to all laborers, workers and mechanics employed by them in the execution of the Agreement pursuant to CA Labor Code 1774. The Contractor will be required to comply with any changes in these wage rates as they are updated by the State and/or Federal government at no cost to the Owner.

Attention is directed to the provisions in section 1777.5 and sections 1777.6 of the Labor Code concerning the requirement to employ apprentices by the contractor or any subcontractor under it.

The Contractor shall comply with and shall ensure all subcontractors comply with all laws and regulations governing the contractor's and subcontractors' performance on this project including, but not limited to: anti-discrimination laws, workers' compensation laws, and prevailing wage laws as set forth in CA Labor Code, Sections 1720-1861 et seq. and licensing laws, as well as Federal Labor Standards set forth in the Davis-Bacon Act (40 USC 276(a-a5), the Copeland "Anti-Kickback" Act (40 USC 276(c); and the Contract Work Hours and Safety Standards Act (CWHSSA) (40 USC 327-333). The contractor is required to include the prevailing wage language in all subcontracts pursuant to CA Labor Code 1775(E)(b)(1). The Contractor shall post, at appropriate conspicuous points on the site of the Project, a schedule showing all the determined general prevailing wage rates.

Pursuant to Senate Bill 854, all contractors bidding on public works projects must register with the Department of Industrial Relations. Contractors are subject to a registration and annual renewal fee. No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)]. Accordingly, all Prime and Subcontractors contained in a bid must provide valid Department of Industrial Relations registration number(s). Failure to provide valid DIR registration numbers in the bid documents shall disqualify the bid.

John Friedenbach
General Manager
Humboldt Bay Municipal Water District

May 2, 2024
Date

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PART 1
BID REQUIREMENTS

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INFORMATION FOR BIDDERS

Project: HBMWD Samoa Reservoir Seismic Retrofit

Bids will be received by Humboldt Bay Municipal Water District (herein called the "Owner"), at 828 Seventh Street, Eureka, CA 95501 until the time listed in the Advertisement for Bids, and then at said office publicly opened and read aloud.

Each bid must be submitted in a sealed envelope and addressed to Humboldt Bay Municipal Water District, 828 Seventh Street, Eureka, CA 95501. Each sealed envelope containing a bid must be plainly marked on the outside as BID FOR: SAMOA RESERVOIR SEISMIC RETROFIT PROJECT, and the envelope shall bear on the outside the name of the bidder, their address, Contractor's license number, and DIR registration number. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed to the Owner at Humboldt Bay Municipal Water District, PO Box 95, Eureka, CA 95502-0095.

Bids received by the Owner after the time specified for bid opening will not be considered. The Bidder is solely responsible for timely delivery of their bid.

A non-mandatory, but highly recommended, pre-bid conference/site visit will be held to familiarize potential Bidders with the project. See the Advertisement for Bids for location, date, and time.

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

The Owner may waive any informalities or minor defects or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No Bidder may withdraw a bid within three (3) months 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 Owner and the Bidder.

Bidders must satisfy themselves of the accuracy of the estimated quantities in the bid schedule by examination of the site and a review of the Plans and Specifications, including addenda. After bids have been submitted, the Bidder shall not assert that there was a misunderstanding concerning the quantities of Work or of the nature of the Work to be done.

The Contract Documents contain the provisions required for the construction of the project. Information obtained from an officer, agent, or employee of the Owner or any other 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 bid must be accompanied by a bid bond payable to the Owner for ten percent of the total amount of the bid. As soon as the bid prices have been compared, the Owner will return the bonds of all except the three lowest responsible bidders. When the Agreement is executed, the bonds of the two remaining unsuccessful bidders will be returned. The bid bond of the successful Bidder(s) will be retained until the payment bond and performance bond have been executed and approved, after which it will be returned. A certified check may be used in lieu of a bid bond.

A performance bond and a payment bond, each in the amount of 100 percent of the contract price, with a corporate surety approved by the Owner, will be required for the faithful performance of the Contract.

Attorneys-in-fact who sign bid bonds or payment bonds and performance bonds must file with each bond a certified and effective dated copy of their power of attorney.

The party to whom the Contract is awarded will be required to execute the Agreement and obtain the performance bond, payment bond, and required insurance certificates within twenty-one (21) calendar days from the date when Notice of Award is delivered to the Bidder. The Notice of Award shall be accompanied by the necessary Agreement and bond forms. In case of failure of the Bidder to execute the Agreement, the Owner may consider the Bidder in default, in which case the bid bond accompanying the proposal shall become the property of the Owner.

The Owner, within twenty-one (21) calendar days of receipt of an acceptable performance bond, payment bond and Agreement signed by the party to whom the Agreement was awarded shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the Owner not execute the Agreement within such period, the Bidder may submit a written notice to withdraw the signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the Owner.

The Notice to Proceed shall be issued within twenty-one (21) calendar days of the execution of the Agreement by the Owner. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the Owner and Contractor.

If the Notice to Proceed has not been issued within the twenty-one (21) day period or within the period mutually agreed upon, the Contractor may terminate the Agreement without further liability on the part of either party.

The Owner may make such investigations as they deem necessary to determine the ability of the Bidder to perform the Work, and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Agreement and to complete the Work contemplated therein.

A conditional or qualified bid will not be accepted if it modifies the Plans or Specifications or method of Work. The intent is to award the entire job (all Schedules thereunder) to such Contractor or Contractors that will result in the lowest overall total cost to the Owner.

Awards will be made to the lowest, responsive, responsible Bidder(s).

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

The Bidder shall supply the names, addresses, and valid DIR registration numbers of major subcontractors, material suppliers (greater than 10% of total contract amount) and/or fabricators with the bid.

The Contract Documents under which it is proposed to execute the Work consist of the Plans and all material bound herewith. These Contract Documents are intended to be mutually cooperative and to provide all details reasonably required for the execution of the proposed Work. Any person contemplating the submission of a Bid shall have thoroughly examined all of the various parts of these Documents, and should there be any doubt as to the meaning or intent of said Contract Documents, the Bidder shall request of the Engineer, in writing at least six (6) working days prior to bid opening, an interpretation thereof. Any interpretation or change in said Contract Documents will be made only in writing, in the form of addenda to the Documents and will be furnished to all Bidders receiving a set of the Documents, issued no later than 72 hours prior to bid opening, who shall submit, or indicate receipt of all addenda with their proposals. The Owner will not be responsible for any other explanation or interpretations of said Documents.

Questions regarding the Plans and Specifications shall be submitted in writing to Justin Palmaymesa at Albat by email at justin@albat.co. Replies to such inquiries will be in the form of addenda or clarification that will be sent to all plan holders.

Contract Plans and Specifications may be obtained as specified in the Advertisement for Bids.

The Contract Documents are assembled, arranged, and titled generally in conformance with the 48-division format suggested by the Construction Specifications Institute (CSI). Minor variations to the CSI format may be used herein to suit Owner requirements or to better adapt the Documents to particular types of projects.

Portions of these Contract Documents may contain standard preprinted material. The Bidder's attention is called to the General Conditions of the Contract, which may modify and add to the preprinted material contained herein. Sentences in the Contract Documents which are phrased in mandatory language, but which include no explicit reference to the party who has responsibility for performing the mandated duty, shall be interpreted as imposing responsibility for performance of the duty described on the Contractor. For example, a directive that “the site shall be kept clean” would impose the duty of keeping the site clean on the Contractor.

Each proposal must be submitted on the prescribed form and be accompanied by a certified check or Bid Bond in an amount of not less than 10 percent of the amount bid. Successful bidders will be required to furnish both a Payment Bond and Performance Bond in the full amount of the Contract Price. In accordance with Public Contract Code Section 10263, the Contractor will be allowed to substitute securities for monies normally withheld by the owner to insure performance under this contract.

Where items in the Bid Proposal are to be submitted on a unit price basis, unit prices will be accepted on all items of Work set forth in the Bid, except those designated to be paid for as a lump sum. The estimate of quantities of Work to be done is tabulated in the Bid and, although stated with as much accuracy as possible, is approximate only and is assumed solely for the basis of calculation upon which the award of Contract shall be made. Payment to the Contractor will be made on the measurement of the Work actually performed by the Contractor as specified on the Contract Documents. The Owner reserves the right to increase or diminish the amount of any class of Work as may be deemed necessary.

Where items in the Bid Proposal are to be submitted on a lump sum basis, a single lump sum price shall be submitted in the appropriate place. The total amount to be paid the Contractor shall be the amount of the lump sum in the Bid, as adjusted for additions or deletions resulting from changes in construction. After award of Contract, the Contractor may be required to break down the lump sum items into unit prices for the various portions to be completed.

All blank spaces in the Bid form must be filled in, in ink, in both words and figures where required. No changes shall be made in the phraseology of the forms. Written amounts shall govern in cases of discrepancy between the amounts stated in writing and the amounts stated in figures. In case of discrepancy between unit prices and totals, unit prices will prevail.

Any Bid Proposal shall be deemed informal which contains omissions, erasures, alterations, or additions of any kind, or prices uncalled for, or in which any of the prices are obviously unbalanced, or which in any manner shall fail to conform to the conditions of the published Advertisement for Bids.

The Bidder shall sign the Bid Proposal in the blank space provided therefor. If Bidder is a corporation, the legal name of the corporation shall be set forth above, together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation. Bid proposals signed by a non-corporate officer shall be invalid. If Bidder is a co-partnership, the true name of the firm shall be set forth above, together with the signature of the general partner or general partners authorized to sign contracts on behalf of the co-partnership. If signature is by an agent, other than an officer of a corporation or a general partner of a partnership, a Power of Attorney must be on file with the Owner prior to opening of Proposals or submitted with the Proposal, otherwise the Proposal will be regarded as not properly authorized.

State and local sales and use taxes, as required by the laws and statutes of the State and its political subdivisions, shall be paid by the Contractor. Prices quoted in the Proposal shall include sales tax unless provision is made in the Bid Proposal form to separately itemize the tax.

Any Bidder may modify their bid by telegraphic or written communication at any time prior to the scheduled closing time for receipt of bids, provided such communication is received by the Owner prior to the closing time. The telegraphic or written communication should not reveal the bid price but should state the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the sealed bid is opened.

Each Bidder must inform themselves of the conditions relating to the execution of the Work, and it is assumed that Bidders will inspect the site, site access limitations, subsurface conditions, weather, variations of soil moisture and workability with rainfall, and make themselves thoroughly familiar with all the Contract Documents. The Bidder should check with local contractors regarding local site, surface, subsurface and material conditions, and variability. Failure to do so will not relieve the successful Bidder of the obligation to enter into a Contract and complete the contemplated Work in strict accordance with the Contract Documents. The Bidder's attention is called to the General Conditions of the Contract Documents regarding the obligation of Bidders to verify for themselves and to their complete satisfaction all information concerning site and subsurface conditions, and Notice requirements.

No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) or be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the State of California Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].This project is subject to compliance monitoring and enforcement by the State of California Department of Industrial Relations. Accordingly, all Prime and Subcontractors contained in a bid must provide valid Department of Industrial Relations registration number(s). Failure to provide valid DIR registration numbers in the bid documents shall disqualify the bid.

Both California State prevailing wage rates and Federal prevailing wage rates will be required on this project, whichever wages are higher. The Contractor will be required to comply with any changes in these wage rates as they are updated by the State and/or Federal government at no cost to the Owner.

All contractors and subcontractors must furnish electronic certified payroll records directly to the Labor Commissioner (Division of Labor Standards Enforcement), electronic Certified Payroll Reporting (eCPR) at the DIR, and directly submit certified payroll and supporting documents to the Humboldt Bay Municipal Water District. The contact information for the Humboldt Bay Municipal Water District is:

Address:	HBMWD Attn: John Friedenbach PO Box 95 Eureka, CA 95502-0095
Business Phone:	(707) 443-5018
Email:	friedenbach@hbmwd.com

Bidders shall inform themselves of, and the Bidder awarded a Contract shall comply with, Federal, State and local laws, statutes, and ordinances related to the execution of the Work. This requirement includes, but is not limited to, grant requirements as they apply to the Contractor’s work, applicable regulations concerning employment of labor, protection of public and employee safety and health, environmental protection, the protection of natural resources, permits, fees, and similar subjects.

BIDDERS' CHECKLIST

This checklist has been prepared and furnished to aid bidders in including all necessary supporting information with their bid. Bidders' submittals shall include, but are not limited to the following:

ITEM		PAGE	CHECKED
1.	Bid Proposal	1-7 through 1-10	_____
2.	List of Subcontractors (Subcontractor Details)	1-11	_____
3.	Bid Bond	1-12 through 1-13	_____
4.	Authority to Sign Bid Proposal (if applicable)	(Attached to Bid Bond)	_____
5.	Power of Attorney	(Attached to Bid Bond)	_____
6.	Qualifications Statement as described in the Advertisement for Bids	(Attached to Bid)	_____
7.	Method of Roof Framing to be Used with Justification (See Roof Build Note 1 on Drawing S-102)	(Attached to Bid)	_____
8.	Prime's and Subcontractors' valid Department of Industrial Relations registration number(s)	(where Requested herein)	_____

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BID PROPOSAL

Proposal of _____
(hereinafter called "Bidder"), organized and existing under the laws of the State of California,

doing business as _____*.

To the Humboldt Bay Municipal Water District, (hereinafter called "Owner").

In compliance with your Advertisement for Bids, Bidder hereby proposes to perform all Work for the Samoa Reservoir Seismic Retrofit Project in strict accordance with the Contract Documents, within the time set forth therein, and at the prices stated below.

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

By submission of this bid, each Bidder certifies, and in the case of a joint bid, each party certifies as to its own organization, that their bid has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this bid with any other Bidder or with any competitor.

Bidder hereby agrees to commence Work under this Contract on or before a date to be specified in the Notice to Proceed and to fully complete the project and pay the liquidated damages as provided in Articles III and IV of the General Conditions.

*Insert "a corporation," "a partnership," or "an individual" as applicable.

Bidder agrees to perform all the Work described in the Contract Documents for the following prices. Bidder is advised to carefully review all sections of the Plans and Specifications in order to completely understand the Work and all constraints, including the schedule and material requirements.

The Work includes the tasks described in the Advertisement for Bids and all other Work required to complete the modifications as shown on the Plans and described in the Specifications.

The following tables have been provided for the Bidder's convenience to assist Bidder in quantifying the major components of the Work, and shall in no way be interpreted to be comprehensive. The bid shall be comprehensive and shall include all work associated with the project.

BASE BID SCHEDULE

BASE BID ITEMS					
Item No.	**Description**	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
1.	Mobilization/Demobilization	1	LS	$_____	$_____
2.	Deconstruct and Dispose of Existing Tank Roof	1	LS	$_____	$_____
3.	Provide and Install New Tank Roof System	1	LS	$_____	$_____
4.	Provide and Install New Platform Adjacent to Top of Ladder	1	LS	$_____	$_____
5.	Replace Interior and Exterior Ladder System	1	LS	$_____	$_____
6.	Remove, Relocate, Modify, and/or Replace Miscellaneous Metal, Piping and Electrical Items at/on the Tank	1	LS	$_____	$_____
7.	Miscellaneous Yard and Tank Piping Modifications	1	LS	$_____	$_____
8.	Structural Retrofits	1	LS	$_____	$_____
9.	Tank Cleaning prior to Placing into Service	1	LS	$_____	$_____
10.	Asphalt and Surface Restoration	1	LS	$_____	$_____

TOTAL BASE BID (Sum of Items 1-10) ($_____)

ADDITIVE BID SCHEDULE

The District is requesting prices for two different types of coating systems in the Additive Bid Schedule. The District's intent is to award only one type of coating system; however, **Bidders must fill in all blanks and provide a cost for each type of coating system.**

ADDITIVE BID ITEMS					
Item No.	**Description**	**Qty**	**Unit**	**Unit Price**	**Total Price**
11.	Seismic Couplers	1	LS	$_____	$_____
12.	Disposal of Tank Sediment	750	CY	$_____	$_____
13.	Prepare and Coat Complete Interior, Exterior, Roof, Ladders, and Appurtenances with Dielectric System	1	LS	$_____	$_____
14.	Environmental Controls for Exterior Coating with Dielectric System	1	LS	$_____	$_____
15.	Prepare and Coat Complete Interior, Exterior, Roof, Ladders, and Appurtenances with Phosphate Ceramic System	1	LS	$_____	$_____
16.	Cathodic Protection System	1	LS	$_____	$_____

TOTAL ADDITIVE BID (Sum of items 11-16) ($_____)

TOTAL BID (Add Total Base Bid Plus Total Additive Bid) ($_____)

TOTAL BID IN WORDS: _____

The low bidder shall be determined based on the TOTAL BID.

The Owner reserves the right to award the Base Bid with or without the Additive Bid Items.

Receipt of the following Addenda is acknowledged:

_____

The representations made herein are made under penalty of perjury.

Respectfully submitted:

Signature	Title
License Number	Date
License Expiration Date	
DIR Registration Number	

(SEAL - If Bid is by Corporation)

SUBCONTRACTOR DETAILS

The Bidder certifies that:

A. __ I do not intend to subcontract any Work on this project.

B. __ I do intend to subcontract portions of the Work on this project.

NOTE: The Bidder shall check box A or box B. If the Bidder does not check a box, it will be deemed that the Bidder has checked box A.

If awarded the Contract, the Bidder proposes to employ the following subcontractors who will perform Work or labor or render service to the Bidder in or about the Work in an amount in excess of one-half of one percent (0.5%) of the total amount of Bidder's proposal. If no subcontract Work is proposed, except within the one-half of one percent (0.5%) limit set forth, the Bidder shall so state.

NAME & ADDRESS OF SUBCONTRACTOR	DESCRIPTION OF WORK TO BE SUBCONTRACTED	SUBCONTRACTOR'S CALIF. LIC. NO. AND DIR NO.

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned,

_____ as Principal, and

_____ , as Surety, are hereby held and firmly bound unto

Humboldt Bay Municipal Water District,

as Owner, in the penal sum of _____for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed this ____ day of _____, 20__.

The Condition of the above obligation is such that whereas the Principal has submitted to _____ a certain bid, attached hereto and hereby made a part hereof to enter into a contract in writing, for the:

Samoa Reservoir Seismic Retrofit Project

NOW, THEREFORE,

(a) If said bid shall be rejected, or

(b) If said bid shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said Bid), and shall furnish a bond for the faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said bid, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

SEAL:

_____
Principal

By: _____

Title: _____

_____
Surety

By: _____
Title

IMPORTANT - Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

NOTE: Bidder shall provide current “Power of Attorney” for Attorney-in-fact who signs Bid Bond.

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PART 2
CONTRACT FORMS

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CONTRACT AGREEMENT

THIS AGREEMENT, MADE THIS _____ DAY OF _____, 20__, by and

between the *Humboldt Bay Municipal Water District*, hereinafter called "Owner," and

_____,

doing business as _____, hereinafter called “Contractor”
(insert "a corporation," "a partnership," or "an individual" as applicable).

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The Contractor will commence and complete the:
   Samoa Reservoir Seismic Retrofit Project

2. The Contractor will furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the project described herein.

3. The Contractor will commence the Work required by the Contract Documents within _____21_____ calendar days after the date of the Notice to Proceed and will complete the same within the time provided in Section B-35 of the General Conditions, unless the period for completion is extended otherwise by the Contract Documents.

4. The Contractor agrees to perform all of the Work described in the Contract Documents and comply with terms therein for the sum of $_____, or as shown in the Bid Proposal.

5. The Contract Documents consist of the Bid Requirements, Contract Forms, General Conditions, Specifications, Appendices, and the Plans, including all modifications thereof incorporated into the documents before their execution, and including all other requirements incorporated by specific reference thereto. These form the Contract.

6. The Owner will pay to the Contractor in the manner and at such times as set forth in the General Conditions such amounts as required by the Contract Documents.

7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement.

_____	_____
Owner	Contractor
Title_____	Title_____
Date_____	Date_____

This page left blank intentionally.

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter
(Corporation, Partnership, or Individual)

called Principal, and _____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

Humboldt Bay Municipal Water District
(Name of Owner)

828 Seventh Street, Eureka, CA 95501
(Address of Owner)

hereinafter called Owner, in the penal sum of

_____ Dollars ($_____)
in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain Contract with the Owner, dated _____ day of _____, 20__, a copy of which is hereto attached and made a part hereof for the construction of:

Samoa Reservoir Seismic Retrofit Project

NOW, THEREFORE, If the Principal shall well, truly and faithfully perform its duties, all the undertaking, covenants, terms, conditions, and agreements of said Contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety and during one year (minimum) guaranty period, and if he shall satisfy all claims and demands incurred under such Contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the Work to be performed thereunder of the Specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the Work or to the Specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed this _____ day of _____, 20__.

ATTEST:

(Principal) Secretary	Principal
	By_____
	Address
Witness as to Principal	
Address	
	Surety
ATTEST:	
Witness as to Surety	By_____ Attorney-in-Fact
Address	Address

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is Partnership, all partners should execute Bond.

IMPORTANT: Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located.

PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter
(Corporation, Partnership, or Individual)

called Principal, and _____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

Humboldt Bay Municipal Water District
(Name of Owner)

828 Seventh Street, Eureka, CA 95501
(Address of Owner)

hereinafter called Owner, in the penal sum of

_____ Dollars ($_____)
in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain Contract with the Owner, dated _____ day of _____, 20__, a copy of which is hereto attached and made a part hereof for the construction of:

Samoa Reservoir Seismic Retrofit Project

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, Subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the Work provided for in such Contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such Work, and all insurance premiums of said Work, and for all wages and fringe benefits of labor, performed in such Work, whether by Subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulated and 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 the Specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the Work or to the Specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed this _____ day of _____, 20__.

ATTEST:

_____	_____
(Principal) Secretary	Principal
	By_____
	_____
	Address
_____	_____
Witness as to Principal	
_____	
Address	
	_____
	Surety
ATTEST:	
_____	By_____
Witness as to Surety	Attorney-in-Fact
_____	_____
Address	Address
_____	_____

NOTE: Date of bond must not be prior to date of Contract. If Contractor is Partnership, all partners should execute bond.

IMPORTANT: Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located.

NOTICE OF AWARD

TO: _____
_____
_____

PROJECT: Samoa Reservoir Seismic Retrofit Project

The Owner has considered the bid submitted by you for the above-described work in response to its Advertisement for bids dated _____ and Information for Bidders.

You are hereby notified that your bid has been accepted for items in the amount of

_____ Dollars ($_____)

You are required by the Information for bidders to execute the Agreement and furnish the required Contractor's certificates of insurance within twenty-one (21) calendar days from the date this Notice is received by you.

If you fail to execute said Agreement and to furnish said insurance within twenty-one (21) calendar days from the date of receipt of this Notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your Bid as abandoned and as a forfeiture of your bid bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the Owner.

Dated this _____ day of _____, 20__.

Owner: Humboldt Bay Municipal Water District

By: _____ Title: General Manager

ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award is hereby acknowledged by:

_____
(Name of Contractor)

Dated this _____ day of _____, 20__.

By: _____ Title: _____

NOTICE TO PROCEED

TO: _____
_____
_____

PROJECT: Samoa Reservoir Seismic Retrofit Project

You are hereby notified to commence Work in accordance with the Agreement on or before the _____ day of _____, 20__,
and you are to complete the Work within the timeframe as noted in Section B-35 of the General Conditions.

The date of completion of all Work is therefore _____ day of _____, 20__.

You are required to return an acknowledged copy of this Notice to Proceed to the Owner.

Dated this _____ day of _____, 20__.

Owner: Humboldt Bay Municipal Water District

By: _____ Title: General Manager

ACCEPTANCE OF NOTICE

Receipt of the above Notice to Proceed is hereby acknowledged by:

_____
(Name of Contractor)

Dated this _____ day of _____, 20__.

By: _____ Title: _____

PART 3
GENERAL CONDITIONS

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GENERAL CONDITIONS
TABLE OF CONTENTS

SECTION A
DEFINITIONS AND TERMS

A-1 General

Wherever the following abbreviations and terms, or pronouns in place of them, are used in these Conditions and other Contract Documents of which these Conditions are a part, the intent and meaning shall be interpreted as provided below.

A-2 Abbreviations

The following abbreviations may be used in the Contract Documents:

AA	Aluminum Association
AASHO	American Association of State Highway Officials
ABMA	American Boiler Manufacturer's Association
ACI	The American Concrete Institute
AGA	American Gas Association
AGC	Associated General Contractors
AGMA	American Gear Manufacturer's Association
AI	The Asphalt Institute
AIA	American Institute of Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ALSC	American Lumber Standards Committee
ANSI	American National Standards Institute, Inc.
API	American Petroleum Institute
APWA	American Public Works Association
AREA	American Railway Engineering Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
CCMTC	California Concrete Masonry Technical Committee
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CRSI	Concrete Reinforcement Steel Institute
DFPA	Douglas Fir Plywood Association
DIR	Department of Industrial Relations
ETL	Electrical Testing Laboratory
FEMA	Federal Emergency Management Agency
FS	Federal Specification
HBMWD	Humboldt Bay Municipal Water District
HMGP	Hazard Mitigation Grant Program
ICBO	International Conference of Building Officials
IEEE	The Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IPA	Integrated Power Assembly
IPCEA	Insulated Power Cable Engineers Association
MBMA	Metal Building Manufacturer's Association
MSS	Manufacturers Standardization Society of the Valve and Fitting Industry Standards

NBFU	National Board of Fire Underwriters
NBS	National Buildings Standards
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NPDES	National Pollution Discharge Elimination System
OSHA	Occupational Safety and Health Act of 1970
PCA	Portland Cement Association
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction
UBC	Uniform Building Code
USPHS	United States Public Health Service
UL	Underwriter's Laboratory
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
USAS	The United States of America Standard Institute
USBR	United States Bureau of Reclamation
WCLIB	West Coast Lumber Inspection Bureau
WIC	Woodwork Institute of California

"Bureau" - United States Bureau of Reclamation
"State" - State of California
"State Standard Specifications" - Standard Specifications issued by the State of California Business and Transportation Agency, Department of Transportation, latest edition, unless a specific edition is referenced.

A-3 Definitions

a) Acceptance - The formal written acceptance by the District of the entire Contract which has been completed in all respects in accordance with the Specifications and any approved modifications.

b) Addenda - Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the Contract Documents, Drawings and Specifications by additions, deletions, clarifications or corrections.

c) As Approved - The words "as approved" unless otherwise qualified, shall be understood to be followed by the words "by the Engineer."

d) Bid - The offer of the Bidder for the Work when made out and submitted on the prescribed bid form, properly signed and guaranteed. A Bid is also known as a Proposal.

e) Bid Bond - The cash, cashier's check, certified check, or bidder's bond accompanying the Bid submitted by the bidder, as a guarantee that the Bidder will enter into a Contract with the District for the performance of work herein described.

f) Bidder - Any individual, firm, partnership or corporation submitting a bid for the work contemplated, and acting directly or through a duly authorized representative.

g) Change Orders - A written order to the Contractor authorizing an addition, deletion, or revision in the work within the general scope of the Contract Documents or authorizing adjustment in the Contract price or Contract time.

h) Claim - A separate demand by the Contractor for (i) a time extension, (ii) payment of money or

damages arising from work done by or on behalf of the Contractor pursuant to the Contract for a public work and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or (iii) an amount the payment of which is disputed by the District.

i) 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 all Contract Documents and supplemental agreements amending or extending the work contemplated which may be required to complete the Work in a substantial and acceptable manner. Supplemental agreements are written agreements covering alterations, amendments or extensions to the Contract and include Addenda and Contract Change Orders.

j) Contract Documents - The Contract Documents are any or all of the documents listed in Article I of the Contract.

k) Contract Price - Total monies payable to the Contractor under the terms and conditions of the Contract Documents.

l) Contract Time - The numbers of days stated in the Contract Documents for the completion of the Work.

m) Contractor - The person or persons, firm, partnership or corporation or other entity that has entered into the Contract with the District to perform the Work.

n) Contract Drawings - "Contract Drawings" or "drawings" means and includes:

(i) all drawings which have been prepared on behalf of the District and which are included in the Contract Documents and all modifying drawings issued by addenda thereto;

(ii) all drawings submitted pursuant to the terms of the Contract by the Contractor with his proposal and by the Contractor to the District during the progress of the Work when accepted by the Engineer. Except where a specific type of drawing is indicated, the terms "Drawings" and "Plans" are used interchangeably throughout the Contract Documents and the Plans are Drawings as defined above.

o) County - County of Humboldt, California.

p) Date of Execution of the Contract - The date on which the Contract is signed by the District's authorized representative.

q) Datum - The figures given in the Specifications or upon the Drawings after the word "Elevation" or an abbreviation of it shall mean NAVD 88 datum unless noted otherwise.

r) Days - Unless otherwise designated, days as used in the Contract Documents shall mean calendar days.

s) District - The Humboldt Bay Municipal Water District, may also be referred to as the District, HBMWD, or Owner.

t) Engineer - Wherever in these documents the word "Engineer" appears, it shall be understood to mean GHD Inc. The Engineer will have final authority as regards to contract administration, field inspection, and related items. Where applicable, “Engineer” shall be interpreted to mean “Engineer and its representatives”, which may include personnel from other firms contracted by the District to perform construction management and construction inspection.

u) Field Order - A written order effecting a change in the Work not involving an adjustment in the Contract Price or an extension of Contract Time, issued by the Engineer to the Contractor during construction.

v) His - "His" shall include "her" and "its".

w) Install - "Install" wherever and in whatever manner used shall mean the installation, complete in place of an item.

x) Notice of Award - The written notice of the acceptance of the Bid from the District to the successful Bidder.

y) Notice to Proceed - Written communication issued by the District to the Contractor authorizing him to proceed with the Work and establishing the date of commencement of the Work.

z) Or Equal - The terms "or equal" or "approved equal" shall be understood to indicate that the "equal" product be 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 requirement will be made by the Engineer.

aa) District Project Representative – The authorized representative of the District who is assigned to the project site or any part of thereof.

bb) Plans or Specification Drawings - The term "Plans or Specification Drawings" refers to the official Plans, profiles, cross sections, elevations, details, and other working drawings and supplementary drawings, or reproductions thereof, signed by the Engineer, which show the location, character, dimensions, and details of the work to be performed. 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.

cc) Project - The undertaking performed as provided by the Contract Documents.

dd) Provide - "Provide" wherever and in whatever manner used shall be understood to mean furnish and install.

ee) Project Geotechnical Engineer – Geotechnical report was prepared by Crawford & Associates, Inc. and is dated July 2021.

ff) Resident Project Representative - Authorized representative of the Engineer who is assigned to the Project or any part thereof.

gg) Service of Notice - Any notice from one party to the other under the Contract shall be in writing and shall be dated and signed by the party giving such notice or by a duly authorized representative thereof. Any such notice shall not be effective for any purpose whatsoever unless service in the following manner:

(i) If the notice is given to the District by personal delivery thereof, the District's Project Representative or by depositing the notice in the U.S. mail, enclosed in a sealed envelope addressed to Humboldt Bay Municipal Water District, P.O. Box 95, Eureka, CA 95502, postage prepaid, by certified mail return receipt requested.

(ii) If the notice is given to the Contractor, by personal delivery to the Contractor or its duly authorized representative at the project site or by depositing in the U.S. mail, enclosed in a sealed envelope address to the Contractor on the Contract Form, postage prepaid, by certified mail, return receipt request.

(iii) If the notice is given to the Surety or any other person, by personal delivery to such Surety or other person by personal delivery to such Surety or other person by depositing in the U.S. mail, enclosed in a sealed envelope, addressed to the surety or other person at the address of such Surety or other person last communicated to the party giving the notice, postage prepaid, by certified mail return receipt requested.

hh) Shall or Will - “Shall,” or “Will,” whenever used to stipulate anything, means shall or will be done or be performed by either the Contractor or the District and means that the Contractor or the District has thereby entered into a covenant with the other party to do or perform the same.

ii) Shop Drawing - All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the Contractor, a Subcontractor, manufacturer, supplier or distributor, which illustrate how specific portions of the Work shall be fabricated or installed.

jj) Shown - “Shown,” “indicated,” “detailed,” and words of like import, wherever and in whatever manner used, with or without reference to the drawings, means shown, indicated or detailed on the Drawings or Plans.

kk) Specifications - A part of the Contract Documents consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship, including the General Conditions.

ll) Specified - “Specified,” “described,” or “noted,” wherever and in whatever manner used, means as specified, described or noted in the Contract Documents.

mm) Subcontractors - The term "Subcontractor", as employed herein, includes only those having a direct contract with the Contractor and it includes one who furnishes material worked to a special design according to the Plans or Specifications of this Work, but does not include one who merely furnishes material not so worked and would be considered a supplier only.

nn) Substantial Completion - That date as certified by the Engineer when the construction of the Project or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that the Project or specified part can be utilized for the purposes for which it is intended.

The Engineer may, at its sole discretion, issue a written notice of substantial completion for the purpose of establishing the starting date for specific equipment guarantees, and to establish the date that the District will assume the responsibility for the cost of operating such equipment. Said notice shall not be considered as final acceptance of any portion of the Work or relieve the Contractor from completing the remaining work within the specified time and in full compliance with the Contract Documents.

oo) Sufficient - “Sufficient,” “necessary,” or “proper,” “acceptable,” “satisfactory,” “desirable,” and words of like import, wherever and in whatever manner used, with or without reference to the Engineer, means sufficient, necessary, proper, acceptable, satisfactory and desirable in the judgment of the Engineer.

pp) Supplementary Conditions (not included for this project) - Modifications to General Conditions required by a Federal Agency for participation in the PROJECT and approved by the Agency in writing prior to inclusion in the Contract Documents, or such requirements that may be imposed by applicable State laws.

References to “Supplemental General Conditions” in the General Conditions and elsewhere in the Contract Documents shall be construed to read “Supplementary Conditions.”

qq) Supplier - Any person or organization who supplies materials or equipment for the Work, including that fabricated to a special design, but who does not perform labor at the site.

rr) Time Limits - All time limits stated in the Contract Documents are of the essence of the Contract.

ss) Work - All the work specified, indicated, shown or contemplated in the Contract to construct the improvements, including all alterations, amendments or extensions thereto made by Contract

Change Order or other written orders of the Engineer.

tt) Written Notice - "Written Notice" shall be deemed to have been duly served when delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended or if delivered at or sent by registered mail to the last business address known to it who gives the notice, or sent by email.

uu) Whenever in the Specifications or upon the Drawings the words DIRECTED, REQUIRED, PERMITTED, ORDERED, DESIGNATED, PRESCRIBED, or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation or prescription of the Engineer is intended, and similarly the words APPROVED, ACCEPTABLE, SATISFACTORY, or words of like import, shall mean approved or acceptable to, or satisfactory to the Engineer, unless otherwise expressly stated.

SECTION B
GENERAL CONDITIONS

ARTICLE I. SCOPE OF WORK

B-1 Intent of Contract Documents

The intent of the Contract Documents is to prescribe the details for the construction and completion of the Work which the Contractor undertakes to perform in accordance with the terms of the Contract. Where the Specifications and Plans describe portions of the Work in general terms, but not in complete detail, it is understood that only the best general practice is to prevail and that only materials and workmanship of the first quality are to be used. Unless otherwise specified, the Contractor shall furnish all labor, materials, tools, equipment and incidentals and do all the work involved in performing the Contract in a satisfactory and workmanlike manner, ready for use occupancy or operation by the District.

The technical provisions are presented in sections for convenience. However, this presentation does not necessarily delineate trades or limits of responsibility. All sections of the Specifications and Plans are interdependent and applicable to the Project as a whole.

The Contract Documents are complementary, and what is called for in any one shall be as binding as if called for in all.

Anything shown on the Drawings and not mentioned in the Specifications or mentioned in the Specifications and not shown on the Drawings shall have the same effect as if shown or mentioned respectively in both. Any work shown on one drawing shall be construed to be shown in all drawings and the Contractor will coordinate the Work and the Drawings. If any portion of the Contract Documents shall be in conflict with any other portion, the various documents comprising the Contract Documents shall govern in the following order of precedence: The District-Contractor Contract; the Bid; any Supplementary or Special Conditions; Instructions to Bidders; the General Conditions; the Specifications; the Drawings. Technical Specifications take priority over general Specifications and detail Drawings take precedence over general Drawings. As between schedules and information given on Drawings, the Schedules shall govern. As between figures given on Drawings and the scales measurements, the figures shall govern. As between large-scale Drawings and small-scale Drawings, the larger scale shall govern. Any conflict or inconsistency between or in the Drawings shall be submitted to the Engineer through the District’s Project Representative or Resident Project Representative in writing. Work done by the Contractor after their discovery of such discrepancies, inconsistencies or ambiguities shall be done at the Contractor's own risk.

B-2 Contractor's Understanding

It is understood and agreed that the Contractor has, by careful examination, satisfied itself as to the

nature and location of the Work, the conformation of the ground, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the Work, the general and local conditions, local weather patterns, and all other matters which can in any way affect the Work under this Contract. No verbal agreement or conversation with any officer, agent or employee of the District, either before or after the execution of this Contract, shall affect or modify any of the terms or obligations herein contained.

Contractor shall comply with all Federal, State, and Local laws and regulations applicable to this scope of work and said project, as well as all permits and environmental conditions established for this project (see section B-13). Contractor is responsible for obtaining all necessary permits for construction except for those permits already obtained by the District prior to construction. If a Contractor materially fails to comply with any term of this award, whether stated in a Federal statute or regulation, an assurance, in a State plan or application, a notice of award, or elsewhere, FEMA and/or the District may take one or more of the actions outlined in 2 CFR Section 200.338, including termination of the project. Project awards may be terminated for convenience through the procedures outlined in 2 CFR Section 200.339.

B-3 Changes in the Work

The District may, at any time, by written order make changes in the Work including but not limited to: (a) changes in the Specifications or Drawings; (b) changes in the sequence, method or manner of performance of the Work; (c) changes in the owner-furnished facilities, equipment, materials, services or site; or (d) changes directing acceleration of the Work. If such changes cause an increase or decrease in the Contractor's cost of, or time required for, performance of the Contract an equitable adjustment will be made and the Contract modified in writing accordingly.

Such modification will be in the form of a Contract Change Order which will set forth the work to be done or the method by which the change and cost adjustment, if any, will be determined, and the time of completion of the Work.

To comply with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), material additions or amendments to this scope of work (SOW) may have to be reviewed by all State and Federal agencies participating in the NEPA/CEQA process. NEPA/CEQA compliance for all SOW additions or amendments is essential before the revised SOW can be approved by FEMA or implemented by the District. Any construction activities associated with a SOW change, prior to FEMA approval, may be ineligible for reimbursement or match. The Contractor shall obtain approval in writing from the District prior to proceeding with any changes of work.

The compensation to be paid for any extra work or change shall be determined in one or more of the following ways or at District's sole election:

a) By unit prices previously approved (unit prices previously approved shall be used in all cases for similar units unless mutually agreed that for some reason they are not applicable);

b) By estimate and acceptance of an agreed upon lump sum; or

c) On a time and materials basis involving the actual necessary expenses and other services necessary to complete the Work. In addition, there shall be added an amount to be agreed upon but not to exceed fifteen (15) percent of the actual necessary expense to cover the cost of general overhead, general superintendence, other expenses and profit. In the events that items (a) and (b) above are not applicable, then this latter method (c) shall be used. Markup by Subcontractors on their work shall not exceed fifteen percent. Contractor's markup on Subcontractor's work shall not exceed five (5) percent.

The Contractor shall keep full and complete records of the actual cost of such work in the form and manner prescribed by the Engineer and shall permit the Engineer to have access to such records as may

be necessary to assist in the determination of the compensation payable for such work.

The Engineer also may at any time by issuing a Field Order make changes in the details of the Work. The Contractor shall proceed with the performance of any change in the Work so ordered by the Engineer unless the Contractor believes that such Field Order entitles it to a change in the Contract Price or Time, or both in which event the Contractor shall give the Engineer written notice thereof within seven (7) calendar days after the receipt of the ordered change. The Contractor shall not execute such changes pending the receipt of an executed change order or further instruction from the District.

If the Contractor is delayed in completing by reason of any change made pursuant to this section, the time for completion of the Work shall be extended by change order for a period agreed to, commensurate with such delay. The Contractor shall not be subjected to any claim for liquidated damages for this period of time, but the Contractor shall have no claim for any other compensation for any such delay.

B-4 Procedures and Allowable Costs on Changes

a) No indirect costs of a Contractor are separately eligible for reimbursement, in compliance with 2 CFR Section 200.410. Such costs are covered by the Subgrantee Administrative Cost allowance formula provided by 44 CFR Section 206.439(b)(1)(ii).

b) Contractors are referred to the State HMGP administrative plan for project cost overrun regulations. If project costs exceed the approved federal share, the District must contact the Governor's Authorized Representative (GAR). The GAR will evaluate requests for cost overruns. Written determination of cost overrun eligibility in accordance with 2 CFR 328 shall be submitted by the GAR to the FEMA Regional Director. Contractor is hereby notified that such notifications and approvals may necessitate project delays, which will be reviewed and approved with the Contractor via a contract Change Order.

c) All changes which affect the cost or time of the construction of the project must be authorized by means of a Change Order. The Change Order will include extra work, work for which quantities have been altered from those shown in the bidding schedule, as well as decreases or increases in the quantities of installed units which are different than those shown in the bidding schedule because of final measurements. All changes should be recorded on a Change Order as they occur. Each Change Order must contain complete and detailed justification for all items addressed by the Change Order.

d) If the change in or addition to the Work will result in an increase in the contract sum, the District shall have the right to require the performance thereof in any of the following ways, at District's sole election:

(i) By unit prices previously approved (unit prices previously approved shall be used in all cases for similar units unless mutually agreed that for some reason they are not applicable);

(ii) By estimate and acceptance of an agreed upon lump sum; or

(iii) On a time and materials basis involving the actual necessary expenses and other services necessary to complete the work. In addition, there shall be added an amount to be agreed upon but not to exceed fifteen (15) percent of the actual necessary expense to cover the cost of general overhead, general superintendence, other expenses, and profit. In the events that items (a) and (b) above are not applicable, then this latter method (c) shall be used. Markup by Subcontractors on their work shall not exceed fifteen percent (15%). Contractor's markup on Subcontractor's work shall not exceed five percent (5%).

e) If the District elects to have the Change in the Work performed on a lump sum basis, such election shall be based on a lump sum proposal which shall be submitted by the Contractor within ten (10) calendar days of the District's request therefor. Request for a lump sum proposal shall not

be deemed an election to have the Work performed on a lump sum basis. The Contractor's proposal shall be itemized and segregated by labor and materials for the various components of the change (no aggregate labor total will be acceptable) and shall be accompanied by signed proposals of any Subcontractors which will perform any portion of the change, and of any persons who will furnish materials or equipment for incorporation therein. The proposal shall also include the Contractor's estimate of the time required to perform said changes or additional work.

The portion of the proposal relating to labor, whether by the Contractor's forces or the forces of any of its Subcontractors, may include reasonably anticipated gross wages of Job Site labor, including foremen, who will be directly involved in the Change in the Work (for such time as they will be so involved), plus payroll costs (including premium costs of overtime labor, if overtime is anticipated, social security, Federal or State unemployment insurance taxes and fringe benefits required by collective bargaining agreements entered into by the Contractor or any such Subcontractor in connection with such labor) and up to fifteen percent (15%) of such anticipated gross wages, but not payroll costs, as overhead and profit for the Contractor or any such Subcontractor, as applicable (such overhead and profit to include all supervision except foremen.)

The portion of the proposal relating to materials may include the reasonably anticipated direct costs to the Contractor or to any of its Subcontractors of materials to be purchased for incorporation in the Change in the Work, plus transportation and applicable sales or use taxes and up to fifteen percent (15%) of said direct material costs as overhead and profit for the Contractor or any such Subcontractor (such overhead and profit to include all small tools), and may further include the Contractor's and any of its Subcontractors' reasonably anticipated rental costs in connection with the Change in the Work (either actual rates or discounted local published rates), plus up to five percent (5%) thereof as overhead and profit for the Contractor or any such Subcontractors, as applicable. If any of the items included in the lump sum proposal are covered by unit prices contained in the Contract Document, the District may, if it requires the Change in the Work to be performed on a lump sum basis, elect to use these unit prices in lieu of the similar items included in the lump sum proposal in which event and appropriate deduction will be made in lump sum amount prior to the application of any allowed overhead and profit percentages. No overhead and profit shall be applied to any unit prices.

The lump sum proposal may include up to five percent (5%) of the amount which the Contractor will pay to any of its Subcontractors for the Change in the Work as a commission to the Contractor.

f) In the event that the Contractor fails to submit its proposal within the designated period, the Engineer may direct the Contractor to proceed with the Change or Addition to the Work and the Contractor shall so proceed. The Engineer shall determine the reasonable costs and time to perform the Work in question, which determination when approved by District shall be final and binding upon the Contractor.

g) In the event that the parties are unable to agree as to the reasonable costs and time to perform the change in or addition to the Work based upon the Contractor's proposal and the Engineer and District do not elect to have the change in the Work performed on a time and material basis, the Engineer and District shall make a determination of the reasonable cost and time to perform the Change in the Work, based upon their own estimates, the Contractor's submission or combination thereof. A Change Order shall be issued for the amount of costs and time determined by the Engineer and the District and shall become binding upon the Contractor unless the Contractor submits its protest in writing to the District within thirty (30) calendar days of the issuance of the Change Order. The District has the right to direct the Contractor in writing to perform the Change in the Work which is the subject of the Change Order. Failure of the parties to reach agreement regarding the costs and time of the performing the Change in the Work and/or any pending protest shall not relieve the Contractor from performing the Change in the Work promptly and

expeditiously.

h) If the District elects to have the Change in the Work performed on a time and material basis, the same shall be performed, whether by the Contractor's forces or the forces of any of its Subcontractors or Sub-subcontractors, at actual costs to the entity or entities performing the Change in the Work (without any charge for administration, clerical expense, supervision or superintendence of any nature whatsoever, including foremen, or the costs, use or rental of tools or plant), plus fifteen percent (15%) thereof as the total overhead and profit to the entity or entities actually performing the change (except that this fifteen percent (15%) shall not be applied against any payroll costs, defined herein with respect to lump sum proposals). If the entity or entities actually performing the work are Subcontractors or Sub-subcontractors, the Contractor shall be allowed five percent (5%) of the total charge of the performing entity or entities (including mark-up) as Contractor's mark-up. No other mark-ups shall be allowed hereunder. The Contractor shall submit to the District daily work and material tickets, to include the identification number assigned to the Change in the Work, the location and description of the Change in the Work, the classification of labor employed (and names and social security numbers), the material used, the equipment rented (not tools) and such other evidence of cost as the District may require. The District may require authentication of all time and material tickets and invoices by persons designated by the District for such purpose. The failure of the Contractor to secure any required authentication shall, if the District elects to treat it as such, constitute a waiver by the Contractor of any claim for the cost of that portion of the Change in the Work covered by a non-authenticated ticket or invoice; provided, however, that the authentication of any such ticket or invoice by the District shall not constitute an acknowledgment by the District that the items thereon were reasonably required for the Change in the Work.

i) No overhead and profit will be paid by the District on account of a Change in the Work except as specifically provided in this Section B-4. Overhead and Profit, as allowed under this paragraph, shall be deemed to include all costs and expenses which the Contractor or any of its Subcontractors may incur in the performance of the Change in the Work and which are not otherwise specifically recoverable by them pursuant to this paragraph.

j) The Contractor shall not be entitled to any amount for indirect costs, damages or expenses of any nature, including, but not limited to, so-called "impact" costs, labor inefficiency, wage, material or other escalations beyond the prices upon which the proposal is based and to which the parties have agreed pursuant to the provisions of this section, and which the Contractor, its Subcontractors and Sub-subcontractors or any other person may incur as a result of delays, interferences, suspensions, changes in sequence or the like, for whatever cause, whether reasonable or unreasonable, foreseeable or unforeseeable, or avoidable or unavoidable, arising from the performance of any and all Changes in the Work performed pursuant to this section. It is understood and agreed that the Contractor's sole and exclusive remedy in such event shall be recovery of its direct costs as compensable hereunder and an extension of the time of the Contract, but only in accordance with the provisions of the Contract Documents.

The Contractor agrees that it shall not be entitled to claim damages for anticipated profits on any portion of work that may be deleted. The amount of any adjustment for work deleted shall be estimated at the time deletion of work is ordered and the estimated adjustment will be deducted for the subsequent monthly pay estimates.

The District reserves the right to contract with any person or firm other than the Contractor for any or all extra work.

B-5 Unilateral Change in or Addition to the Work

Notwithstanding the above, the District, directly or through the Engineer, may direct the Contractor in

writing to perform changes in or additions to the scope of the Contract. The Contractor shall perform such work and the parties shall proceed pursuant to the provisions of Section B-4.

B-6 Differing Site Conditions

The Contractor shall promptly, and before the following conditions are disturbed, notify the District in writing of any:

a) Material that the Contractor believes may be material that is hazardous waste, as defined in Section 25118 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; or

b) Subsurface or latent physical conditions at the site differing from those indicated in the Contract Documents; or

c) Unknown 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.

The Engineer shall thereupon promptly investigate the conditions. If the Engineer finds that they do involve hazardous waste, or do materially differ and cause any decrease or increase in the Contractor's cost or time of performance, it will issue a Change Order as appropriate. Any increase or decrease in the cost of the Work or the time for performance shall be adjusted in the manner provided herein for adjustments as to extra and/or additional work and changes. The procedures applicable to claims per extra costs shall then apply.

In accordance with 36 CFR Part 800, in the event a potential historic property or cultural resource is discovered during construction activities, the Contractor must cease work in the vicinity of the discovery and take all reasonable measures to avoid or minimize harm to the discovered property/resource. Construction activities in the area of the discovery shall not resume until the District concludes consultation with the State Historic Preservation Officer (SHPO) for treatment of the discovery.

B-7 Claims for Extra Costs

a) The Plans for Work show the conditions as they are supposed or believed by the Engineer to exist, but it is neither intended nor to be inferred that the conditions as shown thereon constitute a representation by the District or its officers that such conditions are universally existent nor shall the District or any of its officers or representatives be liable for any loss sustained by the Contractor as a result of any variance between conditions as shown on the Plans and alternate conditions revealed during the progress of the Work, or otherwise.

b) The District assumes no responsibility for any representations made by any of its officers or agents during or prior to the execution of this Contract, unless (1) such representations are expressly stated in the Contract, and (2) the Contract expressly provides that the responsibility therefor is assumed by the District.

c) It is hereby mutually agreed that 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 or the District, or the happening of any event, thing or occurrence, unless the Contractor shall have given the Engineer due written notice of potential claims as hereinafter specified.

d) The written notice of potential claims 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 potential claim. Except as provided in Section B-6, the notice as above required shall be given to the Engineer at least 48 hours prior to the time that the Contractor

commences performance of the work giving rise to the potential claim for additional compensation. If such notice is not given, the Contractor shall be barred from making any such claim for extra compensation.

e) The Contractor may submit a claim to the Engineer concerning any matter for which a protest under Section B-3 or a notice of potential claim is filed within sixty (60) calendar days following the submission of said protest or notice, unless, due to the nature of the claim or the uncompleted state of the work, it is impracticable to determine the amount or the extent of the claim within such period, in which case a claim may be submitted at the earliest time thereafter that such determination can be made, but in no event later than the final release by the Contractor provided for in Section B-71. The claims shall set forth clearly and in detail, for each item of additional compensation claimed, the reasons for the claim, reference to applicable provisions of the Specifications, the nature and the amount of the cost involved, the computations used in determining such costs, and all pertinent factual data. The Contractor shall maintain complete and accurate records of the cost or any portion of the Work for which additional compensation is claimed, and shall provide the Engineer with copies thereof, as required.

f) The Engineer will, within a reasonable time after submission of the Contractor's claim, make decisions in writing on all claims of the Contractor. All such decisions of the Engineer shall be final unless the Contractor shall within ten (10) calendar days after receipt of the Engineer's decision, file with the Engineer a written protest, stating clearly and in detail the basis thereof. Such protest will be forwarded promptly by the Engineer to the District, which will issue a decision upon each such protest, and the District's decision will be final. Pending such decision, the Contractor shall proceed with its work in accordance with the determination or instructions of the Engineer. It is hereby agreed that the Contractor's failure to protest the Engineer's determination or instructions, within ten (10) calendar days from and after the Engineer's determinations or instructions, shall constitute a waiver by the Contractor of all its rights to further protest, judicial or otherwise.

g) It is the intention of this Section that the differences between the parties, arising under and by virtue of the Contract, be brought to the attention of the Engineer 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 it shall have no right to additional compensation for any claim that may be based on any act, failure to act, event, thing or occurrence for which no written notice of potential claim as herein required was timely filed.

h) In the event of an emergency endangering life or property, the Contractor shall act as stated in Section B-62 herein, and after execution of the emergency work shall present an accounting of labor, materials and equipment in connection therewith. The procedure for any payment that may be due for emergency work will be as specified in Section B-3 herein.

B-8 Disputes

Except as otherwise specifically provided in the Contract Documents, the Engineer will initially decide all claims of the Contractor and all disputes arising under and by virtue of the Contract. Such claim or dispute will be processed and decided by the Engineer as soon as practicable after its submission and the submission or availability of any additional information necessary to its decision. If the Contractor is dissatisfied with the Engineer's decision, the Contractor may, within 15 calendar days from the date of the Engineer's decision, follow the procedures set forth in Section B-55. If the Contractor fails to follow the procedures set forth in Section B-55 within the 15 calendar day period, then the Engineer's decision shall be final, conclusive, and binding on the Contractor.

B-9 Guarantee

a) In addition to warranties, representations and guarantees stated elsewhere in the Contract

Documents, the Contractor unconditionally guarantees all materials and workmanship furnished hereunder, and agrees to replace at its sole cost and expense, and to the satisfaction of the Engineer and the District, any and all materials which may be defective or improperly installed.

b) The Contractor shall repair or replace to the satisfaction of the Engineer any or all such work that may prove defective in workmanship or materials, ordinary wear and tear excepted, together with any other work which may be damaged or displaced in so doing.

c) In the event of failure to comply with the above stated conditions within a reasonable time, the District is authorized to have the defect repaired and made good at the expense of the Contractor who will pay the costs and charges therefor immediately upon demand, including any reasonable management and administrative costs, and engineering, legal and other consultant fees incurred to enforce this section.

d) The signing of the Contract by the Contractor shall constitute execution of the above guarantees. Except as otherwise provided in this Contract, the guarantees and warranties shall remain in effect through the one-year maintenance warranty period specified in the Performance Bond.

ARTICLE II. CONTROL OF WORK

B-10 Authority of the Engineer

a) The Engineer is the representative of the District and has full authority to interpret the Contract Documents, to conduct the construction review and inspection of the Contractor's performance, and to decide questions which arise during the course of the work and its decisions on these matters shall be final and conclusive. The Engineer has the authority to reject all work and materials which do not conform to the Contract Documents, and has the authority to stop the work whenever such stoppage may be necessary to ensure the proper execution of the Contract.

If at any time the Contractor's work force, tools, plant or equipment appear to the Engineer to be insufficient or inappropriate to secure the required quality of work or the proper rate of progress, the Engineer may order the Contractor to increase their efficiency, improve their character, to augment their number or to substitute other personnel, new tools, plant or equipment, as the case may be, and the Contractor shall comply with such order.

b) Neither the failure of the Engineer to demand such increase of efficiency, number, or improvement, nor the compliance by the Contractor with the demand, shall relieve the Contractor of its obligation to provide quality work at the rate of progress necessary to complete the Work within the specified time.

c) The Engineer shall have the authority to make minor changes in the Work, not involving extra costs, and not inconsistent with the purposes of the Work.

d) Any order given by the Engineer, not otherwise required by the Contract Documents to be in writing shall, on request of the Contractor, be given or confirmed by the Engineer in writing.

e) Whenever work, methods of procedure, or any other matters are made subject to direction or approval, such direction or approval will be given by the Engineer.

f) The Engineer shall not be responsible for the construction means, controls techniques, sequences procedures or construction safety.

g) The Engineer may delegate the above authorities to others who may be contracted by the District to perform construction management and construction inspection duties.

h) It is expressly agreed and understood that GHD Inc. will have no liability whatsoever resulting from the obligations entered into under the Contract except as provided in any scope of work agreement between GHD Inc. and the District; that the District must look solely to the Contractor for the furnishing of the Work; that the Contractor must look solely to the District for payment; and that the District and the Contractor must look solely to each other for the enforcement of any claims or liabilities arising under or by reason of the Contract.

B-11 Drawings

a) Drawings furnished herewith are for bidding purposes. The Contractor shall be responsible for procuring its own copies of the Contract Documents and full-size drawings. The Contractor shall keep one copy of said drawings, in good order, available to the Engineer and its representatives, and convenient to the working site. The Contractor shall maintain on the job site and make available to the Engineer on request, one current full-sized marked-up set of design drawings which accurately indicate all variations in the completed work that differ from the design information shown on the Plans. If the Contractor, in the course of the Work, finds any discrepancy between the Drawings and the physical condition of the locality, or any errors or omissions in the Drawings, or in the layout as given by points and instructions, it shall be the Contractor's duty to

inform the Engineer in writing, and the Engineer will promptly verify the same. Any work done after such discovery, until authorized, will be done at the Contractor's risk. All Drawings, Specifications, and copies thereof furnished by the Engineer are the property of the Engineer and shall not be reused on other work and, with the exception of the signed Contract sets, are to be returned to the Engineer, on request, at the completion of the Work. All models are the property of the District. The Contractor may be furnished additional instructions and detail drawings by the Engineer as necessary to carry out the work required by the Contract Documents.

The additional drawings and instructions thus supplied, will become part of the Contract Documents. The Contractor shall carry out the Work in accordance with the additional detail drawings and instructions.

b) The Drawings shall be supplemented by such shop drawings prepared by the Contractor as are necessary to adequately control the Work. No changes shall be made by the Contractor in any shop drawings after they have been reviewed by the Engineer.

c) Shop Drawings for any structure shall include, but not be limited to: stress sheets, anchor bolt layouts, shop details, conduit and wire schedules, elevations, panel schedules, equipment inventory, seismic calculations, and mounting plans, which shall be reviewed and accepted by the Engineer before any such work is performed.

d) Contractor agrees that shop drawings processed by the Engineer are not Contract Change Orders; that the purpose of shop drawings submitted by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept, that it demonstrates its understanding by indicating which equipment and material it intends to furnish and by detailing the fabrication methods it intends to use.

e) It is expressly understood, however, that favorable review of the Contractor's shop drawings shall not relieve the Contractor of any responsibility for accuracy of dimensions and details, or for mutual agreements of dimensions and details. It is mutually agreed that the Contractor shall be responsible for agreement and conformity of its shop drawings with the Specifications. Contractor further agrees that if deviations, discrepancies or conflicts between shop drawings and Specifications are discovered either prior to or after shop drawings are processed by the Engineer, the Specifications shall control and shall be followed.

f) Unless otherwise stated, the Engineer shall have thirty (30) calendar days from the date of receipt of shop drawings for review.

g) 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. Any cost related to the Engineer's review of any particular set of shop drawings more than twice, due to incompleteness or unacceptability, shall be borne by the Contractor, and the District reserves the right to withhold such costs from payments due the Contractor.

h) When submitted for the Engineer's review, Shop Drawings shall bear the Contractor's certification that they have reviewed, checked and approved the Shop Drawings and that they are in conformance with the requirements of the Contract Documents.

i) That portion of the Work requiring a shop drawing or sample submission shall not begin until the shop drawing or submission has been approved by the Engineer. A copy of each approved shop drawing and each approved sample shall be kept in good order by the Contractor at the site and shall be available to the Engineer.

j) Acceptance by the Engineer of any drawing, method of work, or any information regarding

materials and equipment the Contractor proposes to furnish shall not relieve the Contractor of his responsibility for any errors therein and shall not be regarded as an assumption of risks or liability by the Engineer or District, or any officer or employee thereof, and the Contractor shall have no claim under the Contract on account of the failure or partial failure or inefficiency or insufficiency of any plan or method or work or material and equipment so accepted. Such acceptance shall be considered to mean merely that the Engineer has no objection to the Contractor using, upon his own full responsibility, the plan or method of work proposed, or furnishing the materials and equipment proposed.

B-12 Construction Staking and Surveys

The Contractor shall furnish land surveys deemed necessary for locating the principal component parts of the Work.

B-13 Permits and Regulations

Permits, licenses, and easements of a temporary or permanent nature, necessary for the prosecution of the Work shall be secured and paid for by the Contractor, except as noted in Section B-32, and herein.

The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the Work as shown on the Plans and described in the Specifications. The Contractor shall promptly notify the Engineer in writing of any specification at variance therewith and any necessary changes shall be adjusted as provided in the Contract for Changes in the Work. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules, and regulations and without such notice to the Engineer, it shall bear all costs arising therefrom.

B-14 Conformity with Contract Documents and Allowable Deviations

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

Whenever a material, article or piece of equipment is identified on the Drawings or Specifications by reference to brand name or catalogue number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered as described in Section B-28. The Contractor may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the Contract Documents by reference to brand name or catalogue number, and if, in the opinion of the Engineer, such material, article, or piece of equipment is of equal substance and function to that specified, the Engineer may approve its substitution and use by the Contractor. Any cost differential shall be deductible from the Contract Price and the Contract Documents shall be appropriately modified by Change Order. The Contractor warrants that if substitutions are approved, no major changes in the function or general design of the Project will result. Incidental changes or extra component parts required to accommodate the substitution will be made by the Contractor without a change in the Contract Price or Contract Time.

B-15 Coordination and Interpretation of Contract Documents

a) The Contract Documents are complementary and a requirement occurring in one is as binding as though occurring in all.

b) In the event of conflict between the Plans and the Technical Specifications, the Technical Specifications shall govern, except that, where items are shown on the Plans and are not

specifically included in the Technical Specifications, the Plans shall govern.

c) Should it appear that the work to be done or any of the matters relative thereto are not sufficiently detailed or explained in the Specifications or Plans, the Contractor shall apply to the Engineer for such further 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 Specifications and Plans, reference shall be made to the Engineer, whose decision thereon shall be final and conclusive.

d) In the event of any discrepancy between any plans and the figures written thereon, the figures shall be taken as correct. Detailed drawings shall prevail over general drawings.

e) Any reference made in these Specifications or on the plans to any Specification, standard, method, or publication of any scientific or technical society or other organization shall, in the absence of a specific designation to the contrary, be understood to refer to the Specification, standard, method, or publication in effect as of the date that the Work is advertised for Bids.

B-16 Subcontracts

a) In accordance with 2 CFR Section 200.213, the Contractors must not make any award or permit any award (subgrant or contract) at any tier to any party which is debarred or suspended or is otherwise excluded from or ineligible for participation in Federal assistance programs under Executive Order 12549, “Debarment and Suspension.”

b) The attention of the Contractor is directed to the provisions of Public Contract Code sections 4100-4113, regarding subcontracting and said provisions are by this reference incorporated herein and made a part hereof.

c) Each Subcontract shall contain a suitable provision for the suspension or termination thereof should the Work be suspended or terminated or should the Subcontractor neglect or fail to conform to every provision of the Contract Documents insofar as such provisions are relevant. No Subcontractor or supplier will be recognized as such, and all persons engaged in work will be considered as employees of the Contractor, and the Contractor will be held responsible for their work, which shall be subject to the provisions of the Contract Documents. The Contractor shall be fully responsible to the District for the acts or omissions of its Subcontractors and of the persons either directly or indirectly employed by him. Nothing contained in the Contract Documents shall create any contractual relationship between any Subcontractor and the District. If a legal action, including arbitration and litigation, against the District is initiated by a Subcontractor or Supplier, the Contractor shall reimburse the District for the amount of legal, engineering and all other expenses incurred by the District in defending itself in said action.

d) The District and the Engineer reserve the right to approve all Subcontractors. Such approval shall be a consideration to the awarding of the Contract and unless notification to the contrary is given to the Contractor prior to the signing of the Contract, the list of Subcontractors which is submitted with its proposal will be deemed to be acceptable.

B-17 Cooperation of Contractors

a) 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 said 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 (including material sources) at any time, by the use of other forces.

b) When two or more contractors are employed on related or adjacent work, each shall conduct its operation 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 its operations, and for loss caused the other due to its unnecessary delays or failure to finish the Work within the time specified for completion.

B-18 Superintendence

a) The Contractor shall designate in writing before starting work an individual as authorized representative who shall have the authority to represent and act for the Contractor. This authorized representative shall be present at the site of the work at all times while work is actually in progress on the Contract. When work is not in progress and during periods when work is suspended, arrangements acceptable to the Engineer shall be made for any emergency work which may be required.

b) The Contractor is solely responsible, at all times, for the superintendence of the Work and for its safety and progress.

c) Whenever the Contractor or its authorized representative is not present on any particular part of the Work where it may be desired to give direction, orders will be given by the Engineer, which shall be received and obeyed by the superintendent or foreman who may have charge of the particular work in reference to which the orders are given.

d) Any order given by the Engineer, not otherwise required by the Specifications to be in writing, will on request of the Contractor, be given or confirmed by the Engineer in writing.

B-19 Inspection of Work

a) Unless otherwise provided, all equipment, materials, and work shall be subject to inspection and testing by the Engineer. The Engineer will observe the progress and quality of the Work and determine, in general, if the Work is proceeding in accordance with the intent of the Contract Documents. The Engineer shall not be required to make comprehensive or continuous inspections to check the quality of the Work, and it shall not be responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work. Visits and observations made by the Engineer shall not relieve the Contractor of its obligation to conduct comprehensive inspections of the Work and to furnish proper materials, labor, equipment and tools, and perform acceptable work, and to provide adequate safety precautions, in conformance with the intent of the Contract.

b) Whenever the Contractor varies the period during which work is carried on each day, it shall give due notice to the Engineer so that proper inspection may be provided. Any work done in the absence of the Engineer shall be subject to rejection. Proper facilities for safe access for inspection to all parts of the Work shall at all times be maintained for the necessary use of the Engineer and other agents of the District, and agents of the Federal, State, or Local governments at all reasonable hours for inspection by such agencies to ascertain compliance with laws and regulations.

c) One or more inspectors may be assigned to observe the Work and to act in matters of construction under this Contract. It is understood that inspectors shall have the power to issue instructions and make decisions within the limitations of the authority of the Engineer. Such inspection shall not relieve the Contractor of its obligation to conduct comprehensive inspections of the work, to furnish proper materials, labor, equipment and tools, and perform acceptable work, and to provide adequate safety precautions in conformance with the intent of the Contract.

d) The Engineer and its representatives and the District and its representatives shall at all times

have access to the Work wherever it is in preparation or progress, and the Contractor shall provide safe and convenient facilities for such access and for inspection. If the Specifications, the Engineer's instructions, laws, ordinances, or any public authority require any material, equipment or work to be specifically tested or approved, the Contractor shall give the Engineer timely notice of its readiness for inspection, and if the inspection is by an authority other than the District, of the time fixed for inspection. Inspections by the Engineer will be made promptly.

e) Work performed without inspection may be required to be removed and replaced under proper inspection and the entire cost of removal and replacing, including the cost of District-furnished materials used in the Work, shall be borne by the Contractor, regardless of whether or not the Work exposed is found to be defective. Examination of questioned work, other than that installed without inspection, may be ordered by the Engineer and, if so ordered, the work must be uncovered by Contractor. If such work is found to be in accordance with the Contract Documents, the District will pay the cost of re-examination and replacement. If such work is found to be not in accordance with the Contract Documents, the Contractor shall pay such cost.

f) The inspection of the Work shall not relieve the Contractor of its obligation to fulfill the Contract as herein prescribed, or in any way alter the standard of performance provided by the Contractor, and defective work shall be made good and unusable materials may be rejected, notwithstanding that such work and materials have been previously overlooked by the Engineer and accepted or estimated for payment. If the Work or any part thereof shall be found defective, Contractor shall, within ten (10) calendar days, make good such defect in a manner satisfactory to the Engineer. If the Contractor shall fail or neglect to make ordered repairs of defective work or to remove the condemned materials from the Work within ten (10) calendar days after direction by the Engineer in writing, the District may make the ordered repairs, or remove the condemned materials, and deduct the cost thereof from any monies due the Contractor.

g) The Contractor shall furnish promptly without additional charge all facilities, labor and materials reasonably needed by the Engineer for performing all inspection and tests. Contractor shall be charged with any additional cost of inspection when material and workmanship are not ready at the time specified by the Contractor for its inspection.

h) Where any part of the Work is being done under an encroachment permit or building permit, or is subject to Federal, State, County or City codes, laws, ordinances, rules or regulations, representatives of the government agency shall have full access to the Work and shall be allowed to make any inspection or tests in accordance with such permits, codes, laws, ordinances, rules, or regulations. If advance notice of the readiness of the Work for inspection by the governing agency is required, the Contractor shall furnish such notice to the appropriate agency.

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

j) Forty-eight (48) hours prior to work being accomplished, the Contractor will notify the Engineer of the proposed working hours to accomplish the work for that day. Overtime and shift work may be established as a regular procedure by the Contract and with the written permission of the Engineer. Such permission may be revoked at any time. No work other than overtime and shift work established as a regular procedure shall be done between the hours of 7 p.m. and 7 a.m., nor on Sundays or legal holidays, except for such work as is necessary for the proper care and protection of the work already performed, or in case of an emergency.

If required, nighttime work periods shall be coordinated with the Engineer in advance, and approval shall be given by the Engineer prior to any work occurring outside the hours described above.

All costs for the overtime inspection, including those occurring as a result of overtime and shift work established as a regular procedure, shall be paid for by the Contractor. Overtime inspection shall include inspection required during holidays, Saturdays, Sundays, and any weekday between the hours of 7 p.m and 7 a.m. Such costs will include, but will not necessarily be limited to, engineering, inspection, general supervision and other expenses which are directly chargeable to the overtime work. All such charges shall be deducted by the District from payment due the Contractor.

k) A prefinal inspection of the Work will be made by the District and the Engineer. This inspection shall be made as soon as practical after Contractor has notified the District in writing that the Work is ready for this inspection. The prefinal inspection shall be made prior to acceptance of any portion of the Work as being substantially complete and prior to filing the Notice of Completion.

A final inspection of all the Work will be made by the District, Engineer, and Contractor.

B-20 Tests

The Engineer and District shall perform or witness all tests specified or required by the Technical Specifications. The responsibility for payment for these tests is also outlined in the Technical Specifications. In general, and unless explicitly stated otherwise, the Contractor is responsible for the performance of all tests required, and the payment for such tests is to be included in the Bid Item to which it relates. No additional payment will be made for the required testing. The Engineer will direct the Contractor to perform such tests as it deems necessary to determine the quality of work or compliance with Contract Documents. The Contractor shall furnish promptly without additional charge all facilities, labor, and material reasonably required for performing safe and convenient tests as may be required by the Engineer. The Contractor shall not be required to reimburse the District for tests performed by the District or Engineer above and beyond those outlined in the plans or specifications. If samples of materials are submitted which fail to pass the specified tests, the Contractor shall pay for all subsequent tests.

B-21 Removal of Rejected and Unauthorized Work and Materials

a) All work or materials which have been rejected shall be remedied, or removed and replaced by the Contractor in an acceptable manner and no compensation will be allowed for such removal, replacement, or remedial work.

b) Any work done beyond the lines and grades shown on the plans or established by the Engineer or any extra work done without written authority will be considered as unauthorized work and will not be paid for. Upon order of the Engineer, unauthorized work shall be remedied, removed, or replaced at the Contractor's expense.

c) Upon failure of the Contractor to comply with any order of the Engineer made under this Section, the District may cause rejected or unauthorized work to be remedied, removed or replaced, and may deduct the costs therefor from any monies due or to become due the Contractor.

d) If following the installation of any equipment furnished hereunder, defects requiring correction by the Contractor are found, the District shall have the right to operate such unsatisfactory equipment and make reasonable use thereof until the equipment can be shut down for correction of defects without injury to the District.

B-22 Deductions for Uncorrected Work

If the Engineer deems it inexpedient to correct work damaged or not done in accordance with the Contract, an equitable deduction from the Contract price shall be made therefor, and such sum may be withheld by District from Contractor's payment.

B-23 Equipment and Plants

a) If equipment is acquired by the contractor under this project and paid for by the District, the use and disposition of the equipment shall be in compliance with 2 CFR Section 200.313.

b) Only equipment and plants suitable to produce the quality of work and materials required will be permitted to operate on the project.

c) Plants will be designed and constructed in accordance with general practice for such equipment and shall be of sufficient capacity to insure the production of sufficient material to carry the Work to completion within the time limit.

d) The Contractor shall provide adequate and suitable equipment and plants to meet the above requirements, and when ordered by the Engineer, shall remove unsuitable equipment from the Work and discontinue the operation of unsatisfactory plants.

e) The Contractor shall identify each piece of its equipment, other than hand tools, by means of an identifying number plainly stenciled or stamped on the equipment at a conspicuous location, and shall furnish to the Engineer a list giving the description of each piece of equipment and its identifying number. In addition, the make, model number and empty gross weight of each unit of compacting equipment shall be plainly stamped or stenciled in a conspicuous place on the unit. The gross weight shall be either the manufacturer's rated weight or the scale weight.

f) In the case of termination of this Contract before completion from any cause whatever, the Contractor, if notified to do so by the District, shall promptly remove any part or all of its equipment and supplies from the property of the District. If the Contractor fails to do so, the District shall have the right to remove such equipment and supplies at the expense of the Contractor.

B-24 Character of Worker

The Contractor shall employ only competent Subcontractors or skillful workers to do the work. If any Subcontractor, or person employed by the Contractor or any Subcontractor shall fail or refuse to carry out the directions of the District or its agents or shall appear to the District or its agents to be incompetent or to act in a disorderly or improper manner, it shall be removed from the project Work immediately on the requisition of the District or its agents, and such person shall not again be employed on the Work. Such discharge shall not be the basis for any claim for compensation or damages against the District, or any of its officers or agents.

B-25 Separate Contracts

The District reserves the right to let other contracts in connection with this work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly connect and coordinate its work with the other contractor's work.

If any part of the Contractor's work depends for proper execution or results upon the work of any other contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such work that render it unsuitable for such proper execution and results. The Contractor's failure to inspect and report shall constitute an acceptance of the other contractor's work as fit and proper for the reception of its work, except as to defects which may develop in the other contractor's work after the execution of its work.

To ensure the proper execution of its subsequent work, the Contractor shall measure work already in place and shall at once report to the Engineer any discrepancy between the executed work and the Drawings.

The District may perform additional Work related to the Project itself, or it may let other contracts containing provisions similar to these. The Contractor will afford the other contractors who are parties to such contracts (or the District, if the District is performing the additional Work itself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of Work and shall properly connect and coordinate his Work with theirs.

If the performance of additional Work by other contractors or the District is not noted in the Contract Documents prior to the execution of the Contract, written notice thereof shall be given to the Contractor prior to starting any such additional Work. If the Contractor believes that the performance of such additional Work by the District or others involves him in additional expense or entitles him to an extension of the Contract Time, he may make a claim therefore as provided in Section B-7 of this Contract.

B-26 Materials, Services and Facilities

a) Unless otherwise specifically stated in the Contract Documents, the Contractor shall furnish all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature on all of the facilities necessary for the execution and completion of the Work. Unless otherwise specified, all materials shall be new and shall be manufactured, handled, and installed in a workmanlike manner to ensure completion of the Work in accordance with the Contract Documents. The Contractor shall, upon request of the Engineer, furnish satisfactory evidence as to the kind and quality of materials.

b) Where materials are to be furnished by the District, the type, size, quantity and location at which they are available will be stated in the Contract Documents.

c) Manufacturers' warranties, guarantees, instruction sheets and parts listed, which are furnished with certain articles or materials incorporated in the Work, shall be delivered to the Engineer before acceptance of the Contract.

d) Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

e) Materials, supplies and equipment shall be in accordance with samples submitted by the Contractor and approved by the Engineer.

f) Materials, supplies or equipment to be incorporated into the Work shall not be purchased by the Contractor or the Subcontractor subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

g) The completed Work shall include all necessary permanent safety devices, such as machinery guards and similar ordinary safety items required by the State and Federal (OSHA) industrial safety authorities and applicable local and national codes. Further, any features of the Work subject to such safety regulations shall be fabricated, furnished, and installed in compliance with these requirements. Prior to performing Work specified herein, the Contractor shall request an inspection by a State Industrial Safety representative for the purpose of determining that the facilities provided are in compliance with the State and Federal safety requirements. Any facilities which are deemed necessary by official response following the above safety inspection shall be added or corrected as required as a part of the Contract Work. However, no payment will be made to the Contractor for such changes or additions to equipment furnished under this Contract since it is a requirement of these Specifications that such equipment be manufactured or fabricated in such a manner as to be in conformance with all Federal, State, and local safety requirements. The

Contractor shall notify all manufacturers, equipment suppliers, and Subcontractors of the provisions of this article.

h) In approving equipment for installation in the project, the District and Engineer assume no responsibility for injury or claims resulting from failure of the equipment to comply with applicable National, State, and local safety codes or requirements, or the safety requirements of a recognized agency, or failure due to faulty design concepts, or defective workmanship and materials.

i) All materials incorporated into the job shall be new, especially purchased for the project unless otherwise specified or agreed in writing. Unless otherwise noted, any equipment offered shall be current modifications which have been in successful regular operation under comparable conditions for a period sufficient to determine the reliability of the product. This time requirement, however, does not apply to minor details nor to thoroughly demonstrated improvements in design or in materials of construction.

j) 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 best grade in quality and workmanship obtainable in the market from firms of established good reputation, or, if not ordinarily carried in stock, shall conform to the usual standards of 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 full conformity and harmony with the intent to secure the best standard of construction and equipment of the work as a whole or in part.

k) If there is a residual inventory of unused supplies exceeding $5,000 in total fair market value upon completion of the Project, and if the supplies are not needed for any other federally sponsored programs or projects, the Contractor shall notify the District and provide unused supplies to the location and at the time arranged, for unloading and storage. The District shall compensate the grant awarding agency for its share (2 CFR Section 200.314).

B-27 Storage of Materials

Materials shall be so stored as to ensure the preservation of their quality and fitness for the Work. When considered necessary, they shall be placed on wooden platforms or other hard, clean surfaces, and not on the ground, and they shall be placed under cover. Stored materials shall be located so as to facilitate prompt inspection. Private property shall not be used for storage purposes without the written permission of the owner or lessee.

Electrical equipment, devices, and motors shall be placed in dry and warm storage as approved by the Engineer.

All equipment and materials which are not to be painted (such as aluminum and stainless steel) and all factory finished or coated equipment and materials which are not to be painted, that are installed prior to completion of adjacent work, shall be completely covered and protected.

Articles or materials to be incorporated in the Work shall be stored in such a manner as to ensure the preservation of their quality and fitness for the Work, and to facilitate inspection.

B-28 Trade Names and Alternatives

For convenience in designation in the Specifications and Plans, certain articles or materials to be incorporated in the Work may be designated under a trade name or the name of a manufacturer and its catalog information. 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:

a) The burden of proof as to the quality and suitability of alternatives shall be upon the Contractor and it shall furnish all information necessary as required by the Engineer. The Engineer shall be

the sole judge as to the quality and suitability of alternative articles or materials and its decision shall be final.

b) Whenever the Specifications and Plans permit the substitution of a similar or equivalent material or article, no tests or action relating to the approval of such substitute material or article will be made until the request for substitution is made in writing by the Contractor accompanied by complete data as to the equality of the material or article proposed. Such request by the Contractor must be made within thirty-five (35) calendar days after award of Contract.

B-29 Certificate of Compliance

a) A Certificate of Compliance shall be furnished prior to the use of any materials for which the Technical Specifications require that such a certificate be furnished. In addition, when so authorized in the Specifications, the Engineer may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance. The Certificate shall be signed by the manufacturer of the material or the manufacturer of assembled materials and shall state that the materials involved comply in all respects with the requirements of the Contract. A Certificate of Compliance shall be furnished with each lot of material delivered to the Work and the lot so certified shall be clearly identified in the Certificate.

b) 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.

c) The District reserves the right to refuse to permit the use of material on the basis of a Certificate of Compliance.

d) The form of the Certificate of Compliance and its disposition shall be as directed by the Engineer.

B-30 Assignment

The Contractor shall not assign the Contract or sublet it as a whole or in part without the prior written consent of the District, nor shall the Contractor assign any monies due, or to become due to it hereafter, without the prior written consent of the District.

B-31 Use of Completed Portions, Right to Operate Unsatisfactory Equipment or Facilities

a) The District may, at any time, and from time to time, during the performance of the Work, enter the work site for the purpose of installing any necessary work by the District labor or other contracts, and for any other purpose in connection with the installation of facilities. In doing so, the District shall endeavor not to interfere with the Contractor and the Contractor shall not interfere with other work being done by or on behalf of the District.

b) If, prior to completion and final acceptance of all the Work, the District takes possession of any structure or facility (whether completed or otherwise) comprising a portion of the Work with the intent to retain possession thereof (as distinguished from temporary possession contemplating the return to the Contractor), then, while the District is in possession of the same, the Contractor shall be relieved of liability for loss or damage to such structure other than that resulting from the Contractor's fault or negligence. Such taking of possession by the District shall not relieve the Contractor from any provisions of this Contract respecting such structure, other than to the extent specified in the preceding sentence, nor constitute a final acceptance of such structure or facility.

c) If, following installation of any equipment or facilities furnished by the Contractor, defects

requiring correction by the Contractor are found, the District shall have the right to operate such unsatisfactory equipment or facilities and make reasonable use thereof until the equipment or facilities can be shut down for correction of defects without injury to the District.

B-32 Lands for Work, Right-of-Way Construction Roads

a) The District will provide the lands, easements, and/or rights-of-way necessary or other rights to enter and work on lands necessary for the performance of the Work. Other permits and licenses are addressed by sections B-13 and B-49. Should the Contractor find it advantageous to use any additional land for any purpose whatsoever, the Contractor shall provide for the use of such land at its expense. The Engineer shall be furnished with a copy of written agreements or otherwise be notified in writing of additional working space which is acquired. Nothing herein contained and nothing marked on the Plans shall be interpreted as giving the Contractor exclusive occupancy of the territory provided by the District. When two or more contracts are being executed at one time on the same or adjacent land in such a manner that work on one contract may interfere with that on another, the Engineer shall decide which contractor shall cease work, and which shall continue, or whether the work on both contracts shall progress at the same time and in what manner, and the decision of the Engineer shall be final and binding. When the territory of one contract is the necessary or convenient means of access for the performance of another contract, such privilege of access or any other reasonable privilege may be granted by the Engineer to the contractor so desiring, to the extent, amount, in the manner, and at the time permitted. No such decision as to the method or time of conducting the work or the use of territory shall be the basis of any claim for delay or damage.

b) Lands, easements or rights-of-way to be furnished by the District for construction operations will be defined by the District or shown on the Plans prior to the start of work.

c) The Contractor shall construct and maintain all roads necessary to reach the various parts of the Work and for the transportation thereto of construction material and personnel. The cost of constructing and maintaining such roads shall be borne by the Contractor.

B-33 District's Right to Audit and Preservation of Records

a) The District is responsible for obtaining audits in accordance with the Single Audit Act of 1996, in compliance with 2 CFR Section 200 Subpart F. The Contractor shall facilitate the completion of such an audit as it relates to the Contractor’s work on this project.

b) The Contractor shall maintain books, records and accounts of all costs in accordance with generally accepted accounting principles and practices. The District, the Comptroller General of the United States, State of California, and its authorized representatives shall have the right to audit the books, records and accounts of the Contractor under any of the following conditions:

(i) The Contract is terminated for any reason in accordance with the provisions of the Contract Documents in order to arrive at equitable termination costs;

(ii) In the event of a disagreement between the Contractor and the District over the amount due the Contractor under the terms of the Contract;

(iii) To check or substantiate any amounts invoiced or paid which are required to reflect the costs of the Contractor, or the Contractor's efficiency or effectiveness under this Contract or in connection with extras, changes, claims, additions, backcharges, or others, as may be provided for in this Contract; and/or

(iv) If it becomes necessary to determine the District's rights and the Contractor's obligations under the Contract or to ascertain facts relative to any claim against the Contractor which may result in a charge against the District;

(v) To determine any difference in cost occasioned by a permissible substitution;

(vi) To make audits, examinations, excerpts, and transcriptions pertinent to the loan financing

on this project.

(vii) For any other reason in the District's sole judgment.

c) If any of the conditions stated in paragraph B-33(a) are satisfied, Contractor shall provide the District (or its representatives), unlimited, reasonable access during working hours to the Contractor's books and records under the conditions stated above. The District's audit rights shall be liberally construed in the District's favor.

d) The Contractor, from the effective date of final payment or termination hereunder, shall preserve and make available to the District for a period of three (3) years thereafter, at all reasonable times at the office of the Contractor (but without any charge to the District), all its books, records, documents, photographs, micro-photographs, and other evidence bearing on the costs and expenses of the Contractor under this Contract and relating to the Work hereunder.

e) In accordance with 2 CFR Section 200.512, financial and programmatic records related to expenditure of funds on grant-supported projects shall be maintained at least 3 years following the date the grantee submits its final expenditure report on the project.

f) The District will make all payments required of it under this Contract subject to audit, under circumstances stated above, which audit may be performed at the District's option, either during the Contract time period or during the record retention time period. Regardless of authorization, approval or acceptance, signatures or letters which are given by the District and are part of the District's control systems or are requested by the Contractor, the payments made under this Contract shall not constitute a waiver or agreement by the District that it accepts as correct the billings, invoices or other charges on which the payments are based. If the District's audit produces a claim against the Contractor, the District may pursue all its legal remedies even though it has made all or part of the payments required by this Contract.

g) If any audit by the District or its representative discloses an underpayment by the District pursuant to the terms of the Contract Documents, the District shall have the duty to pay any amount found by the audit to be owed to the Contractor. If such audit discloses an overpayment, the Contractor shall have the obligation to reimburse the District for the amount of the overpayment. The District's right to claim reimbursement from the Contractor of any overpayment shall not be terminated or waived until three years after the completion of the District's audit or upon the termination of audit rights under subparagraph B-33(d), whichever date is later. The obligation of the Contractor to make reimbursements hereunder shall not terminate except as provided by law.

The District's right to audit and the preservation of records shall terminate at the end of three (3) years after the date final payment is made or termination of the Contract. The Contractor shall include this "Right to Audit and Preservation of Records" clause in all subcontracts issued by it shall require the same to be inserted by all lower tier Subcontractors in their subcontracts, for any portion of the Work. Should Contractor fail to include this clause in any such contract or lower tier contract, or otherwise fail to ensure the District's rights hereunder, Contractor shall be liable to the District for all costs, expenses and attorney's fees which the District may have to incur obtaining or attempting to obtain an audit or inspection of or the restoration of records which otherwise have been available to the District from said persons under this clause. Such audit may be conducted by the District or its authorized representative.

ARTICLE III. PROGRESS AND COMPLETION OF WORK

B-34 Progress Schedule

The Contractor shall submit to the District such schedules of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data, where applicable, as are required by the Contract Documents for the Work to be performed.

Prior to the first partial payment estimate, the Contractor shall submit construction progress schedules showing the order in which it proposes to carry on the Work, including dates at which it will start the various parts of the Work, estimated date of completion of each part and as applicable:

a) The dates at which special detail drawings will be required; and

b) Respective dates for submission of shop drawings, the beginning of manufacture, the testing and the installation of materials, supplies, and equipment.

c) The Contractor shall also submit a schedule of payments that it anticipates it will earn during the course of the Work.

The progress schedules shall be submitted regularly and shall cover a time period satisfactory to the Engineer. The Contractor shall also forward to the Engineer, with the request for progress payment each month, a summary report of the progress of the various parts of the Work under the Contract in the shops and in the field, stating the existing status, rate of progress, estimated time of completion, and cause of delay, if any. If the Work is behind the submitted schedule, the Contractor shall submit in writing a plan acceptable to the District and Engineer for bringing the Work up to schedule.

B-35 Commencement and Progress of the Work and Time of Completion

Prior to the start of construction, the District will conduct a preconstruction conference. At the conference, the District will review the planned development with the Engineer, Contractor, and other interested parties. Items to be reviewed include materials, equipment, rights-of-way, schedules and all arrangements for prosecuting the Work.

The Contractor shall begin work within twenty-one (21) calendar days after receiving a Notice to Proceed and shall diligently prosecute the work to completion within two hundred eighty (280) calendar days thereafter. This is the maximum number of calendar days regardless of weather or other potential delays. The Contractor shall have a fixed number of working days within the above timeframe to complete the work. A “working day” is defined as a calendar day in which any amount of work at the project site is performed. The Contractor shall provide the Engineer 48 hours’ notice, not counting weekends or holidays, prior to any working days. The Contractor is allowed up to one hundred seventy (170) working days to achieve final completion and be ready for final payment.

B-36 Suspension of Work

a) The Engineer may at any time, by notice in writing to the Contractor, suspend any part of the Work for such period of time as may be necessary to prevent improper execution of the Work on the project by the Contractor, its Subcontractors or agents, and the Contractor shall have no claim for damages or additional compensation on account of any such suspension.

b) The District may at any time suspend any part or all of the Work upon ten (10) calendar days written notice to the Contractor, who shall thereupon discontinue all Work suspended except for all operations to prevent loss or damage to Work already executed as may be directed by the Engineer. In the event a part of the Work is suspended, the Contractor, if the suspension is not through its fault or the fault of its Subcontractors or agents, shall be paid on the same basis as Extra Work for costs of work performed in accordance with such orders of the Engineer during

such suspension, provided that this shall not include any cost pertaining to Work not suspended by said notice. Work shall be resumed by the Contractor after such suspension on written notice from the District. In the event of suspension of the entire Work by the District, the Contractor, if the suspension is not through fault of the Contractor or the fault of its Subcontractors or agents, shall be paid the sum of $500.00 for each calendar day during which the entire Work shall have been suspended. Said sum is hereby mutually agreed upon as fixed and liquidated damages in full settlement of all costs and expenses, losses and damages resulting to the Contractor from such suspension. Work shall be resumed by the Contractor after such suspension on written notice from the District.

c) In the event of any suspension of the Work in whole or in part under subsection (b) above, the Contractor shall be entitled to an extension of time wherein to complete the Work to the extent of the delay caused the Contractor thereby.

d) In the event the entire Work shall be suspended by order of the District, as hereinabove provided, and shall remain so suspended for a period of sixty (60) consecutive calendar days, through no fault of the Contractor, and notice to resume the Work shall not have been served on the Contractor as hereinabove provided, Contractor may, at its option, by written notice to the District, terminate the Contract in the same manner as if the termination had been initiated by the District, and the District shall have no claim for damages because of such termination of the Contract.

e) If, through no act or fault of the Contractor, the Work is suspended for a period of more than ninety (90) calendar days by the District or under an order of Court or other public authority, or the Engineer fails to act on any request for payment within thirty (30) calendar days after it is submitted, or the District fails to pay the Contractor substantially the sum approved by the Engineer or any final award by arbitration or litigation within sixty (60) calendar days of its approval and presentation, then the Contractor may, after ten (10) calendar days from delivery of a written notice to the District and the Engineer, terminate the Contract and recover from the District payment for all Work executed and all expenses sustained.

In addition and in lieu of terminating the Contract, if the Engineer has failed to act on a request for payment or if the District has failed to make any payment as aforesaid, the Contractor may upon ten (10) calendar days written notice to the District and the Engineer stop the Work until he has been paid all amounts then due, in which event and upon resumption of the Work, Change Orders shall be issued for adjusting the Contract Price or extending the Contract Time or both to compensate for the costs and delays attributable to the stoppage of the Work.

If the performance of all or any portion of the Work is suspended, delayed, or interrupted as a result of a failure of the District or Engineer to act within the time specified in the Contract Documents, or if no time is specified, within a reasonable time, an adjustment in the Contract Price or an extension of the Contract Time, or both, shall be made by Change Order to compensate the Contractor for the costs and delays necessarily caused by the failure of the District or Engineer.

If the Contractor intends to file a claim for additional compensation for a delay caused by the District or Engineer at a particular time, the Contractor shall file a Notice of Claim with the District within seven (7) calendar days of the beginning of the occurrence. The Notice of Claim shall be in duplicate, in writing, and shall state the circumstances and the reasons for the Claim, but need not state the amount. No Claim for additional compensation will be considered unless a Notice of Claim has been filed with the District within the time and in the manner stated above. Contractor's failure to file a claim shall constitute a waiver.

B-37 Termination For Default - Damages For Delay - Timely Extension

a) The Contractor shall at all times employ such force, plant, materials, and tools as will be sufficient, in the opinion of the Engineer, to prosecute the Work at not less than the rates fixed under the terms of the Contract and to complete the Work or any part thereof within the time limits fixed therein. If the Contractor refuses or fails to prosecute the Work, or any separable part thereof, with such diligence as will ensure the completion within the time specified in the Contract, or any extension thereof, or fails to complete said Work within such time, the District may, after giving ten (10) calendar days written notice to the Contractor, terminate its right to proceed with the Work or such part of the Work as to which there has been delay.

b) The Contractor's right to proceed shall not be so terminated nor the Contractor charged with resulting damage if:

(i) The delay in the completion of the Work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to Acts of God, acts of the public enemy, acts of the District, acts of another contractor in the performance of a Contract with the District, fires, floods, excluding site flooding due to groundwater, epidemics, quarantine restrictions, unusually severe weather for the region, as determined by the Engineer; and

(ii) The Contractor shall, within 48 hours of the start of the occurrence, give notice to the District of the cause of the potential delay and an estimate of the possible time extension involved. The Contractor, within seven (7) calendar days from the beginning of any such delay (unless the Engineer grants further period of time before the date of final payment under the Contract), notifies the Engineer in writing of the causes of delay and requests an extension of time.

(iii) The Engineer shall ascertain the facts and the extent of the delay and extend the time for completing the Work when, in its judgment, the findings of fact justify such an extension, and its findings of fact shall be final and conclusive on the parties.

c) A request for an extension of time, or the granting of an extension of time, shall not constitute a basis for any claim against the District for additional compensation or damages unless caused by the District or another contractor employed by the District.

d) If the Contractor should be adjudged bankrupt, or if it should make a general assignment for the benefit of its creditors, or if a receiver should be appointed for the Contractor on account of its insolvency and not be discharged within ten (10) calendar days after its appointment, or if the Contractor should fail to make prompt payments to Subcontractors or suppliers, or should it persistently disregard laws, ordinances, or the instructions of the Engineer, or otherwise commit a substantial violation of any provisions of the Contract, the District may, after giving ten (10) calendar days written notice to the Contractor, terminate the Contract and the Contractor's right to proceed with the Work.

e) No extension of time will be considered for time lost due to weather conditions normal to the area. Unusual weather conditions, if determined by the Engineer to be of a severity that could not be predicted, may be considered as cause for an extension of Contract completion time.

f) Delays in delivery of equipment or material purchased by the Contractor or his Subcontractors shall not be considered as a just cause for delay. The Contractor shall be fully responsible for the timely ordering, scheduling, expediting delivery, and installation of all equipment and materials.

g) The rights and remedies of the District provided in this section are in addition to any of the rights and remedies provided by law or under this Contract.

h) In addition to the District's rights under this section, if at any time before completion of the work

under the Contract, it shall be determined by the District that reasons beyond the control of the parties hereto render it impossible or against the interests of the District to complete the Work, or if the Work shall be stopped by an injunction of a court of competent jurisdiction or by order of any competent authority, the District may, upon ten (10) calendar days written notice to the Contractor, discontinue the Work and terminate the Contract. Upon service of such notice of termination, the Contractor shall discontinue the Work in such manner, sequence, and at such times as the Engineer may direct. The Contractor shall have no claim for damages for such discontinuance or termination, nor any claim for anticipated profits on the Work thus dispensed with, nor any other claim except for the Work actually performed up to the time of discontinuance, including any extra work ordered by the Engineer to be done, nor for any claim for liquidated damages in accordance with the provisions of Section B-39.

B-38 Rights of District Upon Termination

a) In the event the right of the Contractor to proceed with the Work, or any portion thereof, has been terminated because of the fault of the Contractor and the Contractor has been given ten (10) calendar days' notice to cure such fault and has not done so, the District may take over the Work and prosecute the same to completion by contract or any other method the District deems expedient, and may take possession of and utilize in completing the Work such materials, appliances, equipment and plant as may be on the site of the Work and necessary therefor. Whether or not the Contractor's right to proceed with the Work is terminated, it and its sureties shall be liable for all damages including costs of managerial and administrative services, engineering, legal and other consultant fees, sustained or incurred by the District in enforcing the provisions of Section B-37 and in completing or causing to complete the Contract Work.

b) Upon termination the Contractor shall not be entitled to receive any further payment until the Work is finished. If upon completion of the Work the total cost to the District, including engineering, legal and other consultant fees, costs of managerial and administrative services, construction costs, and liquidated damages shall be less than the amount which would have been paid if the Work had been completed by the Contractor in accordance with the terms of the Contract, then the difference shall be paid to the Contractor in the same manner as the final payment under the Contract. If the total cost incurred by the District on account of termination of the Contract and subsequent completion of the Work by the District by whatever method the District may deem expedient shall exceed said amount which the Contractor would otherwise have been paid, the Contractor and its sureties shall be liable to the District for the full amount of such excess expense.

c) The rights and remedies of the District provided in this section are in addition to any of the rights and remedies provided by the law or under this Contract.

B-39 Failure to Complete the Work in the Time Agreed Upon - Liquidated Damages

a) Liquidated Damages - It is agreed by the parties to the Contract that time is of the essence; and that in case all the Work is not completed before or upon the expiration of the time limit as set in the Bid, Contract and Progress Schedule, or within any time extensions that may have been granted, damage will be sustained by the District; and that it may be impracticable to determine the actual amount of damage by reason of such delay; and it is, therefore, agreed that the Contractor shall pay to the District as damages the amount of $1,000 per day for each and every day's delay in finishing the Work in excess of the number of days specified. The parties expressly agree that this liquidated damage clause is reasonable under the circumstances existing at the time the Contract was made. The District shall have the right to deduct the amount of liquidated damages from any money due or to become due the Contractor.

b) In addition, the District shall have the right to charge to the Contractor and to deduct from the final or progress payments for the Work the actual cost to the District of legal, engineering, inspection,

superintendence, and other expenses, which are directly chargeable to the Contract and which accrue during the period of such delay, except that the cost of final inspection and preparation of the final estimate shall not be included in the charges.

c) Exclusions - Notwithstanding the provisions of subsection (a), the Contractor shall not be liable for liquidated damages or delays caused by the removal or relocation of utilities when such removal or relocation is the responsibility of the District or the owner of the utility under Government Code Section 4215.

B-40 Clean-up

During the progress of the Work, the Contractor shall maintain the site and related structures and equipment in a clean, orderly condition and free from unsightly accumulation of rubbish. Upon completion of Work and before the final estimate is submitted, the Contractor shall at its own cost and expense remove from the vicinity of the Work all plants, buildings, rubbish, unused work materials, concrete forms, and other like materials, belonging to it or used under its direction during the construction, and in the event of its failure to do so, the same may be removed by the District after ten (10) calendar days' notice to the Contractor, such removal to be at the expense of the Contractor. Areas crossed during construction shall be restored by the Contractor to the complete satisfaction of the Engineer, at the Contractor's expense.

ARTICLE IV. LEGAL RELATIONS AND RESPONSIBILITY

B-41 Compliance with Laws - Permits, Regulations, Taxes

Contractor is an independent contractor and shall at its sole cost and expense comply with all laws, rules, ordinances and regulations of all governing bodies having jurisdiction over the Work, obtain all necessary permits and licenses therefor, pay all manufacturers' taxes, sales taxes, use taxes, processing taxes, and all Federal and State taxes, insurance and contributions for social security and unemployment which are measured by wages, salaries or any remuneration paid to Contractor's employees, whether levied under existing or subsequently enacted laws, rules, or regulations. Contractor shall also pay all property tax assessments on materials or equipment used until acceptance by the District. If any discrepancy or inconsistency is discovered in the Plans or Specifications, or in this Contract in relation to any such law, rule, ordinance, regulation, order or decree, the Contractor shall forthwith report the same to the Engineer in writing. It shall also protect and indemnify the District, the Engineer, and all of the District's officers, agents, and servants against any claim or liability arising from or based upon the violation of any such law, rule, ordinance, regulation, order or decree, whether by the Contractor itself or by its employees. Particular attention is called to the following:

a) Without limitation, materials furnished and performance by Contractor hereunder shall comply with Safety Orders of the Division of Industrial Safety, State of California, Federal Safety regulations of the Bureau of Labor, Department of Labor; and any other applicable Federal regulations.

The Contractor, upon request, shall furnish evidence satisfactory to the District and Engineer that any or all of the foregoing obligations have been or are being fulfilled. The Contractor warrants to the District that it is licensed by all applicable governmental bodies to perform this Contract and will remain so licensed throughout the progress of the Work, and that it has, and will have, throughout the progress of the Work, the necessary experience, skill and financial resources to enable it to perform this Contract.

Government code section references shall be interpreted to be the most recent applicable version.

B-42 Prevailing Wage

a) The Contractor shall forfeit as penalty to the District the sum of Two Hundred Dollars ($200) for each calendar day or portion thereof for each worker (whether employed by the Contractor or Subcontractor) paid less than the stipulated prevailing rates for any Work done under the Contract in violation of the provisions of the Labor Code and in particular, Section 1775.

b) The District will not recognize any claims for additional compensation because of the payment of the wages set forth in the Contract Documents. The possibility of wage increases is one of the elements to be considered by the Contractor in determining its proposal, and will not under any circumstances be considered as the basis of a claim against the District or the Engineer.

c) The Contractor shall at all times keep posted at the jobsite current wage rates in effect for this Work.

d) This is a Public Works Project funded with Federal (FEMA) and District funds. Therefore both CA State prevailing wage rates and Federal wage rates will be required on this project, whichever wages are higher. The District requires that all contractors and subcontractors working on this project keep certified payroll records in accordance with California Labor Code 1776 and submit copies to the District.

(i) In accordance with the provisions of section 1720 et seq. of the Labor Code, the Division of Labor Standards and Research has determined the general prevailing rates or wages and employer payments for health and welfare, pension, vacation, travel time, and subsistence pay

as provided for in section 1773.8.

(ii) It shall be mandatory upon the Contractor herein and upon any Subcontractor to pay not less than the said specified rates to all laborers, workers and mechanics employed by them in the execution of the Agreement pursuant to CA Labor Code 1774.

(iii) Attention is directed to the provisions in section 1777.5 and sections 1777.6 of the Labor Code concerning the requirement to employ apprentices by the Contractor or any Subcontractor under it. The Contractor shall submit documentation to the District confirming compliance with these requirements.

(iv) The Contractor shall comply with and shall cause his subcontractors to comply with all laws and regulations governing the contractor's and subcontractor's performance on this project including, but not limited to: anti-discrimination laws, workers' compensation laws, and prevailing wage laws as set forth in CA Labor Code, Sections 1720-1861 et seq. and licensing laws, as well as Federal Labor Standards set forth in the Davis-Bacon Act (40 USC 276(a-a5), the Copeland "Anti-Kickback" Act (40 USC 276(c); and the Contract Work Hours and Safety Standards Act (CWHSSA) (40 USC 327-333). The contractor is required to include the prevailing wage language in all subcontracts pursuant to CA Labor Code 1775(E)(b)(1). The Contractor shall post, at appropriate conspicuous points on the site of the Project, a schedule showing all the determined general prevailing wage rates.

(v) The Contractor agrees to comply with Labor Code Section 1775 (Payment of the Prevailing Wage Rates) and Labor Code 1776 (keeping accurate records) and Labor Code 1777.5, placing responsibility for compliance with the statutory requirements for all apprenticeable occupations on the prime contractor. The Contractor shall comply with the requirements imposed by the California Labor Code Sections 1720 through 1861 regarding public works projects and prevailing wage laws and sections 16000-16800 of the CA Code of Regulations.

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

(vii) Holiday and overtime work when permitted by law shall be paid for at a rate of at least one and one-half times the above specified rate of per diem wages, unless otherwise specified.

(viii) Contractors and any Subcontractors shall be assessed penalties for violating the following labor codes; CA Labor Code 1813 for overtime, 1775 for underpayment of the prevailing wage, and 1776 for inaccurate or incomplete payroll records.

B-43 Labor Compliance and Discrimination

Pursuant to Labor Code section 1771.4, the Contract for this Project is subject to compliance monitoring and enforcement by the California Department of Industrial Relations.

a) On each job site that is subject to compliance monitoring and enforcement by the Department of Industrial Relations under this subchapter, the prime contractor shall post a Notice containing the following language:

"This public works project is subject to monitoring and investigative activities by the Division of Labor Standards Enforcement (DLSE), Department of Industrial Relations, State of California. This Notice is intended to provide information to all workers employed in the execution of the contract for public work and to all contractors and other persons having access to the job site to enable the DLSE to ensure compliance with and enforcement of prevailing wage laws on public works projects."

"The prevailing wage laws require that all workers be paid at least the minimum hourly wage as determined by the Director of Industrial Relations for the specific classification (or type of work) performed by workers on the project. These rates are listed on a separate job site posting of minimum prevailing rates required to be maintained by the public entity which awarded the public works contract. Complaints concerning nonpayment of the required minimum wage rates to

workers on this project may be filed with the DLSE."

Local Office Contact Information:

Telephone Number: 844-522-6734

Address: BOFE – Public Works
Attn: Complaints Unit
2031 2031 Howe Ave, Suite 100
Sacramento, CA 95825

"Complaints should be filed in writing immediately upon discovery of any violations of the prevailing wage laws due to the short period of time following the completion of the project that the DLSE may take legal action against those responsible."

"Complaints should contain details about the violations alleged (for example, wrong rate paid, not all hours paid, overtime rate not paid for hours worked in excess of 8 per day or 40 per week, etc) as well as the name of the employer, the public entity which awarded the public works contract, and the location and name of the project."

"For general information concerning the prevailing wage laws and how to file a complaint concerning any violation of these prevailing wage laws, you may contact any DLSE office. Complaint forms are also available at the Department of Industrial Relations website found at www.dir.ca.gov/dlse/PublicWorks.html."

Attention is directed to Section 1735 of the Labor Code, which reads as follows:

a) No discrimination shall be made in the employment of persons upon public works because of the race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, genetic information, marital status, sex, gender, gender identity, gender expression, age, sexual orientation, or military and veteran status of such persons, except as provided in Section 12940 of the Government Code, and every Contractor for public works violating this section is subject to all the penalties imposed for a violation of this chapter.

Federal Equal Opportunity Clauses from 41 CFR 60 1.4(b) also apply. See Part 4 for detailed outline of Federal requirements. See Part 5 for required Non-discrimination Form.

B-44 Eight-Hour Day Limitation

a) In accordance with the provisions of the Labor Code, and in particular, Sections 1810 to 1815 thereof, inclusive, eight hours labor shall constitute a day's work, and no worker, in the employ of said Contractor, or any Subcontractor, doing or contracting to do any part of the Work contemplated by this Contract, shall be required or permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week in violation of those provisions; provided that subject to Labor Code Section 1815, a worker may perform work in excess of either eight (8) hours per day or forty (40) hours during any one week upon compensation for all hours worked in excess of eight (8) hours per day or forty (40) hours during any one week at not less than one and one-half times the basic rate of pay.

b) The Contractor and each Subcontractor shall also keep an accurate record showing the names, addresses, social security numbers, work classifications, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by the Contractor and by the Subcontractor in connection with the work specified herein, which record shall be open at all reasonable hours to the inspection of the District, State and Federal officers and agents; and it is hereby further agreed that, except as

provided in (a) above, the Contractor shall forfeit as a penalty to the District the sum of one hundred dollars ($100) for each worker employed in the performance of this Contract by it or by any Subcontractor under it for each calendar day during which such worker is required or permitted to labor more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week in violation of Sections 1810 through 1815.

B-45 Compliance with State Requirements for Employment of Apprentices

The Contractor's attention is directed to Section 1777.2 through 1777.5 of the Labor Code; provisions of those Sections pertaining to employment of registered apprentices are hereby incorporated by reference into these Specifications. As applicable, the Contractor or any Subcontractor employed by it in the performance of the Contract work shall take such actions as necessary to comply with the provisions of Section 1777.5. Contractor shall provide the District copies of applicable forms or equivalent: DAS 140 – Public Works Contract Award Information; CAC2 – Training Fund Contributions; and any other communications relating to apprentices on public works projects. Contractor shall be solely liable for any and all fines assessed by the DIR or other agency or entity for non-compliance with any prevailing wage requirements.

B-46 Underground Utilities

In accordance with Government Code Section 4215, the Contractor shall be compensated for the costs of locating, repairing damage not due to the failure of the Contractor to exercise reasonable care, and removing or relocating existing main or trunkline utility facilities not indicated in the Contract Plans and Specifications with reasonable accuracy, and for the equipment on the project necessarily idled during such work; provided that the Contractor shall first notify the Engineer before commencing work on locating, repairing damage to, removing or relocating such utilities.

B-47 Water Pollution

The Contractor shall exercise every reasonable precaution to protect streams, lakes, reservoirs, and other waters of the state and/or United States from pollution with fuels, oils, bitumens, calcium chloride, and other harmful materials and shall conduct and schedule its operations so as to avoid or minimize muddying and silting of said streams, lakes, reservoirs, and water bodies. Care shall be exercised to preserve vegetation beyond the limits of construction. The Contractor shall comply with Section 5650 of the California Fish and Wildlife Code, State of California Construction General Permit, and all other applicable statutes and regulations relating to the prevention and abatement of water pollution.

B-48 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 governments.

B-49 Permits and Licenses

Except as otherwise provided in this Contract, the Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the lawful prosecution of the Work.

Procurement procedures shall be in conformance with 2 CFR Section 200.320.

B-50 Patents

The Contractor shall pay all applicable royalties and license fees and assume all costs arising from the use of patented materials, equipment and devices. The Contractor shall defend all suits or claims for infringement of any patent rights and save the District and Engineer and their duly authorized representatives harmless from loss on account thereof, except that the District shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer or

manufacturers is specified; however if the Contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Engineer.

This project is funded by a Federal Emergency Management Agency (FEMA) Grant. As such, in accordance with 2 CFR Section 200.315, FEMA reserves a royalty-free, nonexclusive, and irrevocable license to reproduce, publish or otherwise use, and to authorize others to use, for Federal Government purposes:

a) The copyright in any work developed under a grant, subgrant, or contract under a grant or subgrant; and

b) Any rights of copyright to which a grantee, subgrantee or a contractor purchases ownership with grant support.

B-51 Public Convenience

a) This section defines the Contractor's responsibility with regard to convenience of the public and public traffic in connection with its operations.

b) The Contractor shall so conduct its operations as to offer the least possible obstruction and inconvenience to the public and it shall have under construction no greater length or amount of work than it can prosecute properly with due regard to the rights of the public.

c) Spillage resulting from hauling operations along or across any publicly traveled way shall be removed immediately by the Contractor at the Contractor’s expense.

d) Construction operations shall be conducted in such a manner as to cause as little inconvenience as possible to abutting property owners.

e) Water shall be supplied if ordered by the Engineer for the alleviation or prevention of dust nuisance as provided in the Contract Documents.

B-52 Safety

a) General - The Contractor shall be solely and completely responsible for the conditions of the job site, including safety of all persons and property during performance of the Work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to all applicable Federal, State, and local laws, ordinances, and codes, and to the rules and regulations established by the California Division of Industrial Safety, and to other rules of law applicable to the Work.

b) The services of the Engineer in conducting construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's work methods, equipment, bracing or scaffolding or safety measures, in, on, or near the construction site, and shall not be construed as supervision of the actual construction nor make the Engineer or the District responsible for providing a safe place for the performance of work by the Contractor, Subcontractors, or suppliers; or for access, visits, use work, travel or occupancy by any person.

c) The Contractor shall carefully instruct all personnel working in potentially hazardous work areas as to the potential dangers and shall provide such necessary safety equipment and instruction as is necessary to prevent injury and damage to property. The Contractor shall appoint for the duration of this Contract, a qualified supervisor employee to develop and/or supervise the Contractor's job safety program that will effectively implement the safety provisions of the above agencies.

d) The Contractor, as a part of its safety program, shall maintain at its office or other well-known place at the job site, safety equipment applicable to the Work as prescribed by the aforementioned authorities, all articles necessary for giving first aid to the injured, and shall establish the procedure for the immediate removal to a hospital or a doctor's care of persons (including employees) who may be injured on the job site.

e) If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Engineer and the District. In addition, the Contractor must promptly report in writing to the Engineer all accidents whatsoever arising out of, or in connection with, the performance of the Work whether on, or adjacent to, the site, giving full details and statements of witnesses.

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

g) All work and materials shall be in strict accordance with all applicable State, Federal, and local laws, rules, regulations, and codes.

h) Nothing in this Contract is to be construed to permit work not conforming to governing law. When Contract Documents differ from governing law, the Contractor shall furnish and install the higher standards called for without extra charge. All equipment furnished shall be grounded and provided with guards and protection as required by safety codes. Where vapor-tight or explosion-proof electrical installation is required by law, this shall be provided.

i) Trenching and Worker Protection - In accordance with Section 6705 of the State Labor Code, the Contractor shall submit to the District specific plans to show details of provisions for worker protection from caving ground. Not less than thirty (30) calendar days before beginning excavation for any trench or trenches five (5) feet or more in depth required under this Contract, the Contractor shall furnish to the Engineer working drawings of its trench safety plan. The trench safety plan working drawings shall be detailed plans showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground. If such plan varies from the shoring system standards established by the Construction Safety Orders of the California Department of Industrial Relations or the Federal Safety and Health Regulations for Construction of the Occupational Safety and Health Administration, Department of Labor, the plan shall be prepared by a registered civil or structural engineer. In no event shall the Contractor use a shoring, sloping, or protective system less effective than that required by said Construction Safety Orders, or less effective than that required by said Federal Safety and Health Regulations for Construction. Submission of this plan in no way relieves the Contractor from the requirement to maintain safety in all operations performed by it or its Subcontractors.

j) Hazardous Wastes and Unforeseen Conditions - In accordance with Section 7104 of the State Public Contract Code, if the Work contemplated hereunder involves digging trenches or other earthwork activities, the Contractor shall promptly, and before the following conditions are disturbed, notify the District, in writing, of any: (i) 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; (ii) Subsurface or latent physical conditions at the site differing from those indicated; or (iii) 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. 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 herein. In the event that a dispute arises between the District and the Contractor whether the conditions materially differ, or

involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the Work, the Contractor shall not be excused from any scheduled completion date provided for herein, but shall proceed with all Work to be performed hereunder. The Contractor shall retain any and all rights provided either by contract or by law which pertain to the resolution of disputes and protests between the District and Contractor.

k) The Contractor shall perform all Work in a fire-safe manner. The Contractor shall supply and maintain onsite adequate firefighting equipment capable of extinguishing incipient fires. The Contractor shall comply with applicable Federal, State, and local fire prevention regulations and where the regulations do not cover, with applicable parts of the National Fire Prevention Standard for "Safeguarding Building Construction Operations," (NFPA No. 241).

B-53 Protection of Person and Property

a) The Contractor shall take whatever precautions are necessary to prevent damage to all existing improvements, including above ground and underground utilities, trees, shrubbery that is not specifically shown to be removed, fences, signs, mailboxes, survey markers and monuments, buildings, structures, the District's property, adjacent property, and any other improvements or facilities within or adjacent to the Work. If such improvements or property are injured or damaged by reason of the Contractor's operations, they shall be replaced or restored, at the Contractor's expense, to a condition at least as good as the condition they were in prior to the start of the Contractor's operations.

b) The Contractor shall adopt all practical means to minimize interference to traffic and public inconvenience, discomfort or damage. The Contractor shall protect against injury any pipes, conduits or other structures, crossing the trenching or encountered in the Work and shall be responsible for any injury done to such pipes or structures, or damage to property resulting therefrom. The Contractor shall support or replace any such structures without delay and without any additional compensation to the entire satisfaction of the Engineer. All obstructions to traffic shall be guarded by barriers illuminated at night. The Contractor shall be responsible for all damage to persons and property directly or indirectly caused by its operations and, under all circumstances, the Contractor must comply with the laws and regulations of the County and the State of California relative to safety of persons and property and the interruption of traffic and the convenience of the public within the respective jurisdictions.

B-54 Responsibility for Repair of Facilities

All public or private facilities, including but not limited to structures, telephone cables, roadways, parking lots, private drives, levees and embankments disturbed during construction of the Work shall be repaired and/or replaced by the Contractor to match facilities existing prior to construction. In addition, the Contractor shall be responsible for any settlement damage to such facilities or adjoining areas for a period of one year after acceptance of such required facilities.

B-55 Resolution of Construction Claims

a) For any claim arising under this Contract, the following procedures will apply:

(i) The claim must be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the day of final payment. Nothing in this subsection is intended to extend the time limit or supersede notice requirements for the filing of claims as set forth elsewhere in this Contract.

b) The Contractor shall proceed with the Work in accordance with the Plans and Specifications and determinations and instructions of the Engineer during the resolution of any claims disputes.

B-56 District's Repair

In the event the Contractor refuses or neglects to make good any loss or damage for which the Contractor is responsible under this Contract, the District may itself, or by the employment of others, make good any such loss or damage, and the cost and expense of doing so, including any reasonable engineering, legal and other consultant fees, and any costs of administrative and managerial services, shall be charged to the Contractor. Such costs and expenses may be deducted by the District from claims for payment made by the Contractor for Work completed or remaining to be completed.

B-57 Antitrust Claim Assignment

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

B-58 Waiver of Right to Rescind For Material Breach

The Contractor agrees that it can be adequately compensated by money damages for any breach of this Contract which may be committed by the District and hereby agrees that no default, act, or omission of the District or the Engineer, except for failure to make progress payments as a required by Section B-67, shall constitute a material breach of the Contract entitling the Contractor to cancel or rescind the provisions of this Contract or (unless the District shall so consent or direct in writing) to suspend or abandon performance of all or any part of the Work. The Contractor hereby waives any and all rights and remedies to which it might otherwise be or become entitled, save only its right to money damages.

B-59 Contractor's License Notice

Contractors are required by law to be licensed and regulated by the Contractors' State License Board which has jurisdiction to investigate complaints against contractors of a complaint if filed within three (3) years of the date of the alleged violation. Any questions concerning a contractor may be referred to the Registrar, Contractors' State License Board, 9835 Goethe Road, Sacramento, California. Mailing address: P.O. Box 26000, Sacramento, California 95826.

ARTICLE V. INSURANCE AND LIABILITY

B-60 Insurance

a) Neither the Contractor nor any Subcontractors shall commence any work until all required insurance has been obtained at their own expense. Such insurance must have the approval of the District as to limit, form, and amount, and shall be placed with insurers with a current A.M. Best's rating of no less than A-:VII.

b) Any insurance bearing on adequacy of performance shall be maintained after completion of the project for the full guarantee period.

c) Prior to execution of the Contract, the Contractor shall furnish the District with original endorsements effecting coverage for all policies required by the Contract. The Contractor shall not permit any Subcontractor identified in the Designation of Subcontractors form to commence work on this project until such Subcontractor has furnished the District with original endorsements effecting coverage for all insurance policies required by the Contract. The endorsements shall be signed by a person authorized by the insurer to bind coverage on its behalf. The Contractor's insurer shall provide complete, certified copies of all required insurance policies, including endorsements affecting the coverage required by this paragraph. The Contractor agrees to furnish one copy of each policy to the District, and additional copies as requested in writing, certified by an authorized representative of the insurer.

d) All of the Contractor's policies shall contain an endorsement providing that written notice shall be given to the District at least sixty (60) calendar days prior to termination, cancellation, or reduction of coverage in the policy.

e) Any policy or policies of insurance that the Contractor elects to carry as insurance against loss or damage to its construction equipment and tools shall include a provision therein providing a waiver of the insurer's right to subrogation against the District and the Engineer.

f) The requirements as to the types, limits, and the District's approval of insurance coverage to be maintained by the Contractor are not intended to and shall not in any manner limit or qualify the liabilities and obligations assumed by the Contractor under the Contract.

g) In addition to any other remedy the District may have, if the Contractor or any of the Subcontractors fails to maintain the insurance coverage as required in this Section, the District may obtain such insurance coverage as is not being maintained, in form and amount substantially the same as required herein, and the District may deduct the cost of such insurance from any amounts due or which may become due the Contractor under this Contract.

h) The Contractor and all Subcontractors shall, at their expense, maintain in effect at all times during the performance of work under the Contract not less than the following coverage and limits of insurance, which shall be maintained with insurers and under forms of policy satisfactory to the District. The maintenance by the Contractor and all Subcontractors of the following coverage and limits of insurance is a material element of this Contract. The failure of the Contractor or any Subcontractor to maintain or renew coverage or to provide evidence of renewal may be treated by the District as a material breach of this Contract.

(i) Worker's Compensation and Employer's Liability Insurance.

a. Worker's Compensation – The Contractor shall Provide, during the life of this Contract, workers' compensation insurance for all of the employees engaged in Work under this Contract, on or at the Project site, and, in case any of sublet Work, the Contractor shall require each subcontractor similarly to provide workers' compensation insurance for all the latter's employees as prescribed by State law. Any class of employee or employees not

covered by a subcontractor's insurance shall be covered by the Contractor's insurance. In case any class of employees engaged in work under this Contract, on or at the Project site, is not protected under the Workers' Compensation Statutes, the Contractor shall provide or shall cause a subcontractor to provide, adequate insurance coverage for the protection of such employees not otherwise protected. The Contractor is required to secure payment of compensation to his employees in accordance with the provisions of Section 3700 of the Labor Code. The Contractor shall file with the District certificates of its insurance protecting workers and shall provide certificates at any time upon request. Company or companies providing insurance coverage shall be acceptable to the District, if in the form and coverage as set forth in the Contract Documents.

b. Contractor shall assume the immediate defense of and indemnify and save harmless the District and its officers and employees, agents, and consultants from all claims, loss, damage, injury, and liability of every kind, nature, and description brought by any person employed or used by Contractor, or any subcontractor, to perform the Work under this contract regardless of responsibility or negligence. Contractor hereby agrees to waive rights of subrogation which any insurer of Contractor may acquire from Contractor by virtue of the payment of any loss. Contractor agrees to obtain any endorsement that may be necessary to effect this waiver of subrogation. The Workers' Compensation Policy shall be endorsed with a waiver of subrogation in the favor of the District for all work performed by the Contractor, its employees, agents and subcontractors.

c. The Contractor and all Subcontractors shall maintain insurance to protect the Contractor or Subcontractor from all claims under Worker's Compensation and Employer's Liability Acts, including Longshoremen's and Harbor Worker's Act. Such coverage shall be maintained, in type and amount, in strict compliance with all applicable State and Federal statutes and regulations. The Contractor shall execute a certificate in compliance with Labor Code Section 1861.

(ii) Claims Against District - If an injury occurs to any employee of the Contractor or any of the Subcontractors for which the employee or its dependents, in the event of its death, may be entitled to compensation from the District under the provisions of the said Acts, or for which compensation is claimed from the District, there will be retained out of the sums due the Contractor under this Contract, an amount sufficient to cover such compensation as fixed by said Acts, until such compensation is paid or it is determined that no compensation is due. If the District is required to pay such compensation, the amount so paid will be deducted and retained from such sums due, or to become due the Contractor.

(iii) Commercial General Liability and Automobile Liability Insurance - the Contractor shall provide and maintain the following commercial general liability and automobile liability insurance:

a. Coverage – coverage for commercial general liability and automobile liability insurance shall be at least as broad as the following:
    i. Insurance Services Office (ISO) Commercial General Liability Coverage (Occurrence Form CG 0001)
    ii. Insurance Services Office (ISO) Business Auto Coverage (Form CA 0001), covering Symbol 1 (any auto)

b. Limits – the Contractor shall maintain limits no less than the following:
    i. General Liability - Five million dollars ($5,000,000) per occurrence or the full per occurrence limits of the policies available, whichever is greater for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit or products-completed operations aggregate limit is used, either the general aggregate limit shall apply separately to the project/location (with the ISO CG 2503, or ISO CG 2504, or insurer's equivalent endorsement provided to District) or the general aggregate limit and products-completed operations aggregate limit shall be twice the required occurrence limit.
    ii. Automobile Liability - One million dollars ($1,000,000) for bodily injury and property damage each accident limit.

c. Required Provisions - the general liability, auto liability and excess liability policies are to contain, or be endorsed to contain, the following provisions:
    i. The District, its directors, officers, employees, and authorized volunteers are to be given insured status at least as broad as ISO endorsement CG 2010 11 85; or both CG 20 10 10 01 and CG 20 37 04 13 (or the CG 20 10 04 13 (or earlier edition date) specifically naming all of the District parties required in this agreement, or using language that states “as required by contract”). All Subcontractors hired by Contractor must also have the same forms or coverage at least as broad; as respects (via CG 20 38 04 13): liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor; premises owned, occupied or used by the Contractor; and automobiles owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the District, its directors, officers, employees, or authorized volunteers.
    ii. It is understood and agreed to by the parties hereto and the insurance company(s), that the Certificate(s) of Insurance and policies shall so covenant and shall be construed as primary, and the District insurance and/or deductibles and/or self-insured retentions or self-insured programs shall not be construed as contributory using the ISO endorsement CG 20 01 04 13 or coverage at least as broad.
    iii. Any failure to comply with reporting or other provisions of the policies including breaches of warranties shall not affect coverage provided to the District, its directors, officers, employees, or authorized volunteers.
    iv. 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.
    v. Each insurance policy required above shall provide that coverage shall not be canceled, except with notice to the District.
d. Such liability insurance shall indemnify the Contractor and his/her sub-contractors against loss from liability imposed by law upon, or assumed under contract by, the Contractor or his/her sub-contractors for damages on account of such bodily injury (including death), property damage, personal injury, completed operations, and products liability.
e. The general liability policy shall cover bodily injury and property damage liability, owned and non-owned equipment, blanket contractual liability, completed operations liability, explosion, collapse, underground excavation, and removal of lateral support.
f. The automobile liability policy shall cover all owned, non-owned, and hired automobiles.
g. All of the insurance shall be provided on policy forms and through companies satisfactory to the District.
h. The comprehensive general and automobile liability insurance coverage shall also include the following:
    i. Provision or endorsement naming the District, the Engineer and its consultants, and each of their officers, employees, and agents, each as additional insureds in regards to liability arising out of the performance of any work under the Contract and providing that such insurance is primary insurance as respects the interest of the District and Engineer and that any other insurance maintained by the District and Engineer is excess and not contributing insurance with the insurance required hereunder.
    ii. "Cross Liability" or "Severability of Interest" clause.
    iii. Provision or endorsement stating that such insurance, subject to all of its other terms and conditions, applies to the liability assumed by the Contractor under the Contract, including, without limitation, that set forth in Section B-61, Indemnity and Litigation Costs.

iv. Provision or endorsement stating that any failure to comply with reporting or other provisions of the policies including breaches of warranties shall not affect coverage provided to the District, its officers, officials, employees, or volunteers.

i) Deductibles and Self-Insured Retentions - Insurance deductibles or self-insured retentions must be declared by the Contractor, and such deductibles and retentions shall have the prior written consent from the District. At the election of the District the Contractor shall either 1) reduce or eliminate such deductibles or self-insured retentions, or 2) procure a bond which guarantees payment of losses and related investigations, claims administration, and defense costs and expenses. Policies containing any self-insured retention (SIR) provision shall provide or be endorsed to provide that the SIR may be satisfied by either the named or additional insureds, co-insurers, and/or insureds other than the First Named Insured.

j) Acceptability of Insurers - Any insurance carrier providing insurance coverage required by the Contract Documents shall be admitted to and authorized to do business in the State of California unless waived, in writing, by the District Risk Manager. Carrier(s) shall have an A.M. Best rating of not less than an A-: VII or better.

k) Responsibility for Work - Until the completion and final acceptance by the District of all the work under and implied by this agreement, the work shall be under the Contractor's responsible care and charge. The Contractor shall rebuild, repair, restore and make good all injuries, damages, re-erections, and repairs occasioned or rendered necessary by causes of any nature whatsoever.

a. The Contractor shall provide and maintain builder's risk insurance (or installation floater) covering all risks of direct physical loss, damage or destruction to the work in the amount specified in the General Conditions, to insure against such losses until final acceptance of the work by the District. Such insurance shall insure at least against the perils of fire and extended coverage, theft, vandalism and malicious mischief, and collapse. The District, its directors, officers, employees, and authorized volunteers shall be named insureds on any such policy. The making of progress payments to the Contractor shall not be construed as creating an insurable interest by or for the District or be construed as relieving the Contractor or his/her subcontractors of responsibility for loss from any direct physical loss, damage or destruction occurring prior to final acceptance of the work by the District.

b. The Contractor shall waive all rights of subrogation against the District, its directors, officers, employees, or authorized volunteers.

l) Evidences of Insurance - Prior to execution of the agreement, the Contractor shall file with the District a certificate of insurance (Acord Form 25 or equivalent) signed by the insurer's representative evidencing the coverage required by this agreement. Such evidence shall include an additional insured endorsement signed by the insurer's representative and evidence of waiver of rights of subrogation against the District (if builder's risk insurance is applicable). Such evidence shall also include (1) attached additional insured endorsements with primary & non-contributory wording, (2) Workers' Compensation waiver of subrogation, and (3) a copy of the CGL declarations or endorsement page listing all policy endorsements, and confirmation that coverage includes or has been modified to include Required Provisions 1-5 above. The District reserves the right to obtain complete, certified copies of all required insurance policies, at any time. Failure to continually satisfy the Insurance requirements is a material breach of contract.

m) Continuation of Coverage - The Contractor shall, upon demand of the District deliver evidence of coverage showing continuation of coverage for at least (10) years after completion of the project. Contractor further waives all rights of subrogation under this agreement. When any of the required coverages expire during the term of this agreement, the Contractor shall deliver the renewal certificate(s) including the general liability additional insured endorsement and evidence of waiver of rights of subrogation against the District (if builder's risk insurance is applicable) to the District at

least ten (10) days prior to the expiration date.

n) Subcontractors - In the event that the Contractor employs other contractors (Subcontractors) as part of the work covered by this agreement, it shall be the Contractor's responsibility to require and confirm that each sub-contractor meets the minimum insurance requirements specified above. The Contractor shall, upon demand of the District, deliver to the District copies such policy or policies of insurance and the receipts for payment of premiums thereon.

o) 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.

p) The District reserves the right to modify these insurance requirements, including limits, based on the nature of the risk, prior experience, insurer, coverage or other circumstances.

B-61 Indemnity and Litigation Cost

a) Promptly upon execution of the Contract, the Contractor specifically obligates itself and hereby agrees to protect, hold free and harmless, defend and indemnify the District, the Engineer and its consultants, and each of their officers, officials, employees and agents, from and against any and all liability, penalties, costs, losses, damages, expenses, causes of action, claims or judgments, including without limitation attorneys' fees and other costs of litigation, which arise out of or are in any way connected with the Contractor's, or its Subcontractors' or suppliers', performance of Work under this Contract or failure to comply with any of the obligations contained in the Contract. This indemnity shall not extend, however, to attorney fees and costs incurred by the District in prosecuting or defending against the Contractor in any proceeding under Section B-8, and shall imply no reciprocal right of the Contractor in any action on the contract pursuant to California Civil Code section 1717 or section 1717.5. To the extent legally permissible, this indemnity and hold harmless agreement by the Contractor shall apply to any acts or omissions, whether active or passive, on the part of the Contractor or its agents, employees, representatives, or Subcontractor's agents, employees and representatives, resulting in liability, irrespective of whether or not any acts or omissions of the parties to be indemnified hereunder may also have been a contributing factor to the liability, except such loss or damage which was caused by the active negligence, sole negligence or willful misconduct of the District.

b) In any and all claims against the District or the Engineer and its consultants, and each of their officers, employees and agents by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation under this Section shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under Worker's Compensation statutes, disability benefit statutes or other employee benefit statutes.

c) Each party to this Contract has been represented by counsel in the negotiation and execution of this Contract.

B-62 Protection of Work

a) The Contractor shall be responsible for the care of all work until completion and final acceptance; and the Contractor shall, at its own expense replace damaged or lost material and repair damaged parts of the Work or the same may be done at the Contractor's expense by the District and the Contractor and its sureties shall be liable therefore. The Contractor shall make its own provisions for properly storing and protecting all material and equipment against theft, injury, or damage from any and all causes. Damaged material and equipment shall not be used in the Work. The Contractor shall take all risks from floods and casualties except as provided by law, and shall

make no charge for the restoration of such portions of the Work as may be destroyed or damaged by flood or other casualties or because of danger from flood or other casualties or for delays from such causes. The Contractor may, however, be allowed a reasonable extension of time on account of such delays, subject to the conditions hereinbefore specified. The Contractor shall not be responsible for the cost, in excess of five percent (5%) of the contracted amount, of repairing or restoring damage to the Work, if the damage was proximately caused by an earthquake in excess of a magnitude of 3.5 on the Richter Scale or by tidal waves; provided that the Work damaged was built in accordance with accepted and applicable building standards, and the Plans and Specifications of the District.

b) The Contractor shall effectively secure and protect adjacent property and structures. The Contractor shall be responsible that no loss or inconvenience shall accrue to the owner or tenant by virtue of its fences having been opened or the gate not having been either shut or attended at all times. In all cases where the Contractor removes fences to obtain work room, it shall provide and install temporary fencing as required, and on completion of construction shall restore the original fence to the satisfaction of the Engineer. All costs of providing, maintaining and restoring gates and fencing shall be borne by the Contractor. The Contractor shall provide and maintain all passageways, guard fences, lights and other facilities for protection required by public authority or local conditions.

c) The Contractor shall use extreme care during construction to prevent damage from dust to crops and adjacent property. The Contractor, at its own expense, shall provide adequate dust control and take other preventive measures as directed by the Engineer.

d) The Contractor shall be responsible for all damage to any property resulting from trespass by the Contractor or its employees in the course of their employment, whether such trespass was committed with or without the consent or knowledge of the Contractor.

e) The Contractor shall see that the work site is kept drained and free of all ground water and any other water which may impede the progress or execution of the Contract work.

f) The Contractor shall be responsible for any damage caused by drainage or water runoff from construction areas and from construction plant areas. In an emergency affecting the safety of life, or of the Work, or of adjoining property, the Contractor, without special instruction or authorization from the Engineer, is hereby permitted to act at the Contractor's discretion to prevent such threatened loss or injury, and it shall so act without appeal if so instructed or authorized. Any compensation claimed by the Contractor on account of emergency work shall be determined as specified under Section B-3. Should the Engineer deem an emergency condition to exist, the Contractor shall immediately do those things and take those steps ordered by the Engineer. The decision of the Engineer in this respect shall be final and conclusive. Any claims for compensation made by the Contractor on account of emergency work shall be determined as specified under Section B-3.

g) Except as provided by Government Code Section 4215, the Contractor shall be responsible for the removal, relocation and protection of all public and private utilities, including irrigation facilities in the nature of utilities, located on the site of the construction project if and to the extent that the same are identified in the Contract Documents, and the Contractor shall not be entitled to any extension of time or claim for damages for extra compensation in connection therewith. If and to the extent that such utilities or facilities are not identified in the Contract Documents, as between the Contractor and the District, the District will be responsible for the cost of their removal, relocation or protection, as the case may be, but the Contractor shall perform any such work in conformance with applicable provisions of Sections B-3 and B-4, if so directed by the Engineer and in such situation the Contractor shall not be responsible for delay in completion of the project caused by the failure of the District or the owner of the utility to provide for such removal or relocation. If the Contractor, while performing the Contract, discovers utility or irrigation facilities

not identified by the District in the Contract Documents, it shall immediately notify the Engineer in writing.

B-63 No Personal Liability

Neither the District, the Engineer, nor any of their other officers, agents, or employees nor any other public office shall be personally responsible for any liability arising under the Contract, except such obligations as are specifically set forth herein.

ARTICLE VI. MEASUREMENT AND PAYMENT

B-64 Measurement of Quantities

a) Where the Contract provides for payment on a lump sum price basis, the Contractor shall submit a price breakdown to the Engineer immediately after award of the Contract. The price breakdown as agreed upon between the Contractor and the Engineer shall be used for preparing future estimates for partial payments to the Contractor and shall list the major items of Work and a price for each item. Overhead and other general costs and profit shall be prorated to each item so that the total of all items equals the lump sum price. The price breakdown shall be subject to the approval of the Engineer and Contractor may be required to verify the prices for any or all items.

Where the Contract provides for payment on a unit price basis, the quantities of work performed will be computed by the Engineer on the basis of measurements taken by the Engineer.

b) Whenever the estimated quantities of Work to be done and materials to be furnished under this Contract are shown in any of the documents including the Proposal, they are given for use in comparing bids and the right is especially reserved, except as herein or otherwise specifically limited, to increase or diminish them as may be deemed reasonably necessary or desirable by the District to complete the Work contemplated by this Contract and such increase or diminution shall in no way violate this Contract, nor shall any such increase or diminution give cause for claims, liability for damage or adjustment to the Contract time bid price.

B-65 Scope of Payment

a) 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 District and for all risks of every description connected with the prosecution of the Work, also for all expenses incurred in consequence of the suspension or discontinuance of the Work as provided in the Contract; and for completing the Work according to the Specifications and Plans. 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 material.

b) No compensation will be made in any case for loss of anticipated profits. Increased or decreased work involving supplemental agreements will be paid for as provided in such agreements.

B-66 Progress Estimate

At the end of each month where work was performed, the Contractor will submit to the Engineer a partial payment estimate filled out and signed by the Contractor covering the Work performed during the period covered by the partial pay estimate and supported by such data as the Engineer may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the District, as will establish the District's title to the material, and equipment and protect its interest therein, including, applicable insurance. The Engineer will within seven (7) calendar days after receipt of each partial payment estimate either recommend payment to the District or return the estimate to the Contractor indicating in writing its reasons for refusing to approve payment. In the latter case, the Contractor may make the necessary corrections and resubmit the partial pay estimate.

Payroll certification forms provided by the Contractor and fully executed shall be filed with the Engineer at the time of submission of each partial payment estimate and also when the claim for final payment is

submitted. Wage Report forms shall be completed and submitted as set forth in Parts 4 and 5.

B-67 Progress Payments

a) The Contractor is made aware that the District will approve all partial payments.

b) Upon receipt of an undisputed, properly submitted progress estimate from the Contractor, recommended by the Engineer, the District shall act in accordance with the following:

(i) Each payment request shall be reviewed by the District as soon as practicable after receipt for the purpose of determining that the progress estimate is a proper payment request.

(ii) Any payment request determined not to be a proper payment request suitable for payment shall be returned to the Contractor as soon as practicable but not later than seven (7) calendar days after receipt. A request returned pursuant to this paragraph shall be accompanied by a document setting forth in writing the reasons why the payment request is not proper.

c) The number of days available to the District to make a payment without incurring interest pursuant to this section shall be reduced by the number of days by which the District exceeds the ten-day return requirement set forth herein.

d) The District will pay the Contractor ninety-five percent (95%) of the amount of each progress estimate within sixty (60) calendar days after receipt of an undisputed, properly submitted progress estimate from the Contractor, recommended by the Engineer. If the District fails to pay an undisputed progress estimate within the allotted sixty (60) calendar days, the District shall pay interest to the Contractor equivalent to the legal rate set forth in subdivision (s) of Section 685.010 of the Code of Civil Procedures. Five percent (5%) of amount of each estimate shall be retained by the District until final completion and acceptance of all Work under Contract.

e) When, in the judgment of the Engineer, the work is not proceeding in accordance with the provisions of the Contract, or when in the Engineer's judgment the total amount of the work done since the last estimate amounts to less than $1,000, no pay estimate will be prepared and no progress payment will be made.

f) No progress estimate or payment shall be considered to be an approval or acceptance of any work, materials, or equipment. Estimated amounts and values of work done and materials and equipment furnished will be confirmed with actual amounts and values as they become available in subsequent progress estimates, progress payments and the final estimate and payment. All estimates and payments will be subject to correction in subsequent progress estimates and payments and the final estimate and payment.

g) The District requires that any payments due to Subcontractors for a portion of the Work satisfactory completed shall be made by Contractor to Subcontractors within thirty (30) calendar days of District's payment to Contractor. Failure to make such payments in a timely fashion may result in the District issuing future progress payments by joint check to the Contractor and Subcontractors.

h) It is mutually agreed between the parties to the Contract that no payments made under the Contract, including progress payments and the final payment, shall be evidence of the performance of the Contract, either wholly or in part, and no payment shall be construed to be an acceptance of any defective or incomplete work or improper materials.

B-68 Liens and Stop Notices

The Contractor agrees to keep the Work, the site of the Work and all monies held by the District free and clear of all liens and stop notices related to labor and materials furnished in connection with the Work, if

permitted by law. Furthermore, the Contractor waives any right it may have to file any type of lien or stop notice in connection with the Work. Notwithstanding anything to the contrary contained in the Contract documents, if any such lien or stop notice is filed or there is evidence to believe that lien or stop notice may be filed at any time during the progress of the Work or within the duration of this Contract, the District may refuse to make any payment otherwise due the Contractor or may withhold any payment due the Contractor a sum sufficient in the opinion of the District to pay all obligations and expenses necessary to satisfy such lien or stop notice. The District may withhold such payment unless or until the Contractor, within ten (10) calendar days after demand therefor by the District, shall furnish satisfactory evidence that the indebtedness and any lien or stop notice in respect thereof has been satisfied, discharged and released of record, or that the Contractor has legally caused such lien or stop notice to be released of record pending the resolution of any dispute between the Contractor and any person or persons filing such lien or stop notice. If the Contractor shall fail to furnish such satisfactory evidence within ten days of the demand therefor, the District may discharge such indebtedness and deduct the amount thereof, together with any and all losses, costs, damages and attorney's fees suffered or incurred by the District from any sum payable to the Contractor under the Contract documents, including but not limited to final payment and retained percentage. This Section shall be specifically included in all Subcontracts and purchase orders entered into by the Contractor.

B-69 Final Acceptance and Date of Completion

Whenever the Contractor shall deem all Work under this Contract to have been completed in accordance therewith, it shall so notify the Engineer in writing, and the Engineer shall promptly ascertain whether the Work has been satisfactorily completed and, if not, shall advise the Contractor in detail and in writing of any additional work required. When all the provisions of the Contract have been fully complied with to the satisfaction of the Engineer, the Engineer shall proceed with all reasonable diligence to determine accurately the total value of all Work performed by the Contractor at the prices set forth in the Contract or fixed by Change Orders, and the total value of all extra work, all in accordance with the Contract. The Engineer will then certify to said final estimate and to the completion of the Work, and will file copies thereof with the District and the Contractor. The date of completion shall be the date upon which the District makes its formal written acceptance of the Work.

B-70 Final Payment

Within ten (10) calendar days after the date of completion, the District will file in the Office of the County Recorder, a Notice of Completion of the Work herein agreed to be done by the Contractor. On the expiration of thirty-five (35) calendar days after the recordation of such Notice of Completion the difference between said final estimate and all payments theretofore made to the Contractor shall be due and payable to the Contractor, subject to any requirements concerning the furnishings of a maintenance bond, and excepting only such sum or sums as may be withheld or deducted in accordance with the provisions of this Contract. All prior certifications upon which partial payments may have been made, being merely estimates, shall be subject to correction in the final certificate.

B-71 Final Release

Final payment to the Contractor in accordance with the final estimate is contingent upon the Contractor furnishing the District with a signed written release of all claims against the District arising by virtue of the Contract. Disputed Contract claims in stated amounts may be specifically excluded by the Contractor from the operation of the release. The release shall be in substantially the following form:

WAIVER AND RELEASE UPON FINAL PAYMENT

The undersigned has been paid in full by the Humboldt Bay Municipal Water District (District) for all labor, services, equipment and material furnished to the District for the Samoa Reservoir Seismic Retrofit Project located in Humboldt County, California, and does hereby waive and release the District, its officers, agents, and employees, from all claims and liability to the Contractor arising out of, or in any way connected with, the Contract, except for the disputed contract claims specified below:

Notice of Disputed Claim

Amount of Claim

$_____

Dated: _____ _____
(Name of Contractor)

By: _____
(Title)

Any payment, however, final or otherwise shall not release the Contractor or its sureties from obligations under the Contract Documents or Performance and Payment Bonds.

B-72 Right to Withhold Payments

a) In addition to all other rights and remedies of the District hereunder and by virtue of the law, the District may withhold or nullify the whole or any part of any partial or final payment to such extent as may reasonably be necessary to protect the District from loss on account of:

(i) Defective work not remedied, irrespective of when any such work be found to be defective;
(ii) Claims or liens filed or reasonable evidence indicating probable filing of claims or liens including, but not limited to claims under Sections 1775, 1776, or 1777.7 of the Labor Code;
(iii) Failure of the Contractor to make payments properly for labor, materials, equipment, or other facilities, or to Subcontractors and/or suppliers;
(iv) A reasonable doubt that the Work can be completed for the balance then unearned;
(v) A reasonable doubt that the Contractor will complete the Work within the agreed time limits;
(vi) Costs to the District resulting from failure of the Contractor to complete the Work within the proper time; or
(vii) Damage to Work or property.
(viii) Damage to another Contractor.
(ix) Performance of Work in violation of the Terms of the Contract Documents.
(x) Where work on unit items is substantially complete, but lacks cleanup and/or other corrections ordered by the Engineer, amounts shall be deducted from the unit prices in partial payment estimates to amply cover such cleanup and correction.
(xi) Failure to file required Equal Opportunity and Affirmative Action forms.

b) Whenever the District shall, in accordance herewith, withhold any monies otherwise due the Contractor, written notice of the amount withheld and the reasons therefore will be given the Contractor. After the Contractor has corrected the enumerated deficiencies, the District will promptly pay to the Contractor the amount so withheld. When monies are withheld to protect the District against claims or liens of mechanics, material men, Subcontractors, etc., the District may at its discretion permit the Contractor to deliver a surety bond in terms and amount satisfactory to the District, indemnifying the District against any loss or expense, and upon acceptance thereof by the District, the District shall release to the Contractor monies so withheld.

B-73 Waiver of Interest

The District shall have no obligation to pay and the Contractor hereby waives the right to recover interest with regard to monies which the District is required to withhold by reason of judgment, order, statute or judicial process.

B-74 Satisfaction of Claims and Liens

Neither the final payment nor any part of the retained percentage shall become due until the Contractor, if required, shall deliver to the District, a complete release of all liens and claims arising out of this Contract, or receipts in full in lieu thereof and, if required in either case, an affidavit that so far as it has knowledge or information the releases and receipts include all the labor and material for which a lien or claim could be filed; but the Contractor may, if any Subcontractor refuses to furnish a release or receipt in full, furnish a bond satisfactory to the Engineer, to indemnify the District against any lien or claim. If any lien or claim remains unsatisfied after all payments are made, the Contractor shall refund to the District all monies that the latter may be compelled to pay in discharging such a lien, or claim, including all costs and reasonable attorney's fees.

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PART 4
SPECIFICATIONS

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. General:

1. The Contract Documents describe the Work to be performed under this Contract which includes, but is not limited to, furnishing all plant, tools, equipment, materials, supplies, and manufactured articles for the Project. The Project consists of improvement work at the 1 MG industrial reservoir at the Samoa site as further summarized below:

    a. 1 MG Industrial Reservoir at Samoa

        1) Designing, furnishing, and replacing the roof beams, cover plates, and other related materials as shown on the Drawings

        2) Designing, furnishing, and replacing the access ladders (interior and exterior)

        3) Designing, furnishing, and installing a new platform adjacent to the top of the new exterior ladder.

        4) Rerouting and reconnection of electrical and controls

        5) Miscellaneous retrofits to tank features

        6) Structural modifications

        7) Paving and site restoration

        8) Sandblasting and coating of the entire interior and exterior of the tank, roof, and appurtenances

        9) Modification of piping with flexible couplers (additive bid item)

2. Work at the tank shall also include the furnishing of all transportation and services, including fuel, power, water, and essential communications necessary for the performance of all labor, work, or other operations required for the performance of the Contract in accordance with the Contract Documents.

3. Work also includes the final site cleanup, restoration, hydroseeding of disturbed areas, and other required work.

4. The Contractor shall carefully review all sections of the Drawings and Specifications in order to completely understand the Work and all constraints including schedule, environmental, permit and material requirements.

5. The Contractor is encouraged to proceed in an orderly and expeditious manner based on the constraints shown on the Drawings and described in the Specifications. All Work is to be constructed in strict accordance with the Contract Drawings and Specifications and subject to the terms and conditions of the Contract.

B. Location of the Work:

1. Humboldt Bay Municipal Water District’s 1-MG industrial reservoir is located near Samoa, CA accessed via Highway 255 and then on to New Navy Base Road.

2. The Owner shall give right of way access to the work site. Work will be strictly confined to the designated areas.

C. Contractor's Duties:

1. Except as specifically noted, provide and pay for all:
    a. Labor, materials, and equipment.
    b. Tools, construction equipment, and machinery.
    c. Water, heat, and utilities required for construction.
    d. All other facilities and services necessary for proper execution and completion of Work.
2. Pay legally required sales, consumer and use taxes.
3. Secure and pay for, as necessary for proper execution and completion of the Work, all applicable permits and licenses, except when explicitly noted otherwise.
4. Give required notices.
5. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of the Work.
6. Promptly submit written notice to Engineer of observed variance of Contract Documents from legal requirements.
7. If any Subcontractor or person employed by the Contractor shall appear to the Engineer to be incompetent or to act in a disorderly or improper manner, they shall be discharged immediately on notice given by the Engineer, and such person shall not again be employed on the Work.
8. The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with this project. The Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to all persons on the jobsite.
9. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons (including employees) and property during performance of the Work. This requirement shall apply continuously and not be limited to normal working hours.
10. Safety provisions shall conform to U.S. Department of Labor (OSHA), the California Occupational Safety and Health Act, and all other applicable Federal, State, County, and local laws, ordinances, codes, the requirements set forth below, and any regulations that may be detailed in other parts of these Specifications.
    a. The Contractor shall have at the worksite copies of suitable extracts of the Construction Safety Orders of Cal-OSHA.
    b. All work shall comply with the provisions of these and all other applicable laws, ordinances, and regulations.

D. All equipment shall be maintained in proper working order, including proper muffling.

1.02 CONTRACT DESCRIPTION

A. Description:

1. The Contractor is advised to carefully review all sections of the Drawings and Specifications in order to completely understand the Work and all constraints including the schedule, permit, and material requirements.
2. All Work is contained in this Contract. The limits of Work are shown in the Contract Drawings and described in these Specifications. It will be the Contractor's responsibility to coordinate their activities to resolve conflicts.
3. All risk of loss, damage or diminution to the Work shall rest with Contractor until final acceptance of the Work by the District.

1.03 WORK SEQUENCE AND CONSTRAINTS

A. The Contractor shall note that only certain constraints are addressed in this section. All Work, whether or not addressed here, shall be governed by applicable parts of this section, and schedules and procedures further submitted for approval.

B. The Contractor shall coordinate all construction sequencing and isolation of facilities with District staff.

C. The first order of business is submission of submittals. Complete submittals for all items to be incorporated into the Work shall be made no later than twenty (20) working days following receipt of Notice to Proceed.

D. The Contractor shall submit a complete work schedule to be approved by the Owner and the Engineer. Contractor shall regularly update and submit updated copies of the schedule to adequately inform the Owner on the progress of the Work.

E. The Contractor shall conduct work in an orderly sequence to assure efficient use of materials and equipment and so as to not cause unnecessary delays to other contractors who might be present on the jobsite.

F. The Contractor shall be responsible for providing transportation of personnel, equipment, and materials to and from the site.

G. The Contractor shall coordinate access to the site with the Owner.

1.04 CONTRACT METHOD

A. This Contract is made up of bid items as provided in the Bid Requirements section of these Specifications.

B. The Contractor shall include the requirements of the General Conditions of the Contract as a part of all its subcontract agreements.

1.05 PROJECT MEETINGS

A. See Section 01 30 00 – Administrative Requirements: Pre-construction Meeting, Progress Meetings, and Pre-Installation Meetings

1.06 CONTRACTOR USE OF PREMISES

A. Staging and laydown areas at the site will be limited to those shown on the Drawings.

B. Construction corporation yards and/or storage areas are the responsibility of the Contractor.

C. Confine operations at the site to areas permitted by the Contract Documents.

D. Do not encumber site with materials or equipment.

E. Do not load structures or roadways with weight that will endanger or render unusable any structures or roadways.

F. Assume full responsibility for protection and safekeeping of products stored on premises.

G. Move any stored products which interfere with operations of the Owner or other contractors.

H. Obtain and pay for use of additional storage of work area for operations.

I. Return all surface areas, including vegetated areas, to their original condition upon completion of the work.

1.07 UTILITIES AND FACILITIES

A. See Section 01 50 00 for utilities available to the Contractor.

B. Restore existing utilities and facilities used during construction to original condition.

C. The Contractor is responsible for locking the gate at the conclusion of each workday.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 15 00

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 GENERAL

A. Unless otherwise specified in other individual sections of these Specifications, quantities of Work shall be determined from measurements or dimensions in horizontal planes.

B. Units of measurement shall be in accordance with U.S. Standard Measures.

C. See Section B-67 of the General Conditions for special provisions related to progress payments and payment schedule to the Contractor.

1.02 MATERIALS

A. The measurement and payment items are listed below:

1. The payments to the Contractor are based on the following items. It is the intent that the scope of the description of the following items encompasses the entire scope of the Work as shown on the Plans and described in the Specifications. The bid amounts shall be for complete in place installations.

BASE BID SCHEDULE

1. Mobilization / Demobilization

Measurement for this item shall be on a lump sum basis. Payment shall correspond to percent complete as confirmed by the Engineer. This Work covers all Contractor costs and effort associated with mobilizing equipment, materials, and labor to the project site as well as demobilization of the same for both the Base Bid Schedule and any additive bid schedules if awarded. Items covered by this include, but are not limited to, bonds, insurance, attendance of Contractor's staff at meetings, contracting and administrative costs, preparation and administrative costs for processing cost proposals, preparation of project schedules, updates to project schedules, costs associated with temporary facilities and utilities, traffic control, punch list items, repairs of damaged property, site cleanup, and project maintenance and warranty.

When 10 percent of the total original Contract amount is earned from bid items, excluding amounts paid for materials on hand, 90 percent of the amount of the bid price for mobilization, or 10 percent of the total Contract amount, whichever is least, will be paid for mobilization. Upon completion of all Work on the project, payment of the balance of the bid amount for mobilization/demobilization will be paid.

2. Deconstruct and Dispose of Existing Tank Roof

Measurement for this item shall be on a lump sum basis. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to deconstruct/demolish the existing tank roof, beams, and related items as shown on the Contract Drawings, described in the Specifications, or required to complete the roof replacement and related work, and dispose of the materials. The Work includes, but is not limited to, disassembling the existing roof components sufficient to remove the roof without causing damage to other tank components, and properly disposing of the materials offsite. Removed materials become property of the Contractor.

3. Provide and Install New Tank Roof System

Measurement for this item shall be on a lump sum basis. Payment shall include full compensation

for all materials, labor, equipment, and supervision necessary to provide and install the new tank roof system as shown on the Contract Drawings and described in the Specifications. The Work includes, but is not limited to, providing structural design of the new roof, providing design drawings and details of the new roof for review and approval, providing and installing roof beams and roof plates, center support column, new railing, landing, hatch, vents, and other appurtenances compliant with current health and safety standards, and other work as outlined on plans, and making new roof and connections watertight.

4. Provide and Install New Platform Adjacent to Top of Ladder

Measurement for this item shall be on a lump sum basis. Payment shall include full compensation for all materials, labor, equipment and supervision necessary to provide and install the new platform on the 1 MG tank adjacent to the ladder as shown in the Contract Drawings and described in the Specifications. The Work includes, but is not limited to, providing structural design of the new platform, providing design drawings and details of the new platform for review and approval, providing and installing the platform, railing, and other appurtenances compliant with current health and safety standards, and all other necessary work to provide for a complete working system.

5. Replace Interior and Exterior Ladder System

Measurement for this item shall be on a lump sum basis. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to deconstruct/demolish the existing tank interior and exterior ladder systems as shown on the Contract Drawings and described in the Specifications and provide and install new interior and exterior tank ladder systems with landings. The Work includes, but is not limited to, disassembling the existing ladder components sufficient to remove the ladder without causing damage to other tank components, removing the ladders, properly disposing of the ladder materials offsite, providing structural design of the new OSHA compliant ladder system, providing design drawings and details of the ladders for review and approval, providing and installing ladders and cages, and other appurtenances compliant with current health and safety standards, and other work as outlined on plans. Removed ladder materials become property of the Contractor.

6. Remove, Relocate, Modify, and/or Replace Miscellaneous Metal, Piping and Electrical Items at/on Tank

Measurement for this item shall be on a lump sum basis. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to remove, relocate, modify, and/or replace miscellaneous metal, piping, conduits, control boxes, conductors, fittings, and appurtenances on the outside of the tank and adjacent to the tank as shown on the Contract Drawings and described in the Specifications. The Work includes, but is not limited to, removal of existing metal enclosures, fabrication/ordering/installation of new metal enclosures, removal of other miscellaneous metal items, installation of miscellaneous steel items, relocation of small piping and conduits and conductors, providing and installing additional pull boxes, remounting equipment and similar items, extension of sample tubes, and other related work as shown on the plans or as required to complete other work shown on the plans. Work includes welding plates over holes on both the interior and exterior of the tank. Removed items not to be relocated become property of the Contractor.

7. Miscellaneous Yard and Tank Piping Modifications

Measurement for this item shall be on a lump sum basis. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to provide miscellaneous yard piping, valve, and appurtenance modifications as shown on the Contract Drawings and described in the Specifications and as required to complete the other tank structural retrofits and not covered under the Additive Bid Item for seismic couplers. It includes but is not limited to draining, disinfection of potable water lines, flushing, and proper disposal of disinfection water. This bid item includes the modifications to the existing 15” fill line with valve excluding the seismic coupler

assembly.

8. Structural Retrofits

Measurement for this item shall be on a lump sum basis. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to provide and install the tank foundation structural retrofits and associated work as shown on the Contract Drawings and described in the Specifications. The Work includes, but is not limited to, utility locating, asphalt removal, excavation, tank cleaning and preparation in the area of retrofits, concrete containment ring, anchor chairs, helical anchors, cast-in-drilled-hole piles, pile caps, reinforced splice plates, control of grade, cover material, dust control, installation of stub ups of pipes, boxes, vaults, and appurtenances, connection to other site piping and appurtenances, and other modifications necessary to accommodate the finished tank foundation retrofits.

9. Tank Cleaning

Measurement for this item shall be on a lump sum basis. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to clean the tank to facilitate the work and after completion of the work as shown on the Contract Drawings and as described in the Specifications. The District shall complete a preliminary cleaning of the tank and the Contractor is responsible for the remainder of the work that includes, but is not limited to, final draining and cleaning of tank prior to work, cleaning the tank after the work is completed, and properly disposing of cleaning water.

10. Asphalt and Surface Restoration

Measurement for this item shall be on a lump sum basis. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to restore asphalt and other surfaces disturbed by the Contractor. This work includes final grading and base rock, raising valve boxes, paving, concrete collars, applying seed and straw to disturbed soil areas, and restoration of other disturbed areas to preconstruction conditions.

ADDITIVE BID ITEMS

11. Seismic Couplers

Measurement for this item shall be on a lump sum basis. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to provide and install seismic coupler assemblies and related modifications as shown on the Contract Drawings and described in the Specifications. The Work includes, but is not limited to, utility locating, excavation, temporary sheeting and shoring, dewatering, dust control, cutting existing piping, welding on flanges, installing new piping, rubber flexible couplers, shrouds, relocating piping and valves, rewelding piping, additional pipe elbows, tees, and fittings as required, repair to cement mortar coatings and linings, modification of other piping affected by seismic coupler assemblies, disinfection, bacteriological testing, pressure testing, formwork, thrust blocks, backfill and compaction, and related items associated with piping seismic retrofit.

12. Disposal of Tank Sediment

The tank stores untreated surface water from the Mad River. Sediment from the water settles out in the tank over time, and it is estimated that the tank currently contains the quantity of sediment within it as noted in the Additive Bid Schedule. Prior to site work performed by the Contractor, the District will drain the tank, remove the sediment from the tank, and clean the interior of the tank. The District will place the sediment on filter fabric in the area east of the fencing around the tank within the limits of construction/staging. The District is attempting to find a use for the material. However, if determined to be necessary, at the direction of the District, the Contractor shall haul off and dispose of the material.

Measurement for this item shall be on a per cubic yard of material hauled off and disposed of

basis. Quantities shall be determined based on the number of full truckloads of material hauled off as confirmed by the Owner's Representative. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to load, haul, and properly dispose of the material.

13. Prepare and Coat Complete Interior, Exterior, Roof, Ladders, and Appurtenances with Dielectric System

Measurement for this item shall be on a lump sum basis. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to sandblast and paint the entire interior and the entire exterior of the tank, as well all other appurtenances, with a dielectric coating system as shown on the Contract Drawings and described in the Specifications. The Work includes, but is not limited to, preparing and painting all exposed piping, ladders and platform, tank, roof, and appurtenances. The Work includes, but is not limited to, sandblasting and other surface preparation, spot cleaning, and painting as shown on the Contract Drawings and described in these Specifications. Environmental controls such as humidity and temperature control for coating the interior of the tank shall be included in this bid item.

14. Environmental Controls for Exterior Coating with Dielectric System

Measurement for this item shall be on a lump sum basis. Payment shall include full compensation for all materials, labor, equipment, and supervision required if it is determined by the Engineer to be necessary to control the atmospheric conditions to achieve conditions that are suitable for exterior surface preparation and/or coating based on coating manufacturer recommendations and/or the presence of lead-containing paint. These environmental controls include but are not necessarily limited to installing a temporary enclosure around the tank and providing heating and humidity control for the tank exterior. If installing a temporary enclosure over the tank is required for preparation or coating purposes, the additive bid item for Environmental Controls shall be awarded. However, any environmental controls required for the interior of the tank shall be included in the respective coating bid item, and dehumidification equipment shall be assumed to be required for the duration of the interior blasting, coating, and curing process.

15. Prepare and Coat Complete Interior, Exterior, Roof, Ladders, and Appurtenances with Phosphate Ceramic System

This item shall be as described under Item 13, except for the product being a phosphate ceramic coating system instead of a dielectric coating system.

16. Cathodic Protection System

Measurement for this item shall be on a lump sum basis. Payment shall include full compensation for all materials, labor, equipment, and supervision required to install a passive cathodic protection system on the tank as shown in the Drawings and described in the Specifications. The Work includes, but is not limited to, installation of magnesium anodes, junction box, reference electrodes, lead wires, and all other equipment required for a fully functional passive cathodic protection system.

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Coordination and project conditions

B. Field engineering

C. Pre-bid meeting

D. Preconstruction meeting

E. Progress meetings

1.02 MEASUREMENT AND PAYMENT

A. Measurement and payment for this item shall be included in the Mobilization/Demobilization Bid Item. No additional measurement or payment will be included for the requirements of this section.

1.03 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of various sections of Project to ensure efficient and orderly sequence of installation of construction elements.

1.04 FIELD ENGINEERING

A. Protect survey control points prior to starting site Work; preserve permanent reference points during construction.

B. Promptly report to Engineer loss or destruction of reference point or relocation required for any reason.

C. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer. The surveyor shall comply with the California Professional Land Surveyors' Act in replacement of all permanent survey monuments.

1.05 PRECONSTRUCTION MEETING

A. Engineer will schedule meeting after Notice of Award.

B. Prior to the commencement of Work at the site, a Preconstruction meeting will be held at a mutually agreed time and place. The Preconstruction meeting shall be attended by the District representatives, District Engineer, Resident Engineer, Construction Foreman, Contractor's Construction Superintendent, key Subcontractors, and any other parties requested by the Contractor or the District Engineer.

C. Unless previously submitted to the Engineer, the Contractor shall bring to the conference three (3) copies of each of the following:

1. Draft Construction Schedule.
2. Procurement schedule of major equipment and materials and items requiring long lead time.
3. Shop Drawing/submittal schedule.
4. Substitution Requests per Section 01 30 00, "Administrative Requirements."

5. Contact sheet listing primary contact information for Contractor's project manager, site superintendent, site foreman, and other key Contractor and Subcontractor personnel, and emergency contact information for after business hours (3 copies).

D. At the Preconstruction meeting the District will provide the Contractor with two (2) sets of the Contract Documents. It shall be the Contractor's responsibility to arrange for paying all costs of additional reproduction required by the Contractor.

E. The purpose of the meeting is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established.

F. The Engineer will preside at the Preconstruction conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

G. Sample Agenda:

1. Notice to Proceed date.
2. Distribution of Contract Documents.
3. Contractor's tentative schedules.
4. Submission of list of Subcontractors, list of products, and progress schedule.
5. Critical work sequencing.
6. Designation of personnel representing parties in Contract and Engineer.
7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
8. Scheduling.
9. Major equipment deliveries and priorities.
10. Use of premises by Owner and Contractor.
11. Owner's requirements and occupancy.
12. Site Safety: Contractor's assignments for safety and first aid.
13. Construction facilities and controls provided by Owner.
14. Temporary utilities provided by Owner.
15. Application for payment procedures.
16. Procedures for testing.
17. Procedures for maintaining record documents.
18. Requirements for system shut down.

1.06 PROGRESS MEETINGS

A. The Engineer shall schedule, arrange and conduct progress meetings. These meetings shall be conducted once every other week, or as mutually agreed by Contractor and Owner, and shall be attended by the Contractor's superintendent and representatives of key Subcontractors, and others, who are active in the execution of the Work. The purpose of these meetings shall be to review the Contractor's schedule provided in accordance with this Section, resolve conflicts, and in general, coordinate and expedite the execution of the Work.

B. Engineer will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings and record the meeting minutes.

C. Attendance Required: Job superintendent, key subcontractors, Owner, Engineer, as appropriate to agenda topics for each meeting.

D. Sample Agenda:

1. Review and acceptance of minutes of previous meeting.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Site Safety.
5. Identification of problems impeding planned progress.
6. Review of submittals schedule and status of submittals.
7. Review of delivery schedules.
8. Maintenance of progress schedule.
9. Corrective measures to regain projected schedules.
10. Planned progress during succeeding work period.
11. Coordination of projected progress.
12. Maintenance of quality and work standards.
13. Effect of proposed changes on progress schedule and coordination.
    a. Progress Payment.
    b. Change Orders.
    c. Claims.
14. Other business relating to Work.

E. The Engineer shall record minutes and distribute copies within two days after meeting to participants, with one copy each to Contractor, Owner, and those affected by decisions made.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittal procedures

B. Construction progress schedules

C. Product data and shop drawings

D. Test reports

E. Certificates

1.02 MEASUREMENT AND PAYMENT

A. Measurement and payment for this item shall be included in the Bid Item to which it relates. No additional measurement or payment will be included for the requirements of this section.

1.03 SUBMITTAL PROCEDURES

A. Submit on Submittal Form (format to be provided by Engineer) with information similar to the attached. Contractor shall submit one electronic version in PDF format.

B. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.

C. Identify Project, Contractor, Subcontractor and supplier, pertinent drawing and detail number, and specification section number, appropriate to submittal.

D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with requirements of the Work and Contract Documents.

E. Schedule submittals to expedite Project and deliver to Engineer. Coordinate submission of related items.

F. For each submittal, allow fourteen (14) calendar days for review by Engineer/Owner.

G. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.

H. When revised for resubmission, clearly identify changes made since previous submission.

I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

1.04 CONSTRUCTION PROGRESS SCHEDULES

A. Submit an initial schedule electronically within twenty-one (21) calendar days after date of Notice to Proceed. After review, resubmit required revised data within fourteen (14) calendar days.

B. Submit revised Progress Schedules with each Application for Payment.

C. Distribute copies of reviewed schedules to Project site file, Subcontractors, suppliers, and other concerned parties.

D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

E. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities.

F. Indicate estimated percentage of completion for each item of Work at each submission.

G. Revisions to Schedules:

1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.

2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

1.05 PRODUCT DATA AND SHOP DRAWINGS

A. Product Data and Shop Drawings: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Submit a single re-producible copy or email an electronic version of the submittal to the Engineer.

C. Mark submittal to clearly identify applicable products, models, options, and other data to be used on this project. Supplement manufacturers' standard data to provide information specific to this Project.

1.06 TEST REPORTS

A. Submit for Engineer's knowledge as contract administrator.

B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.07 CERTIFICATES

A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

1.08 REQUESTS FOR SUBMITTALS

A. Contractor is directed to each Specification section and the Drawings for required submittals.

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Quality control and control of installation

B. Tolerances

C. References

D. Labeling

E. Testing and Inspection Services

F. Manufacturers' field services

G. Examination

H. Preparation

1.02 MEASUREMENT AND PAYMENT

A. Measurement and payment for this item will be included in the Bid Item to which it relates. No additional measurement or payment shall be made for the requirements of this section.

1.03 QUALITY CONTROL AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. When manufacturers' instructions conflict with Contract Documents, request written clarification from Engineer before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform Work by persons qualified to produce required and specified quality.

F. Verify field measurements as indicated on Shop Drawings or as instructed by manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.04 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.05 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on Notice to Proceed date of Contract Documents, except where specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. When specified reference standards conflict with Contract Documents, request written clarification from Engineer before proceeding.

E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

1.06 LABELING

A. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label:

1. Model number.

2. Serial number.

3. Performance characteristics.

1.07 TESTING AND INSPECTION SERVICES

A. Employ and pay for services of an independent testing agency or laboratory acceptable to Owner to perform specified testing.

1. Before starting Work, submit testing laboratory name, address, and telephone number, and names of full-time appropriately licensed or certified Professional Engineer and responsible officer.

2. Submit copy of report of laboratory facilities' inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of deficiencies reported by inspection.

B. Independent firm will perform tests, inspections, and other services specified in individual Specification Sections and as required by the Engineer.

1. Laboratory: Authorized to operate in State of California.

2. Laboratory Staff: Maintain full-time appropriately licensed or certified Professional Engineer on staff to review services.

3. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.

C. Testing, inspections, and source quality control may occur on or off Project Site. Perform off-Site testing as required by the Engineer or Owner.

D. Reports shall be submitted by independent firm to the Engineer, Contractor, and authorities having jurisdiction, in duplicate, indicating observations and results of tests and compliance or noncompliance with Contract Documents.

1. Submit final report indicating correction of Work previously reported as noncompliant.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1. Notify Engineer and independent firm twenty-four (24) hours before expected time for operations requiring services.
2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

F. Employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work according to requirements of Contract Documents.

G. Retesting or re-inspection required because of nonconformance with specified or indicated requirements shall be performed by same independent firm on instructions from Engineer. Payment for retesting or re-inspection will be charged to Contractor.

H. Testing Agency Responsibilities:

1. Test Samples submitted by Contractor.
2. Provide qualified personnel at Site. Cooperate with Engineer and Contractor in performance of services.
3. Perform indicated sampling and testing of products according to specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Engineer and Contractor of observed irregularities or nonconformance of Work or products.
6. Perform additional tests required by Engineer.

I. Testing Agency Reports: After each test, promptly submit two (2) copies of report to Engineer, Contractor, and authorities having jurisdiction. When requested by Engineer, provide interpretation of test results. Include the following:

1. Date issued.
2. Project title and number.
3. Name of inspector.
4. Date and time of sampling or inspection.
5. Identification of product and Specification Section.
6. Location in Project.
7. Type of inspection or test.
8. Date of test.
9. Results of tests.
10. Conformance with Contract Documents.

J. Limits on Testing Authority:

1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency or laboratory may not approve or accept any portion of the Work.
3. Agency or laboratory may not assume duties of Contractor.
4. Agency or laboratory has no authority to stop the Work.

1.08 MANUFACTURER'S FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Engineer thirty (30) calendar days in advance of required observations. Observer subject to approval of Engineer.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing site conditions and surfaces are acceptable for subsequent Work. Beginning new Work means Contractor acceptance of existing conditions.

B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

PART 4 PREPARATION

4.01 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance per applicable section of these Specifications.

B. Seal cracks or openings of substrate prior to applying next material or substance per applicable section of these Specifications.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond per applicable section of these Specifications.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities

B. Temporary Field Office and Storage Facility

C. Vehicular Access

D. Parking

E. Progress Cleaning and Waste Removal

F. Barriers

G. Security

H. Removal of utilities, facilities, and controls

1.02 MEASUREMENT AND PAYMENT

A. Measurement and payment for this item shall be included in the Mobilization/ Demobilization Bid Item, or other appropriate Bid Item. No additional measurement or payment will be included for the requirements of this section.

1.03 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 57 00 – Environmental Requirements

1.04 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures.

1.05 PRODUCT HANDLING

A. Protection:

1. Use all means necessary to maintain temporary facilities and controls in proper and safe condition throughout progress of the Work.

1.06 TEMPORARY UTILITIES

A. General:

1. The Contractor is responsible for coordinating all onsite utility connections and usage with the Owner.

B. Temporary Water

1. There is no water available at the site for the Contractor’s use. The Contractor will be required to provide their own water for use during construction.

C. Temporary Electricity

1. The Contractor must provide its own temporary electric power for use at the site.

2. Contractor will pay cost of energy used and is responsible for all necessary permits, permissions, code and regulatory compliance associated with such use.

D. Temporary Ventilation

1. Ventilate enclosed areas, such as the inside of the tank, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

2. Contractor shall comply with all applicable OSHA requirements for working in confined spaces.

E. Temporary Sanitary Facilities

1. Provide and maintain required facilities and enclosures sufficient to accommodate Contractor and Subcontractor personnel at locations easily accessible from work. Existing facility use is not permitted. Provide facilities at time of project mobilization.

2. Contractor is responsible for cleaning, maintenance, security, placement, and removal of facilities.

1.07 TEMPORARY FIELD OFFICE AND STORAGE FACILITY

A. Contractor and Subcontractors:

1. The Contractor and their Subcontractors shall make arrangements for and maintain temporary field offices and storage facilities as may be necessary for the proper conduct of the Work. These shall be located so as to cause no interference with any Work to be performed on the site. It shall be the responsibility of the Contractor to coordinate with the owner on the location of offices or storage facilities.

2. Upon completion of the project, or as directed by the Owner or Engineer, the Contractor shall remove all such temporary structures and facilities from the site, and leave the premises in the condition required by the Owner.

1.08 VEHICULAR ACCESS

A. Provide unimpeded access for Owner’s vehicles.

B. Provide means of removing mud from vehicle wheels before entering streets.

C. Use existing on-site roads for construction traffic.

1.09 PARKING

A. Arrange for temporary surface parking areas to accommodate construction personnel.

B. When site space is not adequate, provide additional off-site parking.

C. Use of designated existing on-site streets and driveways used for construction traffic is permitted.

D. Tracked vehicles not allowed on paved areas.

E. Maintenance

1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, and mud.

2. Maintain existing areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain surface course and drainage in original, or specified, condition.

1.10 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.

B. Collect and remove waste materials, debris, and rubbish from site weekly and dispose off-site.

1.11 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

B. Protect vehicular traffic, stored materials, site, and structures from damage.

1.12 SECURITY

A. Security Program

1. Protect Work, existing premises and Owner's operations from theft, vandalism, and unauthorized entry.

2. Initiate security program in coordination with Owner's existing security system at project mobilization.

3. If existing chain link security fence around the site is removed for the performance of the work, the Contractor shall provide temporary fencing to prevent access to the site during the performance of the work and shall return security fencing back to existing or better condition upon project completion.

4. Maintain program throughout construction period until Owner acceptance precludes need for Contractor security.

B. Entry Control

1. Samoa has a manual operated gate. Owner will provide two (2) copies of a key for the Samoa site. The gate can also be locked open during the day if required. It is the Contractor's responsibility that all gates are closed at the end of each work day. Contractor shall return keys at the end of the work.

2. Restrict entrance of persons and vehicles into Work site.

3. Owner will control entrance of persons and vehicles related to Owner's operations.

1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 55 50

TEMPORARY TRAFFIC CONTROL SYSTEMS

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide all materials, equipment, and labor necessary to furnish, place, and maintain all temporary traffic control systems, including construction and maintenance area traffic control devices and flaggers as required to perform the Work in accordance with this Section, and all other appurtenant Work, complete in place, as shown on the Contract Drawings and as specified herein.

B. Section Includes:

1. Review of proposed Work areas to determine temporary traffic control requirements.
2. Verification of temporary traffic controls with the Project Engineer or the Owner prior to implementation.
3. Maintenance of traffic control during the Work.
4. Monitoring traffic control during the Work to determine necessary changes required to maintain adequacy.
5. Maintenance of traffic control during non-work hours to maintain adequacy.
6. Removal of temporary traffic control systems after completion of the Work.

1.02 REFERENCES

A. General Conditions, Section B-51 – Public Convenience.

B. State of California, Department of Transportation (Caltrans) Specifications and Standards

1. Standard Specifications
   a. Section 7 Legal Relations and Responsibility to the Public
   b. Section 12 Temporary Traffic Control
2. Standard Plans
   a. Temporary Traffic Control Systems
3. California Manual on Uniform Traffic Control Devices, Current Edition (California MUTCD)

C. Commercial Standards

1. State of California, Division of Industrial Safety, Department of Industrial Relations.
2. Safety Orders of the Division of Industrial Safety, Department of Industrial Relations of the State of California, current edition.

1.03 SUBMITTALS

A. In addition to the submittal requirements of Section 01 33 00 Submittal Procedures, the Contractor shall provide the following at least fourteen (14) calendar days prior to work and shall meet with the approval of the Owner:

1. The Contractor shall submit for review by the Engineer, a Work Zone Traffic Control Plan on 11" x 17" format which contains only information specifically related to work zone traffic control, including pedestrian traffic control. The plan will show which California MUTCD typical applications are to be used for each work operation in addition to site specific traffic control. If the Contractor proposed to use the current edition of California MUTCD in specific work operations, they shall submit in writing for consideration which Typical Application Diagram will be used for each work operation. The Work Zone Traffic Control Plan shall be specific to the proposed work and shall include:
    a. Specific details for construction staging, including the location and limits of the work zone.
    b. Identification of changeable message board locations. A minimum of 2 changeable message boards and 2 arrow boards shall be required.
    c. Locations of all excavations.
    d. American’s with Disabilities Act (ADA) compliant pedestrian routing plans and details showing how pedestrians will be routed through the work area.
    e. Plans for protection of the public from construction-related hazards.
    f. Lane closures and traffic routing including consideration of construction-related trucking routes.
    g. A trucking route for approval by the Engineer. The route must minimize traffic on residential streets that are not part of the project.
    h. Lane closure markings, barricade locations, and sign locations showing the necessary signing, methods of delineation and channelization and reference to the appropriate Caltrans standards and California MUTCD details for all affected roads.
    i. Dimensions of lanes affected by traffic control that will be open to traffic.
    j. Dimensions and locations of signs and cone tapers.
    k. Identification of side streets and driveways affected by construction and show how they will be handled.
    l. Detail of how public transit will be handled through the construction area.
    m. Time periods of lane closures and detours.
2. The Work Zone Traffic Control Plan shall contain a title block which contains the Contractor's name, address, phone number, project superintendent's name, contract name, dates and hours traffic control will be in effect, and a space for review acknowledgment.
3. The Work Zone Traffic Control Plan shall be prepared by a licensed California Civil or Traffic Engineer. The Work Zone Traffic Control Plan shall be submitted to the Engineer and other affected agencies for review at least two weeks prior to implementation in order to determine the Contractor’s compliance with the requirements of this section.
4. No work except for installation of project identification signs will be allowed to commence prior to approval of the Work Zone Traffic Control Plan.
5. A "Letter of Responsibility," on company letterhead, indicating the names and telephone numbers of at least three different persons who shall be available to be contacted in case of emergency at any time during the life of the contract. Said persons must have decision-making authority within the company.

PART 2 PRODUCTS

2.01 GENERAL

A. All construction area stationary and portable sign panels, lights, barricades, and traffic control devices shall be the product of a commercial sign or safety device manufacturer conforming to the requirements of Section 12, Temporary Traffic Control, of the Caltrans Standard Specifications, unless otherwise specified in this Section, shown on the Drawings, and/or as directed by the Engineer.

PART 3 EXECUTION

3.01 GENERAL

A. No work shall commence until traffic control signing has been approved by the Engineer.

B. The Contractor shall provide all appropriate traffic control measures in accordance with this Section prior to start of construction in the public right-of-way or in any area adjacent to the street right of way where public safety is affected.

C. The Contractor shall take all necessary precautions for the protection of the Work and the safety of its employees and the public. Traffic shall be maintained through the construction or maintenance zone in accordance with Sections 7-1.08, 7-1.09 and 12 of the Caltrans Standard Specifications.

D. Field changes to traffic control plans shall be approved by the Engineer prior to installation.

E. When traffic cones or delineators are used to delineate a temporary edge of a traffic lane, the line of cones or delineators shall be considered to be the edge of the traffic lane, however, the Contractor shall not reduce the width of an existing lane to less than 10 feet without written approval from the Engineer.

F. All construction area signs, lights, barricades, and traffic control devices shall be furnished, installed, maintained, and removed in conformance with the latest edition of the California MUTCD. Additional or alternate signs may only be used when specifically authorized by the Engineer.

G. The Contractor shall monitor traffic and safety conditions and maintain adequate traffic control measures during both work and non-work hours in order to maintain compliance with the requirements of this Section.

H. The Contractor shall conform to all requirements of the current "Safety Orders of the Division of Industrial Safety, Department of Industrial Relations of the State of California."

I. If a hazardous condition is observed and the Engineer notifies the Contractor either directly or by telephone, the Contractor shall correct the condition immediately. If the Contractor fails to correct the hazardous condition immediately, the Owner reserves the right to call in a local contractor to perform the necessary work needed to improve public safety. The cost incurred shall be billed to the Contractor. Should the Engineer point out any inadequacy of warning and protective measures, such action on the part of the Engineer shall not relieve the Contractor from responsibility for public safety nor abrogate his obligation to furnish and pay for these devices.

J. All construction area signs, lights, barricades, and temporary traffic control devices shall be completely removed from the roadway when not in use. Locations and methods of storing traffic control equipment adjacent to the roadway between interrupted use shall require prior approval of the Engineer.

K. The Contractor shall completely remove all temporary signs, striping and/or delineators and restore the pavement, as necessary, upon removal or relocation of any temporary traffic controls or detours constructed as part of the Work.

L. Temporary traffic control measures shall be in effect only during Work hours. Normal traffic routing shall be reestablished at the end of each workday.

M. Contractor shall conduct his operation as to offer the least possible obstruction and inconvenience to the public, and he shall have under construction no greater amount of Work than he can prosecute properly with due respect to the rights of the public. Contractor shall provide personal advance notice to each affected resident or business informing him of impending work and provide ample time to remove vehicles and estimated time of driveway closure. This shall be accomplished by delivering a notice to all houses or businesses to be affected by the impending work. The notice shall be typed and signed by the contractor or his designated superintendent. The format and contents of the notice shall be approved by the Engineer prior to commencement of the Work.

N. Construction operations shall be conducted in such a manner as to cause as little inconvenience as possible to abutting property owners. Convenient access to driveways, houses, and buildings along the line of the work shall be maintained, and temporary approaches to crossings or intersecting roads shall be provided and kept in good condition.

O. Whenever the Contractor's operations create a condition hazardous to the public, furnish, erect, and maintain such fences, barricades, lights, signs and other devices as are necessary to prevent accidents or damage or injury to the public.

P. Should the Contractor appear to be neglectful or negligent in furnishing warning and productive measures as above specified, the Engineer may direct attention to the existence of hazard, and the necessary warning and protective measures shall be furnished and installed by the Contractor at his expense, without cost to the Owner. Should the Engineer point out any inadequacy of warning and protective measures, such action on the part of the Engineer shall not relieve the Contractor from responsibility for public safety nor abrogate his obligation to furnish and pay for these devices.

Q. Under no circumstances shall access to businesses or residences be held up more than 30 minutes at any one time. The Contractor may coordinate with property and business owners to schedule work so that longer delays do not adversely affect residents or business owners to their satisfaction. In addition, Contractor shall give personal notice to all affected property owners as specified in paragraph M, hereinbefore. Before closing any street to through traffic, Contractor shall obtain prior approval from the Engineer seven (7) calendar days in advance of closure. Contractor shall at all times provide access to public facilities such as schools, etc. and make provisions for passage of emergency vehicles.

3.02 PEDESTRIAN TRAFFIC

A. The Contractor is directed to Chapter 6D, Pedestrian and Worker Safety, in the California MUTCD, the Drawings, and these Specifications.

B. Pedestrians shall be provided with a safe, convenient and accessible path that, at a minimum, replicates the most desirable characteristics of the existing sidewalk, path or footpath.

C. The Contractor shall construct and maintain temporary pedestrian pathways through the work zone, where required, that shall be in compliance with the requirements of the Americans with Disabilities Act (ADA) and the California MUTCD.

D. Pedestrian routes shall not be impacted for the purposes of any non-construction activities such as parking of vehicles or equipment, or stock piling of materials.

E. Pedestrians shall not be led into conflicts with work site vehicles, equipment or operations.

END OF SECTION

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SECTION 01 56 00

SITE AND AREA CLEANUP

PART 1 GENERAL

1.01 DESCRIPTION

A. Maintain work areas free from accumulations of waste, debris, dust and mud caused by Contractor's operations.

B. Upon completion of Work, remove all waste materials, tools, equipment, machinery, and surplus materials. Leave the property clean. Leave all rights of way in a condition equal to that at the beginning of Work.

1.02 MEASUREMENT AND PAYMENT

A. Measurement and payment for this item shall be included in the Mobilization/ Demobilization Bid Item. No additional measurement or payment will be included for the requirements of this section.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PROTECTION

A. The Contractor shall be solely responsible for the protection of adjacent properties, structures, streets and utilities. Any damage shall be repaired to its original condition or better, as determined by the Engineer, at the Contractor’s expense.

B. The Contractor shall protect benchmarks, survey control points, and existing structures not identified for removal from damage or displacement.

3.02 REMOVAL

A. Remove all components associated with the existing tank roofs from the site.

B. Do not burn or bury materials on site. Leave site in clean condition.

3.03 DURING CONSTRUCTION

A. Execute cleaning to ensure that any private property, grounds, and especially access roads and public properties, are maintained free from accumulation of waste materials, dust, mud, and debris.

B. Loose and removed paint flecks, sand blast material, demolition debris, and all other dust, debris and materials generated during the performance of the work shall be contained at all times during the performance of the work and not allowed to be blown, tracked, or otherwise dispersed across the site and shall be removed and properly disposed of at regular intervals during the performance of the work and shall be completely removed and properly disposed of upon project completion.

C. The Contractor shall keep all access roads clean and free of dust, mud and debris resulting from the Contractor’s operations.

D. All waste materials, debris and rubbish shall be disposed of at sites to be chosen by Contractor.

E. If, in the opinion of the Engineer, the Contractor has not sufficiently cleaned the project area, the Engineer shall issue a written notice to the Contractor stating that the Contractor shall clean the project area to the satisfaction of the Engineer within forty-eight (48) hours. If the Contractor does not properly clean up (in the opinion of the Engineer or the Owner), then either the Engineer or the Owner shall have the option of using outside equipment to perform the Work and such cost will be withheld from the Contract.

3.04 AFTER CONSTRUCTION

A. After construction is complete, all sanitary and other temporary facilities, construction materials, equipment, and other debris shall be completely removed from the site and recycled or disposed of properly by the Contractor.

B. If, in the opinion of the Engineer, the Contractor has not sufficiently cleaned the project area, the Engineer shall issue a written notice to the Contractor stating that the Contractor shall clean the project area to the satisfaction of the Engineer within forty-eight (48) hours. If the Contractor does not properly clean up (in the opinion of the Engineer or the Owner), then either the Engineer or the Owner shall have the option of using outside equipment to perform the Work and such cost will be withheld from the Contract. Site shall be left in a condition equal to or better than existed prior to construction.

END OF SECTION

SECTION 01 57 00

ENVIRONMENTAL REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Permit Compliance, Spill Prevention, Dust Control, Tire Tracking Prevention

1.02 RELATED SECTIONS

A. Section 02 41 00 – Demolition

B. Section 02 83 00 – Removal and Disposal of Material Containing Lead

C. Section 31 23 16 – Excavation

1.03 MEASUREMENT AND PAYMENT

A. Refer to Section 01 15 00 - Measurement and Payment.

1.04 SUBMITTAL REQUIREMENTS

A. Submit in accordance with Section 01 33 00 – Submittal Procedures.

B. Dewatering Plan:

1. The Contractor shall submit a Dewatering Plan within five (5) working days of Notice to Proceed in accordance with this Specification Section. The Plan shall describe, in detail, the Contractor's approach to control water during construction activities. The Dewatering Plan shall be developed even if the project site is dry and no nuisance water is encountered.

    a. The Contractor shall be responsible for final design, installation, maintenance and removal of all dewatering systems.

    b. The Contractor is required to dewater construction areas to provide for proper excavation and filling. Although dewatering methods are left to the discretion of the Contractor, the Dewatering Plan needs to be approved by the Engineer prior to beginning of construction work.

    c. Full compensation for conforming to the provisions for developing and adhering to the Dewatering Plan shall be considered as included in prices paid for the various contract items of work involved and no additional compensation shall be allowed.

C. Spill Prevention and Response Plan:

1. Prior to beginning of work and within five (5) working days after date of the Notice to Proceed, the Contractor shall prepare and submit for approval by the Engineer, a Spill Prevention and Response Plan to regulate the use of hazardous and toxic materials, such as fuels and lubricants for construction equipment. The Engineer will review, approve, and oversee implementation of the Spill Prevention and Response Plan.

    a. The Contractor's Spill Prevention and Response Plan must include: 1) spill cleanup procedures; 2) worker training; and 3) impact avoidance measures.

b. As part of the Plan, the Contractor shall indicate fueling areas for equipment and shall be a minimum of 100 feet away from waters unless the Contractor receives written permission from the Engineer.

c. Full compensation for conforming to the provisions for developing and adhering to the Dewatering Plan shall be considered as included in prices paid for the various contract items of work involved and no additional compensation shall be allowed.

D. Tire Tracking Control Plan:

1. Prior to beginning of work and within five (5) working days after date of the Notice to Proceed, the Contractor shall prepare and submit for approval by the Engineer, a Tire Tracking Control Plan for all trucks and construction equipment, which enter and leave the construction site during the project.

a. As part of the Plan, the Contractor shall indicate means of removing sand, mud, vegetation, rhizomes/roots, and seeds from vehicle wheels and under carriage before entering and exiting the construction site onto County or private roadways through installation of stable rock construction entrances, steel grates, tire cleaning stations and routine street sweeping/vacuuming and as necessary to maintain the roads free of sediment.

b. Roads utilized as part of the project shall be monitored by the Contractor on a daily basis for sediment tracking and other materials due to construction activities, and swept in a timely manner, as needed to prevent suspension of material which has a tendency to become airborne, or that could wash off into waterways. Roads shall be left clean at the end of each working day; cleaning operations shall not create water runoff or dust.

c. The Plan shall include the location, size, maintenance and removal of such controls and designated monitoring periods and personnel to minimize sediment tracking onto roads.

d. Full compensation for conforming to the provisions for developing and adhering to the Tire Tracking Control Plan shall be considered as included in prices paid for the various contract items of work involved and no additional compensation shall be allowed.

E. Dust Prevention Plan:

1. Prior to beginning of work and within five (5) working days after date of the Notice to Proceed, the Contractor shall prepare and submit for approval by the Engineer, a Dust Prevention Plan for all construction activities that have the potential to generate visible dust.

a. Construction activities include, but not limited to grubbing, stripping, excavation, hauling, travel on gravel roads, and sediment placement on application areas.

b. At a minimum the submittal shall include the water source(s), proposed spray/application methods, frequency of watering, location, possible tarping of haul trucks, designated monitoring periods and personnel to prevent visible dust in accordance to these specifications and project permits.

c. Full compensation for conforming to the provisions for developing and adhering to the Dust Prevention Plan shall be considered as included in prices paid for the various contract items of work involved and no additional compensation shall be allowed.

1.05 GENERAL PROJECT-WIDE MEASURES

A. Contractor shall comply with all provisions of any additional federal, state and local permits necessary to complete the project.

B. It is the responsibility of the Contractor to verify that the District has obtained all necessary federal and state permits. The Contractor is responsible for securing all County and California Department of Transportation permits, copies of which must be provided to the Engineer prior to construction start. Contractor will maintain a copy of all permits at the Project site.

C. The Contractor shall comply with all other permit conditions, including construction windows, restrictions on work approach related to special status species and archaeologically significant resource areas, buffer zones related to special status species, pre-construction and construction clearance surveys, daily site clearances, and construction monitoring.

D. Procedures regarding Encountering Human Remains. Human remains may be encountered, given the reported presence of prehistoric sites in the vicinity. If human graves or remains are encountered, the following measures shall be implemented:

1. The Contractor will halt the work in the vicinity

2. The County Coroner will be notified. At the same time, a qualified archaeologist will be contacted to evaluate the situation.

3. The Engineer will be notified.

4. If human remains are of Native American origin, the Coroner will notify the Native American Heritage Commission within 24 hours of identification (916) 653 – 4082

E. Procedures regarding Archeological and Cultural Sensitive Resources: Surface surveys have not detected cultural materials within the limits of planned excavation. However, if any items of potential cultural or archeological significance are encountered during excavation operations, construction within this area shall be halted immediately, and the Contractor shall notify the archeologist/Engineer. The Contractor is advised that if any archaeological findings are discovered during construction that the monitor or archaeologist has the authority to slow or stop construction activities as they deem necessary.

F. Hazardous Materials

1. Work Cessation in the Event Suspected Hazardous Materials are Encountered. Project construction Contractors shall stop all work in the area of any suspected soil or groundwater contamination, or any unearthing of storage drums or other potential sources of hazardous materials/wastes. The Contractor shall then comply with relevant sections of the General Conditions and Technical Specifications.

G. General Impact and Avoidance Measures

1. Employees will strictly limit their activities, vehicles, equipment, and materials to the designated temporary impact areas, staging areas, and work areas.

2. To avoid attracting predators, the action area will be kept clean of trash. All food-related trash items will be enclosed in sealed containers and removed daily from the action areas. Trash will be bagged and removed from the site and properly disposed of at the close of each workday to avoid attracting ravens, crows, or other potential predators.

3. No pets associated with construction personnel will be allowed on the action area

4. All equipment maintenance and staging, and dispensing of fuel, oil, and coolant, will occur within the staging area. Equipment will be checked for leaks prior to leaving the staging area and repaired as necessary.
5. Crews shall not attempt to feed, harass, or otherwise intentionally interact with any listed species or nesting birds.

H. Invasive Species

1. Only native vegetation suitable for the project region shall be used for re-vegetation of disturbed areas. A tire wash area shall be established in the lower staging area, and trucks or other equipment shall be cleaned prior to accessing the remainder of the project site to avoid the risk of establishing invasive plants.

I. Noise

1. Semi-stationary equipment (e.g., generators, compressors, etc.) shall be located as far as possible from residences near the project site or shielded if feasible.
2. Equipment muffler/maintenance requirements shall be implemented.
3. Equipment and on-site trucks used for construction shall be equipped with mufflers or other appropriate sound reducing equipment.
4. Impact tools such as jack hammers used for project construction would be hydraulically or electrically powered when feasible to avoid noise associated with compressed air exhaust from pneumatically powered tools.

J. Air Quality

1. All exposed surfaces (parking areas, staging areas, soil piles, graded areas, and unpaved access roads) will be watered as necessary during windy periods when dust is generated.
2. All haul trucks transporting soil, sand, or other loose material will maintain at least one foot of freeboard or cover the load.
3. Idling times shall be minimized by shutting off equipment when idling for more than five minutes.
4. All construction equipment shall be maintained and properly tuned in accordance with manufacturers specifications.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 FUNDER REQUIREMENTAS

A. Contractor shall conform to all requirements in Appendices C and D.

3.02 AIR QUALITY AND DUST CONTROL

A. The Contractor shall adhere to all project permits and shall utilize BMPs to minimize fugitive dust generation and assure compliance with North Coast Unified Air Quality Management District Rule 104 Section 4.0 regarding the control of fugitive dust.

B. Unimproved access or unpaved haul roads, material stock piles, excavated and graded areas, and areas of exposed soil on the construction site shall be sprinkled with water or otherwise treated to fully suppress dust when and where dust becomes a problem. Sources of water for dust control are provided above.

C. At the discretion of the Engineer, grading and construction may be prohibited during periods of high winds (>15 mph), which have the potential to result in the generation of windblown dust and sediment not reasonably controllable with standard watering techniques.

D. When not in use or unattended, construction equipment and vehicles will be shut down, locked up, and not left idling.

E. Equipment and vehicles shall also be tuned and maintained in accordance with manufactures' specifications to avoid excessive emissions.

F. All equipment shall operate with factory-equipped mufflers.

G. Water active earthwork areas and staging areas as needed for dust control. All active construction areas and sediment application areas shall be watered at a rate sufficient to keep soil moist and prevent formation of wind-blown dust.

H. Exposed stockpiles of dirt, sand, and similar material shall be enclosed, covered, and/or watered daily, or treated with approved non-toxic soil binders as necessary to prevent generation of fugitive dust.

I. Contractor shall use water trucks or spray from hoses to control dust created by outdoor work operations during entire period of the Contract as directed by Engineer and stipulated in Specifications; Contractor shall satisfactorily control dust created by operations to the satisfaction of the Engineer.

END OF SECTION

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SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Products

B. Product delivery requirements

C. Product storage and handling requirements

D. Product options

1.02 PRODUCTS

A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.

C. Furnish interchangeable components from same manufacturer for components being replaced.

1.03 MEASUREMENT AND PAYMENT

A. Measurement and payment for this item shall be included in the Bid Item to which it relates. No additional measurement or payment will be included for the requirements of this section.

1.04 PRODUCT DELIVERY REQUIREMENTS

A. Schedule delivery of products or equipment as required to allow timely installation and to avoid prolonged storage.

B. Transport and handle products in accordance with manufacturer's instructions.

C. Deliver products or equipment in manufacture’s original unbroken cartons or other containers designed and constructed to protect the contents from physical or environmental damage.

D. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.

E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

F. Clearly and fully mark and identify as to manufacturer, item and installation location.

1.05 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products in accordance with manufacturer’s instructions. Provide manufacturer’s instructions for storage and handling.

B. Store with seals and labels intact and legible.

C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

D. For exterior storage of fabricated products, place on sloped supports above ground.

E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.06 STORAGE FACILITIES

A. Contractor shall obtain all necessary laydown and storage areas necessary for the execution of the Work. The District has space available for laydown and storage near the Project site as shown on the Drawings. However, the Contractor shall satisfy themselves as to whether there is adequate staging area at the site for construction materials and equipment. Contractor shall obtain all necessary permissions and approvals for use of other laydown and storage areas and shall submit a signed statement from the property owner granting permission and holding the District harmless from any and all damages that may result from the Contractor's use of the site.

1.07 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed, except as provided for in the General Provisions.

C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

1.08 PRODUCT SUBSTITUTION PROCEDURES

A. General Conditions, Section B-14 – Conformity with Contract Documents and Allowable Deviations.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 70 00

EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Protecting installed construction.

D. Project record documents.

E. Operation and maintenance data.

F. Spare parts and maintenance products.

1.02 MEASUREMENT AND PAYMENT

A. Measurement and payment for this item will be included in the Bid Item to which it relates. No additional measurement or payment will be made for the requirements of this section.

1.03 CLOSEOUT PROCEDURES

A. Completion Submittal:

1. File Contractor's Notice of Completion and Request for Final Inspection.

B. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.

C. Provide submittals to Engineer required by authorities having jurisdiction.

D. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.04 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.

C. Clean site; sweep paved areas, rake clean landscaped surfaces.

D. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.05 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings at pipe and conduit openings.

1.06 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings, Product Data, and Samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
2. Field changes of dimension and detail.
3. Details not on original Contract drawings.

G. Submit Record Documents to Engineer with claim for final Application for Payment.

1.07 OPERATION AND MAINTENANCE DATA

A. Submit data bound and organized in 8-1/2 x 11 inch (A4) text pages, three D side ring binders with durable cloth covers.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, date of submittal.

C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions, arranged by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:

a. Significant design criteria.

b. List of equipment.

c. Parts list for each component.

d. Operating instructions.

e. Maintenance instructions for equipment and systems.

f. Maintenance instructions for [special] finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

3. Part 3: Project documents and certificates, including the following:

a. Shop drawings and product data.

b. Certificates.

c. Photocopies of warranties and bonds.

1.08 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Includes:

1. Site Demolition required for this Work shall be as specified on contract drawings and as otherwise required to complete the work shown on the drawings. Site demolition is needed to access existing utilities, make utility connections, install new utilities, make structural tank modifications, and other related work necessitated by the utility replacement work.

1.02 MEASUREMENT AND PAYMENT

A. Measurement and payment for demolition shall be done under the bid item to which it relates.

1.03 JOB CONDITIONS

A. Extent and Character of Demolition:

1. Prior to bidding, the contract shall verify the extent and character of demolition required to complete the work as shown on the plans and as required by the specifications. The contractor shall anticipate that the area requiring demolition shall be more extensive than that shown on the plans due to materials encountered during excavations, vegetation covering areas to be demolished, and the overall nature of the work. Also, the contractor should expect that the thickness and character of the materials to be demolished shall be more extensive that may be shown and could be variable. Concrete should be assumed to be reinforced with rebar.

B. Dust control:

1. Use all means necessary to prevent the spread of dust during performance of the work of this Section. The contractor shall be responsible for obtaining and paying for water for dust control.

C. Runoff and Erosion Control:

1. The contractor shall be responsible for complying with the Stormwater Best Management Practices and any other requirements of permits required for the project. This shall include the control of runoff and erosion associated with demolition.

D. On Site Burning

1. On-site burning will not be permitted.

E. Protection:

1. Use all means necessary to protect existing structures designated to remain and, in the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer at no additional cost to the Owner.

2. Use all means necessary to protect existing utilities, roadways, driveways, paths of travel and other features to remain in service.

3. The road shall be in active use throughout the construction project and so the contractor is responsible for coordinating activities with the owner and installing and maintaining temporary barricades, trench plates, detours, and other control features to allow all activities to continue while protecting work areas and pedestrians.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SITE INSPECTION

A. Prior to bidding and again prior to any demolition work, carefully inspect the site and determine the extent of work involved as well as above and below ground utilities. The contractor shall locate all utilities prior to demolition. The contractor should anticipate that not all utilities are shown on the plans and that further investigation by the contractor is required.

B. Report any discrepancy to the Engineer immediately.

3.02 COORDINATION AND SCHEDULING

A. Schedule and coordinate demolition with Owner, any utilities or other contractors which may be involved.

3.03 HAZARDOUS MATERIALS

A. See Specification 02 83 00 (Removal of Materials Containing Lead).

3.04 SAFETY

A. All work shall conform to pertinent OSHA regulations and to other local codes and ordinances as applicable.

3.05 REMOVAL OF DEBRIS AND SITE RESTORATION

A. Remove all debris from the site and dispose of in accordance with all local and federal laws and regulations. Leave the site in a neat and orderly condition. Restore areas as specified on the plans or as per preconstruction conditions.

END OF SECTION

SECTION 02 83 00

REMOVAL AND DISPOSAL OF MATERIAL CONTAINING LEAD

PART 1 GENERAL

1.01 SUMMARY OF LEAD-RELATED WORK

A. General

1. This work may involve disturbance of finishes at the project site that are known or assumed to contain very low levels of lead.

    a. Surface coatings generally representative of paint present at the project site were collected to evaluate specific painted project site features for the presence of lead. Various sampled surface coatings were reported to contain very low levels of lead.

    b. For testing performed and analytical results, see the hazardous materials report appended to these specifications (Appendix B).

    c. Surface coatings at the project site shall be understood to be subject to applicable governmental regulations concerning lead.

2. The Contractor is solely responsible for determining and implementing applicable California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA) worker protection requirements, including Title 8 of the California Code of Regulations, Section 1532.1 (8 CCR 1532.1) in a manner that protects Contractor personnel, District personnel, the public, and the environment from potential lead or other hazardous material exposure resulting from Contractor work in association with this project.

3. Contractor shall furnish all labor, materials, services, insurance and equipment which are specified, shown or reasonably implied for effective containment, dust suppression, cleaning, impaction, transport, and disposal of lead from the project site including the following work:

    a. Removal of the sand/paint waste stream generated by sandblasting the existing tank coating.

4. The work includes the proper containment, removal, transport, and disposal of the following lead-contaminated materials associated with lead-related construction activities including, but not limited to, the following:

    a. All materials used for work area preparation

    b. All discarded personal protective equipment

    c. All other potentially contaminated materials

    d. All lead contaminated waste and debris

B. Upon completion of Contractor’s work, all interior and exterior surfaces located within the Contractor’s scope of work are to be free of visible lead-containing debris and/or lead-dust hazards.

C. All work shall be supervised by experienced persons trained, knowledgeable and qualified in the techniques of lead containing material impaction, proper handling, disposal requirements and the subsequent cleaning of lead-contaminated areas.

1.02 RELATED SECTIONS

A. Section 09 91 00 – Tank Preparation and Coating

1.03 RELATED DOCUMENTS

A. See the hazardous materials report appended to these specifications (Appendix B).

1.04 MEASUREMENT AND PAYMENT

A. Measurement and Payment for this item will be included in the surface preparation/coating bid item to which it relates. Measurement and Payment shall include all equipment, tools, labor and materials required to abate, contain, test, containerize, transport and dispose of any material containing lead or other hazardous waste generated during the performance of this work. Work shall also include any administrative, worker protection, environmental protection, reporting, medical surveillance, or other measures required for the performance of the work detailed in this section.

1.05 REFERENCES

A. Work at the project site is understood to meet the Cal/OSHA definition of construction work [1532.1(a)] and includes the planned impaction of paint that has detectable levels of lead, thus, is subject to regulation by governmental agencies and standards, including those denoted below.

1. Code of Federal Regulations (CFR)

a. 29 CFR 1926, Construction Standards

b. 40 CFR Parts 261, 265, and 268, Hazardous Waste Management

c. 40 CFR Part 745, Lead: Identification of Dangerous Levels of Lead

d. 40 CFR Part 745, Subpart E Lead Renovation, Repair and Painting Program

e. 49 CFR Parts 172, 173, 178, 179, Hazardous Material Transportation

2. California Code of Regulations (CCR)

a. 8 CCR Division 1, Chapter 4, Construction Safety Orders

b. 8 CCR 1532.1, Lead in Construction

c. 8 CCR 1537, Welding, Cutting, and Heating of Coated Metals

d. 8 CCR 1531, Respiratory Protection

e. 17 CCR Division 1, Chapter 8, Accreditation/Certification, and Work Practices in Lead–Related Construction

f. 22 CCR Division 4.5, Environmental Health Standards for Management of Hazardous Waste

1.06 DEFINITIONS

A. Definitions specific to the work of this section:

1. Abatement – Hazardous materials related construction undertaken for the purpose of eliminating or reducing existing recognized hazardous materials related hazards. Title 17 CCR, Division 1, Chapter 8 defines abatement as any set of measures designed to reduce or eliminate lead hazards or lead-based paint for public and residential buildings, but does not include containment or cleaning.

2. Accreditation – Accreditation means that California Department of Public Health (CDPH) has reviewed and finds acceptable a training provider's written application for accreditation, and has conducted and finds acceptable, an on-site audit as specified in Title 17 CCR, Division 1, Chapter 8, subsection 35078(e). Accredited training provider means any individual, corporation, partnership or other unincorporated association or public entity to which the Department has granted accreditation or provisional accreditation to offer lead-related construction courses and continuing education instruction.

3. Action Level (AL) – Cal/OSHA employee exposure level for airborne concentrations of lead of 30 micrograms per cubic meter of air (30 µg/m3) calculated as an eight-hour time-weighted average (TWA) per CCR Title 8, Section 1532.1 Lead (8 CCR 1532.1[b]).

4. Air Monitoring – The process of measuring the air contaminant (e.g. lead) content of a specified volume of air in a stated period of time. The purpose of air monitoring is to determine compliance with regulatory occupational and specified environmental exposure limits for airborne contaminates.

5. Cal/OSHA – The State of California Department of Industrial Relations, Division of Occupational Safety and Health.

6. CDPH – The State of California Department of Public Health.

7. Certified Lead Supervisor – A certified lead supervisor is an individual who has received a certificate or an interim certificate from CDPH as a "certified lead supervisor."

8. Certified Lead Worker– A certified lead supervisor is an individual who has received a certificate or an interim certificate from CDPH as a "certified lead worker."

9. Clearance Inspection – A clearance inspection means an on-site limited investigation, as described in Chapter 15: Clearance, sections II-VI, "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing," U.S. Department of Housing and Urban Development, June 1995.

10. Competent Person – An onsite supervisor who has been formally trained in lead-related construction and who is capable of identifying lead hazards, substandard and improper lead hazard controls, procedures, practices, and conditions and who has sufficient experience and authority to take prompt corrective measures to take corrective action.

11. Containment – Protective physical barriers and associated means and methods used to contain airborne contaminant dust within the work area and prevent contamination of surfaces and grounds below and adjacent to areas where a hazardous material is being disturbed.

12. Contractor – the appropriately-licensed contractor, including contractor personnel and/or affiliates, selected to remove the hazardous materials at the project site.

13. Hazardous Lead Waste – Lead-containing debris shall be classified as hazardous due to the characteristic of toxicity, as determined by testing in accordance with the California Code of Regulations, Title 22, Division 4.5. Any substance(s) listed in Chapter 11 Section 66261.24 at concentrations greater than the applicable listed Soluble Threshold Limit Concentration (STLC) or Total Threshold Limit Concentration (TTLC) is considered hazardous waste and may need to be further characterized by the Toxicity Characteristic Leaching Procedure (TCLP) in accordance with 40 CFR 261 and other tests prior to disposal as a hazardous waste.

14. Hazardous Waste – Waste material that is listed or meets the criteria for hazardous waste as set forth in California Code of Regulations (CCR), Title 22, and Article 9 (see below). At minimum, with regard to the work project, the following shall be considered to be hazardous wastes associated with lead containing paint with respect to this section:

    a. Paint waste or other debris that has been classified as hazardous due to the characteristics of toxicity, as determined by testing in accordance with CCR, Title 22, Div. 4.5.

    b. Any substance listed in Chapter 11, Section 66261.24 at concentrations greater than its listed Soluble Threshold Limit Concentration (STLC) of 5.0 part per million (ppm) or Total Threshold Limit Concentration (TTLC) of 1000 ppm. If the STLC or TTLC values are exceeded, the lead related waste will need to be further characterized by the Toxicity Characteristics Leaching Procedure (TCLP) in accordance with 40 CFR 261.

15. HEPA Vacuum Equipment – High efficiency particulate air (HEPA) filtered vacuuming equipment with a filter system capable of collecting and retaining lead dust. Filters shall be certified to be of 99.97% efficiency for retaining particles of 0.3 microns diameter or larger.

16. HUD – United States Department of Housing and Urban Development.

17. Intact LCP/LBP Components – LCP/LBP components (including equipment) removed substantially intact with LBP firmly adhering to the surface.

18. Lead Based Paint (LBP) – Paint that contains greater than or equal to 0.5 percent lead by weight, or 5,000 ppm, when analyzed by atomic absorption spectroscopy (AAS) or inductively coupled plasma-atomic emissions spectroscopy (ICP-AES) or 1.0 milligrams of lead per square centimeter (mg/cm2) as determined by x-ray fluorescence (XRF) testing or laboratory analysis, or as identified by plan. Untested paints or coatings must be presumed to contain LBP. The presence of LBP triggers specific CDPH rules for residential and public buildings. LBP triggers certain Cal/OSHA pre-job notification requirements, if quantity thresholds are exceeded.

19. Lead Containing Paint – Consumer Product Safety Commission (CPSC) definition of a paint or finish coating with a lead content of greater than 0.009 percent by weight (90 ppm). Note: Cal/OSHA regulation requires compliance with worker protection rules when impacting paint or material containing lead at any detectable level. Untested paints must be presumed to contain lead at Lead Based Paint (LBP) levels (see LBP definition, below).

20. Lead Containing Material – Any material, other than a paint or coating, with a lead content of 0.5 percent (5,000 ppm) or greater. Lead containing material may poise occupational and environmental hazards depending on lead content (level), operation or process, amount of disturbance, and other factors.

21. Lead Contaminated Dust – Lead-contaminated dust means dust that contains an amount of lead equal to, or in excess of:

    a. Forty micrograms per square foot (40 µg/ft2) for interior floor surfaces; or

    b. Two hundred and fifty micrograms per square foot (250 µg/ft2) for interior horizontal surfaces; or

    c. Four hundred micrograms per square foot (400 µg/ft2) for exterior floor and exterior horizontal surfaces.

22. Lead Contaminated Soil – Lead-contaminated soil means bare soil that contains an amount of lead equal to, or in excess of, four hundred parts per million (400

ppm) in children's play areas and one thousand parts per million (1000 ppm) in all other areas.

23. Lead Hazard – Lead hazard means deteriorated lead-based paint, lead contaminated dust, lead contaminated soil, disturbing lead-based paint or presumed lead-based paint without containment, or any other nuisance which may result in persistent and quantifiable lead exposure.

24. Lead Paint Surface Preparation – The process of conducting surface preparation by means of sandblasting prior to selective or general work or painting. Where the surface is being prepared for painting, lead-related work controls apply for any additional surface preparation required for painting. Also referred to as lead paint stabilization.

25. Lead Related Construction – Any construction, alteration, painting, demolition, salvage, renovation, repair, or maintenance of any residential or public building, including preparation and clean-up, that, by using or disturbing lead containing material or soil, may result in significant exposure of adults or children to lead.

26. Lead Related Waste – Paint chips, vacuum dust, and debris, used cleaning articles, wastewater, plastic sheets and other disposable items used during lead/chromium containing paint impaction are considered lead contaminated waste or suspect hazardous waste pending further characterization.

27. Parts Per Million (ppm) – A common unit used to denote the lead concentration of surface coatings. Note: ppm is equivalent to milligrams per kilogram (mg/kg).

28. Permissible Exposure Limit (PEL) – This is the highest level of a regulated contaminant in air that an employee can be permitted to be exposed to in an eight hour work day without respiratory protection. For longer work days, the PEL is lowered and can be determined by dividing 400 by the number of hours worked per day. When the PEL is exceeded, action must be taken to lower the exposure level and protect the worker per the applicable regulation.

    a. PEL (lead) – An exposure to airborne lead of 50 micrograms of lead per cubic meter of air (50 µg/m3), averaged over an 8-hour workday referred to as a time weighted average (TWA).

29. Personal Protective Equipment (PPE) – Coveralls, respirators, gloves, eye and hearing protection, hardhats and/or other personal equipment worn by individuals for the purpose of shielding from exposure to potentially hazardous materials or site conditions.

30. Presumed Lead-Based Paint – Presumed lead-based paint means paint or surface coating affixed to a component in or on a structure constructed prior to January 1, 1978. Presumed lead-based paint does not include paint or surface coating that has been tested and found to contain an amount of lead less than one milligram per square centimeter (1.0 mg/cm2) less than half of one percent (0.5%) by weight, or less than 5,000 ppm.

31. Qualified Person – The specially trained individual to be responsible for conducting air sampling, calibration of air sampling pumps, evaluating sampling results, and conducting respirator fit tests. This role is often assigned to the Competent Person.

32. Regulated Area – A designated and controlled area in which hazardous material impaction or hazardous materials–impacted work activities are undertaken or which may become contaminated as a result of such actions. A regulated area, also known as a work area, is a controlled area delineated by barrier tape (or similar means) at minimum and signage to restrict access to Authorized

Personnel. In some instances, a higher degree of physical isolation and control may be required and specified.

33. Removal – Procedures specified as necessary to remove and clean–up hazardous materials, paint and debris with heavy metal contamination or components with heavy metal containing coatings from the designated areas and to dispose of these materials at an acceptable site in accordance with Federal, State and Local Regulations.

34. Trigger Task – Operation, process or task specifically identified by Cal/OSHA Lead Standard - 8 CCR 1532.1 as a potential lead exposure hazard requiring certain protective measures to be implemented prior to obtaining the results of an initial exposure assessment. Trigger tasks include, but are not limited to, any of the following tasks when materials or paints that contain lead are present and will be disturbed:

    a. Manual work

    b. Manual scraping or sanding

    c. Heat gun applications

    d. Use of power tools for cleaning or removal

    e. Rivet busting

    f. Abrasive blasting and clean-up of spent abrasive

    g. Welding, cutting or torch burning

35. Transportation Storage Disposal (TSD) Facility – An USEPA or State permitted facility for transportation, storage, and disposal of hazardous wastes.

36. USEPA – United States Environmental Protection Agency.

37. USEPA RRP – United States Environmental Protection Agency Lead Renovation, Repair and Painting Program (RRP) regulation (40 CFR 745, Subpart E) establishes standard lead-safe work practices, training/certification requirements for entities conducting renovation and/or demolition work within pre-1978 housing, child care facilities and kindergartens.

38. Visually Clean – Free of visible dust, paint chips, dirt, debris, or films removable by vacuuming or wet cleaning methods specified. For outside soil or ground cover areas, visually clean shall mean free of construction or paint debris, chips or dust distinguishable from the initial soil or ground conditions.

39. Washroom – A room or area established outside the work area for hand washing at minimum. Where the lead PEL is exceeded, the washroom shall contain a shower facility with hot and cold water and a water filtering system.

1.07 SUBMITTALS AND NOTICES

Requirements are as set forth in the contract for items required to be submitted under this section. Prior to the start of work at the project site, but not fewer than 14 calendar days prior to the planned commencement of work, the Contractor shall submit copies of the following documentation to the Engineer:

A. Work Procedure and Lead Compliance Submittal

1. Contractor shall submit the following to the Engineer prior to the start of work applicable to these specifications and in conjunction with the submittals required under Section 09 91 00 - Tank Preparation and Coating:

a. Detailed work plan describing the methods to be used including products, work procedures, tools and equipment, and lead containment and contamination controls and clean-up methods.

b. Cal/OSHA lead compliance plan for controlling worker exposure to lead.

c. Name and training documentation for the Competent Person responsible for lead compliance.

d. Plan for disposal of lead-contaminated wastes generated by this work in accordance with all applicable Federal, State and Local regulations

e. Name and certification of laboratory to be used for waste characterization analysis.

1.08 CONTRACTOR'S COMPLIANCE AND QUALITY ASSURANCE

A. Competent Person

1. The Contractor shall have a Competent Person onsite at all times while Lead-Related Construction involving a trigger task is in progress. The Contractor's Competent Person shall communicate and coordinate with the Owner with regard to work schedules, inspections, daily submittals, and compliance issues.

PART 2 PRODUCTS

2.01 PROTECTIVE COVERING

A. Polyethylene sheets (poly) used onsite shall be fire resistant and of 6 mil thickness.

B. Other reinforced impervious plastic sheeting products (10 mil thickness minimum) as may be required for use as drop cloths protection of deck, grounds, flatwork and other surfaces.

2.02 TAPE

A. Self-adhesive tape capable of sealing joints of adjacent sheets of polyethylene sheeting and for attachment of polyethylene sheeting to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions.

2.03 DISPOSAL CONTAINERS FOR HAZARDOUS WASTE

A. Provide six (6) mil thick polyethylene sheeting, six (6) mil leak-tight polyethylene bags and other impervious containers or drums as required by applicable regulations.

B. Provide labels for all waste container as all waste shall be labeled as hazardous or presumed hazardous waste unless proven otherwise by appropriate sampling and laboratory analysis unless otherwise noted.

C. All hazardous waste shipping containers shall meet applicable DOT requirements.

2.04 WARNING SIGNS AND LABELS

A. Caution Signs

1. Signs are to be large enough to be readable from a distance and include the following phrase in minimum two-inch high letters:

CAUTION LEAD HAZARD

KEEP OUT UNLESS AUTHORIZED

2. Signs shall be posted at each approach to each lead or abatement regulated area or area where lead-related construction work is conducted.

B. Cal/OSHA Lead Warning Signs

1. Signage including the following phrase shall be posted at the entrance to each regulated area:

DANGER

LEAD WORK AREA

MAY DAMAGE FERTILITY OR THE UNBORN CHILD

CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM

DO NO EAT, DRINK OR SMOKE IN THIS AREA

C. Labels

1. Hazardous waste shall be labeled according to Federal, State and Local regulations including but not limited to the California Code of Regulations, Title 22, Chapter 30 and the United States Department of Transportation 49 CFR Parts 172, 173, 178 and 179.

2.05 PERSONAL PROTECTIVE EQUIPMENT

A. Personal protective equipment shall comply with the requirements of 8 CCR 1532.1, Lead.

B. Minimum protective clothing and equipment for trigger tasks pending initial exposure monitoring and any operation known to exceed the PEL shall consist of disposable, full-body coveralls, disposable boots, gloves, or equivalent in accordance with ANSI Z41. Sleeves at wrists and cuffs at ankles shall be secure.

C. All disposable clothing worn during each work shift shall be removed prior to exiting the regulated area and shall be properly segregated and placed in containers for proper waste characterization. The Contractor shall bear full responsibility for additional costs associated with waste profiling and disposal if wastes are not properly segregated.

D. Eye protection and hard hats shall be available and worn at all times and shall conform to ANSI 87.1 and ANSI 89.1

E. The Contractor shall provide Authorized Visitors with suitable disposable protective clothing, headgear, respirators, and footwear whenever authorized visitors are required to enter the regulated area.

2.06 RESPIRATORS

A. For trigger tasks pending initial exposure assessment results and any operation known to exceed the PEL, provide workers with personally issued respiratory equipment approved by NIOSH and suitable for the lead exposure level in the regulated area and any other airborne contaminate hazards present.

2.07 TOOLS AND EQUIPMENT

A. Provide suitable tools for the removal of LCP and lead contamination including HEPA vacuums, HEPA exhaust units, ground fault circuit interrupters (GFCIs), ladders, scaffold, and garden sprayers.

B. All tools and equipment brought onsite shall be clean and free of lead and other hazardous material contaminants. HEPA vacuums shall be labeled with a lead warning

label and dedicated to lead-impacted construction work to prevent commingling of lead wastes with asbestos or other vacuum wastes.

C. Provide enough support equipment, including but not limited to lumber, nails, hardware, shower stalls, hoses, plumbing, drain pans, sump pumps, and waste water storage drums to construct and operate the required hand washing system and, where required, a portable Wash Room with showers.

PART 3 EXECUTION

3.01 GENERAL

A. All work impacting known or presumed lead containing material must be accomplished in conformance with these specifications, applicable regulations and provisions of the contract documents. Contractor shall be solely responsible for compliance with applicable State and Federal lead and hazardous waste exposure, containment and disposal requirements. In addition to the lead hazard controls of these specifications, the applicable requirements for selective demolition, surface preparation, painting, restoration, patching, and repair shall be adhered to.

B. Public and worker warning and safety information to be posted: Inside the designated construction area, post signs at all approaches to the lead removal or trigger task regulated area entrance to read:

CAUTION LEAD HAZARD

KEEP OUT UNLESS AUTHORIZED

C. In addition, post the Cal/OSHA Lead Hazard Warning Poster at the immediate regulated area entrance where trigger tasks are conducted unless monitoring results show airborne exposure levels to be below PEL.

3.02 GENERAL WORK AREA PREPARATION

A. The following requirement apply to lead-impacted work involving trigger tasks or other work that is likely or known to disturb material containing lead in a manner that will generate lead containing dust and debris within the regulated area.

1. Exterior Areas:

   a. For demolition, debris clean-up, and paint stabilization activities:

      1) Cover and protect ground and/or horizontal surfaces within regulated area as to contain the lead hazard within the established work area.

      2) Extend groundcover from a sufficient distance beyond the work activity, as needed, to contain all lead-related construction debris within the containment.

2. Seal all seams and secure plastic to prevent undesired movement. Where lead-containing material removal is likely to generate airborne dust or paint chips, devise a suitable containment to control such dust and prevent dispersal by wind.

3. Provide a designated entry/exit point to regulated areas suitable for workers to properly decontaminate and exit from the regulated area as specified herein. Install lead caution and warning signage as specified above and provide at minimum a hand washing facility.

4. Lead-related construction work shall not initially proceed until the Engineer or Inspector has checked and approved regulated area preparations.

3.03 WORKER PROTECTION AND DECONTAMINATION

A. The Contractor shall use only workers trained and medically qualified for the assigned lead work and respirator usage for trigger tasks or other work known or reasonably expected to generate airborne exposures to lead in excess of the AL or PEL.

B. Medically-qualified shall mean that the worker who perform trigger tasks, abatement or other Lead-Related Construction tasks likely to exceed the AL, has had at minimum biological monitoring and a medical evaluation for use of respiratory protection in accordance with 8 CCR 1532.1 (j).

C. If the AL is anticipated to exceeded on any project for 30 days or more per year, the employee shall be enrolled in an occupational medical exam for lead exposure and periodic biological monitoring per 8 CCR 1532.1 (j) (2) and (3).

D. Each worker shall have successfully completed lead training in accordance with 8 CCR 1532.1 (l). All workers shall have had a minimum lead hazard communication training tailored to their particular job assignments.

E. All workers and their supervisors performing lead-related construction work anticipated or determined to exceed the AL are required to have formal documented training in lead hazards meeting 8 CCR 1532.1 (l) (2).

F. Where the workers and their supervisors are assigned work that is determined or reasonably expected to exceed the PEL, both the workers and their supervisors shall be trained by a Department of Public Health (CDPH) accredited training provider for lead related construction and certified as lead workers and supervisors by CDPH.

G. All tools and equipment shall be decontaminated by HEPA vacuuming and/or wet wiping prior to being taken out of the regulated area. Tools and equipment with inaccessible internals shall be externally wet-wiped, bagged and sealed prior to being removed from the regulated area.

H. Workers shall not eat, drink, smoke, apply cosmetics or chew gum or tobacco within the work area.

3.04 SURFACE PREPARATION

A. Prepare the surface for the primer coating in accordance with the painting specifications of this contract.

B. Feather the coating edge transitions from substrate to coatings and from one coat to the next to obtain a smooth, clean, adhered surface for painting.

3.05 CLEANING AND DECONTAMINATION OF WORK AREAS

A. Perform the following clean-up procedures daily:

1. Clean regulated areas until they are free of loose dust and debris using HEPA and/or wet-wiping after pick-up of large debris.

2. Wet debris with a fine mist of water and collect and containerize the material. All material to be properly segregated, double bagged or containerized, sealed, and moved to a designated, secure, waste storage area for waste characterization.

3. At the end of each work day the Contractor's Competent Person shall inspect work performed to ensure the work has been completed and no visible dust or residue remains on the areas removed and/or in the regulated area. OWNER’s Representative shall be included in that inspection process when and if they request inclusion.

B. Final Clean up and Decontamination of Regulated Areas:

1. At completion of lead-related construction work involving trigger tasks or task which produce lead-containing dust and debris, perform cleaning as follows:

    a. Clean all regulated areas where lead-related construction was performed by vacuuming all surfaces with a HEPA vacuum followed by wet-wiping using methods and materials sufficient to prevent cross contamination.

    b. Disassemble and remove containment barriers at each regulated area location after cleaning as specified above. Place containment construction material debris into waste bags and remove to the temporary waste storage area.

    c. Place containment membranes and plastic sheeting and waste rags in labeled six mil plastic bags or containers, seal and store in a designated, secure, waste storage area for waste characterization.

C. The cleaning procedure employed by the Contractor shall prevent spread of contamination and effectively clean surfaces, while producing minimal waste.

D. All tools and equipment potentially contaminated with lead shall be decontaminated prior to exiting the regulated area and/or appropriately containerized to avoid dispersion of lead to other areas of the project site.

3.06 LEAD CONTAMINATION OF THE ENVIRONMENT

A. In the event that removed lead-containing material, dust, or debris is not properly contained within the regulated area and thereby migrates outside established barriers, the Contractor shall stop work immediately, notify OWNER immediately, and commence clean-up and decontamination procedures as described herein or directed by OWNER.

3.07 WASTE STORAGE, SEGREGATION, AND CHARACTERIZATION

A. The Contractor shall provide for secure onsite temporary storage of lead-containing material and/or related waste. Waste storage location, equipment, containers and methods are subject to prior approval by OWNER.

B. Intact LCP components are not normally considered to be hazardous wastes and may often be removed and disposed of as non-hazardous construction wastes. However, it is the Contractor's sole responsibility to ensure the waste produced by the Contractor's means and methods is properly characterized and disposed of.

C. The Contractor shall be responsible for secure onsite temporary storage for known or suspect hazardous LBP paint chip, dust/debris, and clean–up related waste. Contractor is also responsible for segregating wastes into appropriate waste streams based on waste characterization, sampling, and disposal requirements.

D. As needed, and as determined by Contractor according to applicable State and Federal regulatory requirements, waste streams shall be tested by the Contractor using the following lead testing protocol thresholds for determination of hazardous waste characterization:

Table 1 – California Environmental Protection Agency (Cal/EPA) Testing Protocol for Lead

Laboratory Analytical Method for Determination of Lead Content	**Hazardous Waste Threshold**	**Waste Characterization**
Total Threshold Limit Concentration (TTLC)	≤50 ppm	Non-Hazardous Waste

Table 1 – California Environmental Protection Agency (Cal/EPA) Testing Protocol for Lead

Laboratory Analytical Method for Determination of Lead Content	Hazardous Waste Threshold	Waste Characterization
Total Threshold Limit Concentration (TTLC)	>50 ppm - ≤1,000 ppm	Run STLC
Total Threshold Limit Concentration (TTLC)	>1,000 ppm	California Hazardous Waste, Run TCLP
Soluble Threshold Limit Concentration (STLC)	≤5 mg/L	Non-Hazardous Waste
Soluble Threshold Limit Concentration (STLC)	>5 mg/L	California Hazardous Waste, Run TCLP

Table 2 – USEPA Testing Protocol for Lead

Laboratory Analytical Method	Hazardous Waste Threshold	Waste Characterization
Toxicity Characteristic Leaching Procedure (TCLP)	>5 mg/L	RCRA Hazardous Waste
Toxicity Characteristic Leaching Procedure (TCLP)	≤5 mg/L	Non-RCRA Hazardous Waste

E. Based on the above testing protocols, any representative waste stream having a soluble lead concentration greater than or equal to five ppm lead as determined by STLC or TCLP analyses or any waste greater than or equal to 1,000 ppm lead using the TTLC analysis shall be considered a lead hazardous waste. If the TTLC result for a waste stream is less than 50 ppm lead, then no further testing is required for the sampled waste stream unless the waste changes in character or composition.

F. Composite representative samples shall be taken of each waste stream category generated and shall be composited into one sample for analysis. A minimum of four composite samples shall be taken to represent each category of waste generated. It will be the responsibility of the Contractor to ensure representative samples are taken from each category of segregated waste.

G. Each category of suspect hazardous waste shall be tested and characterized according to requirements of the selected permitted waste disposal site.

H. If other hazardous constituents are known or suspected to be present, the testing shall also include those substances or conditions.

I. The waste shall be packaged, stored, handled, transported and disposed of for each category of waste generated based on the testing results and regulatory protocol.

J. All testing shall be performed by a laboratory that complies with and is certified under the Environmental Laboratory Accreditation Program (ELAP) established by CDPH.

K. The cost of all waste characterization or waste profiling required by the approved landfill will be the responsibility of the Contractor.

L. In the event that OWNER determines that the waste is not properly segregated, the mixed waste stream shall be considered hazardous. The Contractor shall be responsible for the costs associated with any additional testing required.

M. The Contractor shall bear full responsibility for additional costs associated with waste disposal and characterization if waste is not properly segregated as required herein.

3.08 HAZARDOUS WASTE DISPOSAL

A. Site Storage and Handling

1. The Contractor shall pay strict attention to the requirements of 40 CFR 262 and 265 and Title 22, Division 4.5 for the onsite handling of hazardous waste, with special attention given to the time of storage, amount of material stored at any one time, use of proper containers, and personnel training

2. All hazardous waste shall be stored in secure, locked, labeled, sealed impervious containers and not placed on the unprotected ground.

3. All containers shall be shielded adequately to prevent dispersion of the debris by wind or rain and shall be labeled as hazardous waste.

4. Any evidence of improper storage shall be cause for immediate shutdown of the project until a corrective action is taken.

B. The exterior of waste containers shall be cleaned using a HEPA vacuum and/or wet-wiping prior to removing them from the work area.

C. Wastes shall not be treated or processed in an attempt to mitigate the waste streams hazardous characteristics; as such treatment is prohibited by RCRA.

D. The Contractor shall arrange to have the lead hazardous waste transported from the site in accordance with the requirements of 40 CFR 263 and 264, and disposed of properly in accordance with 40 CFR 268, 8 CCR Articles 40 and 41, 49 CFR Parts 172, 173, 178, and 179 and Title 22, Chapter 30, Articles 5, 6, 6.5 and 8.

E. The Contractor shall submit to OWNER the Name, Class, and USEPA ID Number of the waste disposal site(s) to be used for each waste category that has been determined by testing to exceed the hazardous waste thresholds provided in State and Federal regulations.

F. The Contractor shall prepare hazardous waste shipping manifests for review by OWNER. Upon waste or material pickup by the selected waste transporter, manifests shall be signed by OWNER and copies retained to verify that all steps of the handling and disposal process have been completed properly.

1. Copies of the fully completed manifests and landfill weight tickets shall be provided to OWNER.

G. The Contractor shall be responsible for all costs associated with transportation and disposal of all wastes generated as the result of this work.

H. No waste characterized as hazardous waste or originating from a waste stream characterized as hazardous shall be stored onsite for more than 90 days prior to being properly transported for disposal.

I. All equipment, materials, and waste generated on this project must be removed offsite to their proper locations by the Contractor within 7 calendar days from completion of all abatement and lead-impacted construction work.

J. Containers to be loaded for transportation from the storage area must be removed by workers who have entered from uncontaminated areas, dressed in clean coveralls.

3.09 ALTERNATIVE PROCEDURES

A. If specified procedures cannot be utilized, a request shall be made in writing to OWNER providing details of the problem encountered and recommended alternatives.

B. Alternative procedures shall provide equivalent or greater employee protection than procedures that are replaced.

3.10 STOP WORK ORDERS

A. OWNER has the authority to stop work if it is determined that conditions or procedures are not in compliance with the specifications and/or applicable regulations; to the extent of potential endangerment of state employees, the public or environment.

B. The work stoppage shall remain in effect until conditions have been corrected, corrective measures have been taken to the satisfaction of OWNER and the Contractor has received written approval from OWNER to recommence work.

C. All standby time and testing costs required to correct the above mentioned problems shall be borne solely at the Contractor's expense.

D. Examples of conditions that might result in a work stoppage include but are not limited to:

1. Uncontrolled visible emissions which escape the established regulated area or breach physical protective barriers within the regulated area.

2. Ambient airborne levels of lead outside the construction area at more than 15 µg/m3 of lead averaged over an eight-hour work period. Measurement of the ambient airborne lead levels may be made outside the immediate regulated area and at the nearest areas occupied by unprotected personnel or the public.

3. Waste storage area left unsecured and/or improper containment of lead hazardous waste.

4. Lead surface contamination outside the regulated area above clearance or pre-start background levels, whichever is higher as determined by wipe tests.

3.11 PROJECT CLOSEOUT

A. Prior to approval of final payment request, the Contractor must provide the following information:

1. Copies of all hazardous waste manifests, profile sheets and weight tickets for all hazardous wastes.

2. Copies of all required environmental air monitoring results.

3. Copies of all outstanding daily submittals not previously submitted to OWNER.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Formwork.
2. Reinforcement.
3. Accessories.
4. Cast-in place concrete.
5. Finishing and curing.

1.02 REFERENCES

A. American Concrete Institute:

1. ACI 301 - Specifications for Structural Concrete.
2. ACI 305 - Hot Weather Concreting.
3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
4. ACI 318 - Building Code Requirements for Structural Concrete.
5. ACI 350.4 – Design Considerations for Environmental Engineering Concrete Structures.

B. ASTM International:

1. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
2. ASTM C33 - Standard Specification for Concrete Aggregates.
3. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
5. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
6. ASTM C150 - Standard Specification for Portland Cement.
7. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
8. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
9. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
10. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
11. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
12. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

13. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
14. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
15. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.

1.03 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on joint devices, attachment accessories and admixtures.

C. Design Data:

1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
    a. Hot and cold weather concrete work.
    b. Air entrained concrete work.
2. Identify mix ingredients and proportions, including admixtures.

D. Manufacturer's Installation Instructions: Submit installation procedures and interface required with adjacent Work.

1.04 CLOSEOUT SUBMITTALS

A. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301.

B. Conform to ACI 305 when concreting during hot weather.

C. Conform to ACI 306.1 when concreting during cold weather.

D. Acquire cement and aggregate from one source for Work.

E. Perform Work in accordance with Caltrans Standard Plans Standards.

F. Maintain one copy of each document on site.

1.06 COORDINATION

A. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.01 FORM MATERIALS AND ACCESSORIES

A. Form Materials: At discretion of Contractor. New materials to be used.

B. Form Release Agent: Colorless mineral oil not capable of staining concrete or impairing natural bonding characteristics of coating intended for use on concrete.

2.02 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, 60 ksi yield, deformed billet bars, uncoated finish. Welded reinforcing: ASTM A704/A704M, 60 ksi yield.

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for support of reinforcing; plastic tipped or non-corroding for supports in slabs forming finished ceilings or where supports are exposed to weather.

C. Fabricate concrete reinforcement in accordance with ACI 318.

D. Weld reinforcement in accordance with AWS D1.4.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150, Portland Cement Type II – Moderate.

B. Normal Weight Aggregates: ASTM C33.

1. Coarse Aggregate Maximum Size: 3/4 inch in accordance with ACI 318.

C. Water: ACI 318; potable, clean and without deleterious amounts of chloride ions.

2.04 ADMIXTURES

A. Air Entrainment: ASTM C260, containing no chlorides or other corrosion causing chemicals.

B. Chemical: ASTM C494/C494M Type A – Water Reducing, Type D – Water Reducing and Retarding, containing no chlorides or other corrosion causing chemicals.

C. Fly Ash: ASTM C618 Class C or F.

D. Plasticizing: ASTM C1017/C1017M Type I, plasticizing and Type II, plasticizing and retarding.

2.05 ACCESSORIES

A. Epoxy Bonding Compound: ASTM C881. Provide Type I for bonding hardened concrete to hardened concrete; Type II for bonding freshly mixed concrete to hardened concrete; and Type III as a binder in epoxy mortar or concrete, or for use in bonding skid-resistant materials to hardened concrete. Provide Grade 1 or 2 for horizontal surfaces and Grade 3 for vertical surfaces. Provide Class A if placement temperature is below 40 degrees F; Class B if placement temperature is between 40 and 60 degrees F; or Class C if placement temperature is above 60 degrees F.

B. Vapor Retarder: ASTM E1745 10 mil thick; type recommended for below grade application. Furnish joint tape recommended by manufacturer.

C. Non-Shrink Grout: ASTM C1107/C1107M; Grade A; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 3,000 psi in 72 hours and 7,000 psi in 28 days.

D. Aluminum Metal Isolation: Two coats of a high build polymide epoxy paint, such as Tnemec 66, or equal (8 mils). Total thickness of system DFT = 8.0 mils.

2.06 JOINT DEVICES AND FILLER MATERIALS

A. Joint Filler: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/4 inch thick; tongue and groove profile.

B. Joint Sealant: ASTM C920 unless otherwise noted; suitable for materials to which applied.

1. Horizontal Joints: Grade P, use T.
2. Vertical Joints: Grade NS.

2.07 CONCRETE MIX

A. Mix and deliver concrete in accordance with ASTM C94, Option C.

B. Select proportions for concrete in accordance with ACI 301.

C. Provide concrete to the following criteria:

D. For all concrete shown on structural drawings:

Material and Property	**Measurement**
Compressive Strength (28 day)	4,000 psi
Cement Type	ASTM C150
Water-Cement Ratio (maximum)	0.45 by weight (mass)
Aggregate Size (maximum)	1.0 inch
Air Content	3 percent plus or minus 1.5 percent
Fly Ash Content	Maximum 25 percent, minimum 15 percent of total weight of cementitious materials
Slump	One (1) inch minimum, four (4) inches maximum, as measured at point of placement.

E. For all miscellaneous concrete not shown on structural drawings:

Material and Property	**Measurement**
Compressive Strength (28 day)	3,000 psi
Cement Type	ASTM C150
Water-Cement Ratio (maximum)	0.59 by weight (mass)
Aggregate Size (maximum)	1.0 inch
Air Content	3 percent plus or minus 1.5 percent
Fly Ash Content	Maximum 25 percent, minimum 15 percent of total weight of cementitious materials
Slump	One (1) inch minimum, four (4) inches maximum, as measured at point of placement.

F. Admixtures: Include admixture types and quantities approved through the submittal process.

1. Use accelerating admixtures in cold weather only when approved by the Engineer. Use of admixtures will not relax cold weather placement requirements.
2. Do not use calcium chloride nor admixtures containing calcium chloride.
3. Use set retarding admixtures during hot weather only when approved by the Engineer.
4. Add air entrainment admixture to concrete mix for work exposed to exterior.

G. Evaporation Retardant:

1. Provide to retard rapid evaporation of water from fresh exposed concrete.

2. Fluorescent color tint which shall disappear completely upon drying is optional.
3. Manufacturers:
    a. Master Builders Co., Cleveland, OH, Confilm or Confilm LL-898.
    b. Evelid Chemical Co., Cleveland, OH, Eucobar.
    c. Or approved equal.

PART 3 EXECUTION

3.01 FORMWORK ERECTION

A. Erect formwork, shoring, and bracing to achieve design requirements. Use new materials for all formwork.

B. Camber slabs and framing to achieve ACI 301 tolerances.

C. Provide bracing to ensure stability of formwork.

D. Form external corners of equipment pads with 3/4 inch chamfer.

E. Apply form release agent to formwork prior to placing form accessories and reinforcement.

F. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings affected by agent.

G. Clean forms as erection proceeds, to remove foreign matter.

3.02 INSERTS, EMBEDDED COMPONENTS, AND OPENINGS

A. Provide formed openings where required for work to be embedded in and passing through concrete members.

B. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

C. Install concrete accessories straight, level, and plumb.

3.03 REINFORCEMENT PLACEMENT

A. Place reinforcement, supported and secured against displacement.

B. Ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings.

C. Weld reinforcement in accordance with AWS D1.4.
    1. Do not weld crossing reinforcement bars for assembly except as permitted by Architect/Engineer.

D. Space reinforcement bars with minimum clear spacing in accordance with ACI 318.

E. Maintain concrete cover around reinforcement in accordance with ACI 318.

3.04 EXAMINATION

A. Verify requirements for concrete cover over reinforcement.

B. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.05 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.

B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

C. Remove debris and ice from formwork, reinforcement, and concrete substrates.

D. Remove water from areas receiving concrete before concrete is placed.

3.06 PLACING CONCRETE

A. Place concrete in accordance with ACI 301.

B. Notify testing laboratory minimum 24 hours prior to commencement of operations.

C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, and anchor bolts are not disturbed during concrete placement.

D. Install vapor retarder under interior slabs on grade in accordance with ASTM E1643. Lap joints minimum 6 inches and seal watertight in accordance with manufacturer's recommendations.

E. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight in accordance with manufacturer's recommendations.

F. Separate slabs on grade from vertical surfaces with 1/4 inch thick joint filler.

G. Deposit concrete at final position. Prevent segregation of mix.

H. Place concrete in continuous operation for each panel or section determined by predetermined joints.

I. Do not interrupt successive placement: do not permit cold joints to occur.

J. Consolidate concrete.

K. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

L. Saw cut joints within 12 hours after placing. Saw cut joints as soon as concrete surface is firm enough not to be torn or damaged by blade and before random shrinkage cracks can form. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.

M. Screed slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 ft.

3.07 CONCRETE FINISHING

A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1.

B. Steel trowel surfaces which are indicated to be exposed.

C. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

3.08 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Cure slab surfaces in accordance with ACI 301.

3.09 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed by Contractor's testing laboratory in accordance with ACI 301 and under provisions of General Conditions.

B. Provide free access to Work and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.

D. Concrete Inspections:

1. Continuous Placement Inspection: Inspect for proper installation procedures.
2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.

E. Strength Test Samples:

1. Sampling Procedures: ASTM C172.
2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, field cured.
3. Sample concrete and make one set of three cylinders for every 100 cu yds or less of each class of concrete placed each day and for every 5,000 sf of surface area for slabs and walls.
4. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
5. Make one additional cylinder during cold weather concreting, and field cure.

F. Field Testing:

1. Slump Test Method: ASTM C143/C143M.
2. Air Content Test Method: ASTM C173/C173M.
3. Temperature Test Method: ASTM C1064/C1064M.
4. Measure slump and temperature for each compressive strength concrete sample.
5. Measure air content in air entrained concrete for each compressive strength concrete sample.

G. Cylinder Compressive Strength Testing:

1. Test Method: ASTM C39/C39M.
2. Test Acceptance: In accordance with ACI 318.
3. Test one cylinder at 7 days.
4. Test two cylinders at 28 days.
5. Retain one for testing when requested by Engineer.
6. Dispose remaining cylinders when testing is not required.

H. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

3.10 PATCHING

A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.

B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.

C. Patch imperfections in accordance with ACI 301.

3.11 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by Engineer.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

END OF SECTION

SECTION 03 48 00

PRECAST CONCRETE UTILITY BOXES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Precast concrete valve boxes.
2. Precast concrete clean out boxes.
3. Precast check valve box.

1.02 RELATED SECTIONS

Related work specified in other sections:

A. Section 01 30 00 Administrative Requirements

B. Section 01 40 00 Quality Requirements

C. Section 01 70 00 Execution and Closeout Requirements

D. Section 31 23 17 Trenching

1.03 REFERENCED CODES AND SPECIFICATIONS

The following standards apply:

A. American Society for Testing and Materials:

1. ASTM A48 - Standard Specification for Gray Iron Castings.
2. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
3. ASTM A536 - Standard Specification for Ductile Iron Castings.
4. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
5. ASTM C33 - Standard Specification for Concrete Aggregates.
6. ASTM C150 - Standard Specification for Portland Cement.
7. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
8. ASTM C857 - Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
9. ASTM C858 - Underground Precast Concrete Utility Structures.
10. ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
11. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
12. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joints Sealants.

1.04 DESIGN CRITERIA

A. Watertight precast reinforced air-entrained concrete structures designed to ASTM C890 live loading and installation conditions, and manufactured to conform to ASTM C913.

B. Minimum 28-day Compressive Strength: 5,000 psi.

C. Honeycombed or retempered concrete is not permitted.

1.05 SUBMITTALS

Submit the following in accordance with Section 01 33 00 – Submittal Procedures:

A. Shop Drawing: Provide dimensional drawings and details for each precast concrete utility box. Indicate plan, location and inverts of connecting piping.

B. Product Data: Submit data on valve vaults and utility boxes.

C. Manufacturer's Certificates: Submit Statement of Compliance, supporting data, from materials suppliers attesting that precast concrete valve vaults and utility boxes provided meet or exceed ASTM Standards and specification requirements.

D. Manufacturer's Installation Instructions: Submit special procedures for precast concrete valve vaults and utility boxes installation.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with applicable encroachment permits.

B. Maintain **one copy** of **each** document on site.

1.07 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing and protecting products.

B. Delivery, Storage and Handling:

1. Transport and handle precast concrete units with equipment designed to protect units from damage.

2. Do not place concrete units in position to cause overstress, warp or twist.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

1.09 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate work with the Owner.

PART 2 PRODUCTS

2.01 PRECAST CONCRETE VALVE boxes

A. Manufacturers:

1. Oldcastle Precast

a. Valve Boxes: Model G05T with ADS plastic extension

2. Vaughn Concrete Products, Inc.

3. Jensen Precast, or approved equal.

4. Substitutions: Section 01 60 00 - Product Requirements.

B. Materials:

1. Portland Cement: ASTM C150, Type II.

2. Coarse Aggregates: ASTM C33; Graded 1 inch to No. 4 Sieve.

3. Sand: ASTM C33; 2.35 fineness modulus.

4. Water: Potable; clean and free of injurious amounts of acids, alkalis, salts, organic materials, and substances incompatible with concrete or steel.

5. Air-Entraining Admixtures: ASTM C260.

6. Reinforcing Steel:

a. Deformed Bars: ASTM A615/A615M, Grade 40.

b. Welded Wire Fabric: ASTM A185.

7. Joint Sealant:

a. ASTM C990.

C. Mixes: Design concrete mix to produce required concrete strength, air-entrainment, watertight properties, and loading requirements.

D. Frames and Covers:

1. Manufacturer: Oldcastle Precast, Jensen Precast or approved equal.

a. Model: As indicated on the Contract Drawings

2. Ductile Iron Castings: ASTM A536.

3. Covers suitable for H-20 traffic loads.

4. Contact surfaces machined and matched.

5. Cast cover inscription with pipeline service.

2.02 NOT USED

2.03 BEDDING MATERIALS

A. Where indicated in the drawings, bedding material below precast concrete boxes, shall conform to the Caltrans Standard Specification Section 68-1.025, “Permeable Material”. Use Class 2 Permeable Material

B. Bedding material below precast concrete box frames shall conform to the Caltrans Standard Specification Section 26-1.02A, “Class 2 Aggregate Base”. Use ¾” Class 2 aggregate base below precast concrete box frames as shown on the Contract Drawings.

2.04 Fabrication and Manufacturer

A. Fabricate precast reinforced concrete boxes in accordance with ASTM C913, to dimensions indicated on Drawings, and to specified design criteria.

PART 3 EXECUTION

3.01 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify piping connection, size, location and invert are as indicated on Drawings.

3.02 FABRICATION

A. Fabrication of precast concrete structures shall be in accordance with an approved shop drawing submittal.

3.03 PREPARATION

A. Excavate to the required depth and install Class 2 aggregate base below structure as shown on the Contract Drawings.

B. Level the resting surface and verify top of aggregate base elevation so that top of box and pipe and/or conduit elevations will be as indicated on the Contract Drawings.

3.04 INSTALLATION

A. Install all precast concrete products in accordance with manufacturer's instructions and as shown on the Contract Drawings.

B. Excavate for precast vaults in accordance with Section 31 23 17 in location and to depth shown. Provide clearance around sidewalls of structure for construction operations.

C. When groundwater is encountered. Prevent accumulation of water in excavations. Place manholes (and structures) in dry trench.

D. Assemble multi section vaults by lowering each section into excavation. Lower, set level, and firmly position base section before placing additional sections.

E. Lift precast components at lifting points designated by manufacturer.

F. Remove foreign materials from joint surfaces and verify sealing materials are placed properly. Maintain alignment between sections by using guide services affixed to lower section.

G. Verify vaults installed satisfy required alignment and grade.

H. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe. Fill annular space with mortar.

I. Set precast concrete sections plumb and aligned with the underlying sections with no more than quarter (¼) inch maximum overlap.

J. Exposed holes in the concrete sections required for handling or other purposes shall be filled with non-shrinking grout or by grout in combination with concrete plugs.

3.05 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements and 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Request inspection by Engineer prior to placing aggregate cover over piping.

C. Compaction Testing: See Specification 31 23 17 – Trenching.

D. Frequency of Tests: three compaction tests per box installation.

3.06 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.

END OF SECTION

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SECTION 03 60 00

GROUT

PART 1 GENERAL

1.01 SUMMARY OF SECTION

A. The principal items specified herein are:

1. Non-Shrink Grout: Non-Shrink grout is to be used unless another type is specifically referenced or shown on the Drawings.
2. Epoxy Grout
3. Cement Grout

B. The Contractor shall provide all materials, equipment, and labor necessary to furnish and place grout and shall form, mix, place, cure, repair, finish, and do all other work as necessary to produce finished grout as shown on the Drawings and as specified herein.

1.02 MEASUREMENT AND PAYMENT

A. Measurement and payment for all grout work shall be included under the Bid Item to which it relates.

1.03 RELATED SECTIONS

A. Related work specified in other sections:

1. Section 03 30 00 Cast-In-Place Concrete
2. Section 03 48 00 Precast Concrete Utility Boxes

1.04 REFERENCED CODES AND SPECIFICATIONS

A. The following standards apply:

1. Specifications, codes, and standards shall be as specified in Section 03 30 00, Cast-in-Place Concrete, and as referred to herein.
2. Commercial Standards:
   a. ASTM C 109 Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-In. or 50-mm Cube Specimens).
   b. ASTM C 531 Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacings.
   c. ASTM C 579 Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacings.
   d. ASTM C 827 Test Method for Change in Height of Early Ages of Cylindrical Specimens from Cementitious Mixtures.
   e. ASTM D 696 Test Method for Coefficient of Linear Thermal Expansion of Plastics.
   f. CRD-C 621 Army Corps of Engineers Specification for Non-shrink Grout.

1.05 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – “Submittal Procedures”:

1. Certificates of Compliance: Certificates of Compliance shall be provided for all products and materials proposed to be used under this Section.

PART 2 PRODUCTS

2.01 PREPACKAGED GROUTS

A. Non-Shrink Grout:

1. Non-shrink grout shall be a prepackaged, inorganic, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout specified herein shall be that recommended by the manufacturer for the particular application.

2. Non-shrink grouts shall have a minimum 28-day compressive strength of 7000 psi; shall have no shrinkage (zero percent) and a maximum 4.0 percent expansion in the plastic state when tested in accordance with ASTM C 827; and shall have no shrinkage (zero percent) and a maximum of 0.2-percent expansion in the hardened state when tested in accordance with CRD C 621.

3. Application: Non-shrink grout shall be used for the repair of all holes and defects in concrete members, grouting under all equipment base plates, and at all locations where non-shrink grout is specified.

B. Epoxy Grout:

1. Epoxy grout shall be a pourable, non-shrink, 100-percent solids system. The epoxy grout system shall have 3 components: resin, hardener, and specially blended aggregate, all premeasured and prepackaged. The resin component shall not contain any non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. Manufacturer's instructions shall be printed on each container in which the materials are packaged.

2. The chemical formulation of the epoxy grout shall be that recommended by the manufacturer for the particular application.

3. The mixed epoxy grout system shall have a minimum working life of 45 minutes at 75 degrees F.

4. The epoxy grout shall develop a compressive strength of 5000 psi in 24 hours and 10,000 psi in 7 days when tested in accordance with ASTM C 579, Method B. There shall be no shrinkage (zero percent) and a maximum 4.0 percent expansion when tested in accordance with ASTM C 827.

2.02 CEMENT GROUT

A. Cement Grout: Cement grout shall be composed of one part cement, 3 parts sand, and the minimum amount of water necessary to obtain the desired consistency. Where needed to match the color of adjacent concrete, white portland cement shall be blended with regular cement as needed. The minimum compressive strength at 28 days shall be 4000 psi.

B. Cement shall be as specified in Section 03 30 00, Cast-in-Place Concrete.

2.03 CONSISTENCY

A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where "dry pack" is specified, it shall mean a grout of that consistency; the type of grout to be used shall be as specified herein for the particular application.

2.04 MEASUREMENT OF INGREDIENTS

A. Measurements for cement grout shall be made accurately by volume using appropriate containers. Shovel measurement will not be allowed.

B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

PART 3 EXECUTION

3.01 GENERAL

A. All surface preparation, curing, and protection of cement grout shall be as specified in Section 03 30 00, Cast-in-Place Concrete. The finish of the grout surface shall match that of the adjacent concrete.

B. The manufacturer of non-shrink grout and epoxy grout shall provide on-site technical assistance upon request.

C. All mixing, surface preparation, handling, placing, consolidation and other means of execution for prepackaged grouts shall be done according to the printed instructions and recommendations of the manufacturer.

3.02 CONSOLIDATION

A. Grout shall be placed in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

PART 4 TESTING

4.01 GENERAL

A. Contractor's independent testing laboratory shall perform strength testing of grout in accordance with ASTM C39 and C301. Submit test reports to the Owner.

END OF SECTION

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SECTION 05 50 00

MISCELLANEOUS METALS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes shop fabricated metal items.

1. Ledge and shelf angles.
2. Structural supports for miscellaneous attachments.
3. Anchor bolts

1.02 MEASUREMENT AND PAYMENT

A. Refer to Section 01 15 00 Measurement and Payment.

1.03 REFERENCES

A. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
5. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
6. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
7. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
8. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
9. ASTM A312/A312M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes.
10. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
11. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
12. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
13. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
14. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
15. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.

16. ASTM F436 - Standard Specification for Hardened Steel Washers.

B. American Welding Society:

1. AWS D1.1 - Structural Welding Code - Steel.
2. AWS D1.6 - Structural Welding Code - Stainless Steel.

C. National Ornamental & Miscellaneous Metals Association:

1. NOMMA Guideline 1 - Joint Finishes.

D. SSPC: The Society for Protective Coatings:

1. SSPC - Steel Structures Painting Manual.
2. SSPC SP 1 - Solvent Cleaning.
3. SSPC SP 10 - Near-White Blast Cleaning.
4. SSPC Paint 15 - Steel Joist Shop Paint.
5. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

1.04 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

C. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.05 QUALITY ASSURANCE

A. Finish joints in accordance with NOMMA Guideline 1.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Accept metal fabrications on site in labeled shipments. Inspect for damage.

C. Protect metal fabrications from damage by exposure to weather.

1.07 FIELD MEASUREMENTS

A. Verify field measurements are as on shop drawings.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Structural W-Shapes: ASTM A992/A992M.

B. Structural Shapes: ASTM A36/A36M.

C. Channels and Angles: ASTM A36/A36M.

D. Steel Plate: ASTM A36/A36M.

E. Hollow Structural Sections: ASTM A500/A500M, Grade B.

F. Steel Pipe: ASTM A53/A53M, Grade B Schedule 40.

G. Bolts: ASTM A307; Grade A or B.

1. Finish: Hot dipped galvanized.

H. Nuts: ASTM A563 heavy hex type.

1. Finish: Hot dipped galvanized.

I. Washers: ASTM F436; Type 1.

1. Finish: Hot dipped galvanized.

J. Welding Materials: AWS D1.1; type required for materials being welded.

K. Shop Primer: SSPC Paint 15, Type 1, red oxide.

L. Touch-Up Primer: Match shop primer.

M. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.

2.02 MATERIALS - STAINLESS STEEL

A. Bars and Shapes: ASTM A276; Type 304.

B. Tubing: ASTM A269; Type 304.

C. Pipe: ASTM A312/A312M, welded; Type 304.

D. Plate, Sheet and Strip: ASTM A240/A240M OR ASTM A666; Type 304.

E. Bolts, Nuts, and Washers: ASTM A354.

F. Welding Materials: AWS D1.6; type required for materials being welded.

2.03 ANCHOR BOLTS

A. Anchor Rods: ASTM A307; Grade A.

1. Shape: Hooked.

2. Furnish with nut and washer; unfinished.

2.04 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.05 FACTORY APPLIED FINISHES - STEEL

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime paint items with two coats except where galvanizing is specified.

D. Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication.

E. Galvanizing for Fasteners, Connectors, and Anchors:

1. Hot-Dipped Galvanizing: ASTM A153/A153M.
2. Mechanical Galvanizing: ASTM B695; Class 50 minimum.

2.06 FACTORY APPLIED FINISHES - STAINLESS STEEL

A. Satin Polished Finish: Number 4, satin directional polish parallel with long dimension of finished face.

B. Mirror Polished Finish: Number 8, mirror polish with preliminary directional polish lines removed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify field conditions are acceptable and are ready to receive Work.

3.02 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.

C. Field weld components indicated on Drawings.

D. Perform field welding in accordance with AWS D1.1.

E. Obtain approval of Architect/Engineer prior to site cutting or making adjustments not scheduled.

F. After erection, touch up welds, abrasions, and damaged finishes with prime paint or galvanizing repair paint to match shop finishes.

END OF SECTION

SECTION 09 91 00

TANK PREPARATION AND COATING

PART 1 GENERAL

1.01 SUMMARY

A. The Work performed under this section includes removal, containment and disposal of existing internal and external tank coating systems and related debris; surface preparation; coating and lining of the existing HBMWD Samoa Reservoir 1 MG Industrial steel water storage tank interior and exterior metallic tank surfaces along with furnishing all coating systems and related products, labor, equipment, materials, removal of residue, touch-up paint, protection of uncoated surfaces, worker safety, environmental and regulatory compliance, and performing all operations required for satisfactory completion of the Work specified herein. Tank interior and exterior metallic tank surfaces include permanently affixed internal and external appurtenances such as ladders and accessories. The Contractor shall be responsible for abating hazardous materials based on the report included as Appendix B of the specifications. Contractor is responsible for complying with the California Code of Regulations, California and Federal OSHA, EPA, and other governing local, state or federal regulations.

B. The Contractor is provided with two Alternative Coating and Lining Systems. As noted in the bid documents, the Contractor shall provide a cost for each system, and the decision to award either system is up to the Owner's discretion.

1. Alternative 1 shall be considered the dielectric coating and lining systems specified herein. If Alternative 1 is selected, cathodic protection for the tank interior shall be required as shown in the Drawings and Specifications.

2. Alternative 2 includes interior lining and exterior coating with a Phosphate Ceramic Conversion Coating, such as the system manufactured by Eoncoat, in accordance with the references and instructions included as Appendix F.

1.02 REFERENCES

A. See the Limited Hazardous Materials Survey Report included as Appendix B to these specifications. Contractor is responsible for familiarizing with the contents of this report and adhering to the requirements in Specification 02 83 00 (Removal and Disposal of Material Containing Lead).

B. Reference Standards: Obtain and use the most current specified reference standards, coating manufacturer's product data sheets and application guides.

1. 29 CFR, Code of Federal Regulations

   a. Title 29 Occupational Safety and Health Administration (OSHA), U.S. Department of Labor

   b. Title 40 Environmental Protection Agency

2. National Sanitation Foundation (NSF)

3. ANSI/NSF 61 - Drinking Water System Components - Health Effects

4. American Society for Testing and Materials (ASTM)

5. ASTM D 16 - Terminology Relating to Paint, Varnish, Lacquer, and Related Products

6. ASTM D 4417 Method B - Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
7. ASTM D 3359 Method A - Measure Adhesion by Tape Test

C. American Water Works Association (AWWA)

1. AWWA C 652 - Disinfection of Water-Storage Facilities
2. AWWA D 102 - Painting Steel Water Storage Tanks

D. SSPC

1. SSPC Painting Manual Volume 1 - Good Painting Practice
2. SSPC Guide 6 - Containing Debris Generated During Paint Removal Operation
3. SSPC-SP1 Solvent Cleaning
4. SSPC-SP2 Hand Tool Cleaning
5. SSPC-SP3 Power Tool Cleaning
6. SSPC-SP6 Commercial Blast Cleaning
7. SSPC-SP10/NACE 2 Near-White Metal Blast Cleaning
8. SSPC-VIS 1 - Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning
9. SSPC-PA 2 – Measurement of Dry Coatings Thickness with Magnetic Gages
10. SSPC-PA3 A Guide to Safety in Paint Applications

E. National Association of Corrosion Engineers (NACE)

1. NACE – SP0188 (Standard Practice Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates)
2. NACE Publication 6D-173 A Manual for Painter Safety

F. Only use the most current reference standards.

1.03 SUBMITTALS

A. Shop Drawings

1. Contractor shall be responsible for providing particulate or dust control measures. Include list of materials, suppliers, and product data. Design will be reviewed for the containment and disposal of spent abrasive material. Include application techniques in the submittal.

B. Product Data:

1. Submit manufacturer’s data for abrasive blast material to be used including generic description, complete technical data, and instructions.
2. Submit manufacturer's most current product data for each coating, including generic description, complete technical data, surface preparation, and application instructions. Include schedule of material and thickness of each coat.
3. Material Safety Data Sheets (MSDS) for all applicable materials including coatings, thinners and abrasive materials.
4. Certification that materials in contact with potable water have been approved according to NSF/ANSI 61/Standards.

C. Certificates: Submit manufacturer’s certification that coatings comply with specified requirements and are suitable for intended application.

D. Color Samples: Submit manufacturer's color samples showing full range of standard colors for selection by Owner.

E. Qualifications of Coating Contractor. Submit the following:

1. Copy of California Contractor's license.
2. Department of Industrial Relations registration number.
3. Written certification that each applicator performing Work on the projects is trained and qualified to perform the Work.
4. Written certification from the Contractor that they are qualified to apply the coating system specified.
5. Submit list of a minimum of three (3) completed projects over the last 5 years of similar size and complexity to this Work OR written certification from the Coating Manufacturer that the Coating Contractor is pre-qualified and pre-approved to apply the Manufacturer's products. Include for each project (if applicable):
    a. Project name and location
    b. Name of owner with contact number
    c. Name of contractor with contact number
    d. Name of engineer with contact number
    e. Name of coating manufacturer with contact number
    f. Approximate area (square footage) of coatings applied.
    g. Date of completion.

F. Warranty: Submit manufacturer's and applicator's warranty statements for approval.

1.04 PERMITS, CERTIFICATES, LAWS AND ORDINANCES

A. The Contractor shall, at their own expense, procure all permits, certificates, and licenses required of by law for the execution of the work. The Contractor shall comply with all Federal, State, Air Quality District, County, City or District laws, ordinances, or rules and regulations relating to the performance of the work.

B. Without limiting the general aspects or other requirements of this specification, all surface preparation, coating and painting of surfaces shall conform to applicable standards and practices as set forth by the National Association of Corrosion Engineers (NACE), Steel Structures Painting Council (SSPC), American Water Works Association (AWWA), and coating manufacturer's printed instructions. If any requirements of this specification conflict with a referenced standard, the more stringent requirement shall apply.

1.05 QUALITY ASSURANCE

A. Do not use or retain contaminated, outdated, or diluted materials for coating operations. Do not use materials from previously opened containers.

B. Use only products of the approved Manufacturers. Use products of one manufacturer in any one resurfacing system with compatible materials. Provide same material product for touch up as for original material.

C. Make available all locations and phases of the work for access by the Owner, Inspector, or other personnel designated by the Owner. The Contractor shall provide ventilation and egress to safely access the coating work areas for inspection.

D. Conduct work so that the coating systems are installed as specified herein. Work will be continually available to the Inspector to ensure that the coating systems are installed as

specified herein. The Inspector shall inspect the work to determine conformance with the specifications and referenced documents. Any nonconforming coating system work shall be corrected as specified herein or as recommended by the Manufacturer.

E. The specified dielectric coating system products manufactured by PPG, Tnemec, Devoe, Carboline, and Sherwin-Williams have been approved. The Eoncoat phosphate ceramic conversion coating has been approved. Submissions of alternative coating systems / manufacturers shall be submitted with all documents to the Engineer in writing. The Contractor's bid shall accommodate the specified systems and submittal of an equal system does not guarantee its approval.

F. Samples and Tests:

1. New materials:

a. Owner reserves right to select unopened containers of materials on job and submit independent laboratory for testing.

b. Costs for all tests shall be borne by Contractor.

c. Retests of rejected materials shall be paid for by Contractor.

d. Remainder of contents of container not required for testing will be returned to Contractor.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Purchase and deliver materials for preparation and painting of the tank at one time. Submit shipping invoices at time of delivery. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying:

1. Coating or material name.
2. Manufacturer.
3. Color name and number.
4. Batch or lot number.
5. Date of manufacture. Materials older than one year from the date of manufacture shall not be allowed.
6. Mixing and thinning instructions.
7. Federal Specification Number if applicable.
8. Application and mixing instructions.
9. Hazardous material identification label.
10. Shelf life date.
11. Storage requirements. Submit storage and application temperature requirements for all coating system materials.

B. Storage:

1. Coatings shall be stored in original unopened containers in clean, dry, weather tight spaces where the temperature is maintained between 40 °F and 100 °F (4 °C and 38 °C) unless otherwise recommended in writing by the manufacturer. The coating temperature shall be brought to the coating manufacturer's most current written recommended application temperature before use.
2. Store all materials only in area or areas designated by the Owner. Confine mixing, thinning, clean up, and associated operations, as well as storage of

materials related debris before authorized disposal, to these areas. All materials are to be stored on pallets or similar storage handling skids off the ground.

3. Guard against fire. Flammable materials shall be stored according to state and local codes. Provide fire extinguishers of the type recommended by the manufacturer for the coatings in the areas of storage and areas being painted.
4. Deposit cleaning rags and waste material in metal containers having tight covers.
5. Keep containers sealed until ready for use.
6. Do not use materials beyond manufacturer's shelf life limits.
7. All coating shall be delivered to the shop or job site in original, unopened containers with labels intact. Minor damage to containers is acceptable provided the container has not been punctured or the lid seal broken.
8. Each container of coating shall be clearly marked or labeled to show coating identification, date of manufacture, batch number, and other information as needed to meet regulatory requirements. Each type of coating shall be accompanied by the manufacturer's Material Safety Data Sheet (MSDS) and product data sheet containing information such as basic chemical composition, acceptable weather conditions for application, and proper storing and mixing.
9. All containers of coating shall remain unopened until required for use. No more containers of coating shall be opened than will be applied that day. The label information shall be legible and shall be checked at the time of use.
10. Coating which has livered, gelled, or otherwise deteriorated during storage shall not be used; however, thixotropic materials which can be stirred to attain normal consistency may be used.
11. The oldest coating of each kind that is in acceptable condition shall be used first. In every case, the coating is to be used before its shelf life has expired. Materials exceeding storage life recommended by the Manufacturer shall be removed from the site.
12. Mix all lining materials in an enclosed mixing area designated by the Owner. This enclosed area must protect the mixing operation and materials from direct sunlight, inclement weather, freezing, or other means of damage or contamination. Protect all other concrete and metallic surfaces and finishes from any spillage of material(s) within the mixing area. The material temperature should be between 70° F and 90° F before application, unless noted otherwise on the manufacturer's product data sheet.
13. Do not use floor drains, dikes or storm drains for disposal of coating system materials. Contractor shall be responsible for the safe removal and lawful disposal of all waste materials.
14. The Contractor shall take all precautions and implement all measures necessary to avert potential hazards associated with the resurfacing system materials as described on the pertinent Material Safety Data Sheets or container labels.

C. Handling: Protect materials during handling and application to prevent damage or contamination.

1.07 SAFETY

A. The Contractor is responsible for providing a safe working environment for anyone entering the area at all times.

B. The Contractor shall provide and require use of personal protective life saving equipment for persons working in or about project site in accordance with requirements set forth in

the latest revisions of OSHA Regulations for Construction, AWWA, Section 7, or other regulatory agencies applicable to the construction industry. The manufacturer's printed instructions, appropriate technical bulletins and manuals, including SSPC-Paint Application Guide No. 3, shall apply.

C. No work shall be performed until the Contractor's appropriate Work Requests and Lockout Systems have been coordinated with the Owner and are in place. The Work Request system provides a mechanism to advise plant staff of a Contractor's work activities. The Lockout system is a safety procedure to prevent unintended equipment activation.

D. Keep any flammable materials such as cleaning solvents, thinners, or resurfacing materials away from open flames, sparks or temperatures higher than 150° F. Drums containing flammable materials shall be grounded. Flammable materials not being used shall be maintained in their onsite storage area.

E. Power tools are to be in good working order to avoid open sparking. No spark producing tools shall be used in restricted areas as indicated herein.

F. The Contractor shall maintain a clean work area and have Underwriter's Laboratories approved fire extinguishers on-hand. The Contractor shall furnish these fire extinguishers.

G. Workers performing abrasive blasting operations shall wear a fresh air supplied protective helmet and hood and personal protective clothing acceptable to industry standards and all government regulations. Workers engaged in or near work during abrasive blasting shall wear eye and face protection devices and air purifying respirators with appropriate filters. Barrier crams shall be used on any exposed skin.

H. Workers performing coating operations shall wear the appropriate personal protective equipment, clothing, and NIOSH approved respirator acceptable to industry standards and all government regulations. When paints or coatings are applied in confined areas, all persons exposed to toxic vapors or atomized coatings shall wear air-supplied masks. Equipment shall also include protective helmets that shall be worn by all persons while in the vicinity of the work area.

I. Dispose of rags used for wiping up resurfacing materials, solvents, and thinners by drenching them with water and placing in a metal container with a tight fitting metal cover. Complete this disposal process at the end of each day. Final disposal of these materials is the Contractor's responsibility.

J. Matches, flames, or sparks resulting from any source including welding, must be removed from the work area during coating work. Smoking is NOT permitted in any areas where flammable materials are present.

K. Sound Levels: Whenever occupational noise exposure exceeds maximum allowable sound levels, Contractor shall provide and require the use of approved ear protection devices.

L. Illumination: Adequate illumination shall be provided while work is in progress, including explosion-proof lights and electrical equipment. Whenever required by the Engineer, Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected.

M. Temporary Ladders and Scaffolding: All temporary ladders and scaffolding shall conform to applicable safety standards. They shall be erected where requested by the Engineer to facilitate inspection and be moved by the Contractor to locations requested by the Engineer.

N. Grounding: Blasting and painting hoses shall be grounded to prevent accumulation of a charge of static electricity.

O. Fire Hazard: Flammable, volatile solvents in paint and coating constitute a major hazard with regard to fire and explosions wherever flame or spark exposure is possible. All flames, smoking, and welding, etc., are strictly prohibited. Fire abatement devices shall be readily available and in operating condition. All paints and coatings shall be stored in conformance with applicable State, County and/or Local Fire Codes pertaining to flammable materials.

P. The Contractor shall take necessary precautions to keep fire hazard to a minimum, removing from the area daily all oily rags, waste, and other combustibles not in covered containers.

1.08 PROJECT CONDITIONS

A. The Contractor shall at all times conduct the work so as to assure the least possible inconvenience to the general public and adequate protection of persons and property in the work vicinity. Attention shall be paid to prevailing winds to reduce drifting of abrasive blast residue, dust, and paint or coating overspray. At no time should drifting materials exceed any governmental agency's laws, codes, or guidelines. Public noise exposure shall be limited to hours of operation specified and delineated by the Owner.

B. Weather:

1. Air and Surface Temperatures: Prepare surfaces and apply and cure coatings within air and surface temperature range according to manufacturer’s published instructions.

2. Surface Temperature: Minimum of 5°F (3°C) above dew point and rising.

3. Relative Humidity: Prepare surfaces and apply and cure coatings within relative humidity range according to manufacturer’s instructions.

4. Precipitation: Do not prepare surfaces or apply coatings in rain, snow, fog, or mist.

5. Wind: Do not spray exterior coatings if wind velocity is above manufacturer’s limit.

6. Environmental Controls: Environmental controls for the tank exteriors may be required depending on the time of year the work is being performed and the coating manufacturer requirements for their particular coating system. Environmental controls may also be required for surface preparation due to the presence of lead containing paint. Environmental controls include but may not necessarily be limited to installing a temporary enclosure over the tank, heating, and humidity control. The Contractor must be aware of local conditions and requirements and arrange to comply with these measures. If installing a temporary enclosure over the tank is required for preparation or coating purposes, the additive bid item for Environmental Controls shall be awarded. However, any environmental controls required for the interior of the tank shall be included in the respective coating bid item, and dehumidification equipment shall be assumed to be required for the duration of the interior blasting, coating, and curing process.

C. Ventilation:

1. Provide ventilation during coating evaporation stage in confined or enclosed areas according to AWWA D 102.

2. Ventilation must be maintained as directed by the Coating Manufacturer following the completion of application to facilitate cure of the materials.

3. Ventilation: All solvent vapors shall be completely removed by suction type, explosion-proof exhaust fans and blowers, as described in AWWA Section 7-

Safety precautions. Air shall not be forced from the outside into the enclosure. Care should be taken to remove toxic vapors and atomized particles with special attention given to the lowest and coolest areas.

4. Ventilation systems shall remain in service during coating application and for a minimum of seven days after completion of final coating application or coating repair, or until coating has fully cured, whichever is longer. Fuel or electricity costs, general maintenance and operations, shall be the responsibility of the Contractor unless specified otherwise. Dehumidification equipment, if required, shall run seven (7) days minimum for curing. Data recorders shall be used to track the interior climatic conditions, including surface temperatures. The instruments shall be provided by the Contractor.

D. Dust and Contaminants:

1. Schedule coating work to avoid excessive dust and airborne contaminants.
2. Protect work areas from excessive dust and airborne contaminants during coating application and curing.
3. All substrates to be coated must be clean, dry, and sound before the application of any coatings.

1.09 WARRANTY

A. Dielectric System Manufacturer Warranty: Coating manufacturer shall provide a 2-year-minimum material warranty for interior and exterior coating systems.

B. Dielectric System Applicator Warranty: Coating applicator shall provide a 2-year-minimum application and labor warranty for interior and exterior coating systems.

C. Phosphate Ceramic Conversion Coating Warranty: Coating manufacturer shall provide a 30-year-minimum material warranty for interior and exterior coating systems.

D. Phosphate Ceramic Conversion Coating Warranty: Coating applicator shall provide a 30-year-minimum material warranty for interior and exterior coating systems.

E. Warranty for Finish Coat Applied over Phosphate Ceramic Conversion Coating: Coating manufacturer shall provide a 2-year-minimum material warranty for exterior finish coating systems.

F. Warranty for Finish Coat Applied over Phosphate Ceramic Conversion Coating: Coating applicator shall provide a 2-year-minimum material warranty for exterior finish coating systems.

G. Warranty/Maintenance Inspections: Interior and Exterior Coating Systems.

1. First inspection will take place twelve (12) months after satisfactory completion and acceptance of application of coatings.
2. The Contractor shall coordinate and facilitate first year anniversary inspection of the interior and exterior of the tank coating.
3. Provide suitable interior lighting and ventilation for the tank inspection.
4. Repair any coating failures due to faulty workmanship or material.
5. Provide the Engineer’s approval of proposed methods to repair coating system.

H. Inspection shall be attended by Owner or Owners Representative, Applicator, Engineer, and manufacturer’s representative.

I. Within the 2 year warranty period, Applicator shall repair all deficiencies in coating systems as determined by the Engineer according to Manufacturer’s instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. PPG, Tnemec, Devoe, Carboline, Sherwin-Williams, and Eoncoat have been approved.

B. Approved Equals: Submit system proposed as “Equal” for review and approval or revision as required by the Engineer. If other manufacturers are proposed and accepted, manufacturer's requirements shall be followed, but in no case may thickness or coverage be less.

2.02 COATING AND LINING SYSTEMS– ALTERNATIVE 1

A. Interior
1. Interior Primer: Generic Classification: Polyamidoamine Epoxy or Cycloaliphatic Amine Epoxy, applied to a DFT of 4 to 5 mils in one coat (NSF-approved zinc prime coat).
2. Interior Intermediate: Generic Classification: Polyamidoamine Epoxy or Cycloaliphatic Amine Epoxy, applied to a DFT of 4 to 6 mils in one coat.
3. Interior Finish: Generic Classification: Polyamidoamine Epoxy or Cycloaliphatic Amine Epoxy, applied to a DFT of 4 to 6 mils in one coat.

    A. Notes: Use contrasting colors to differentiate coats. Interior coating systems shall be approved for use on potable water projects by National Sanitation Foundation (NSF).

B. Exterior
1. Exterior Primer: Generic Classification: Zinc-Rich, Aromatic Urethane, applied to a DFT of 2.5 to 5 mils in one coat
2. Exterior Intermediate: Generic Classification: Polyamidoamine Epoxy or Cycloaliphatic Amine Epoxy applied to a DFT of 4.0 to 6.0 mils in one coat.
3. Exterior Finish: Generic Classification: Aliphatic Acrylic Polyurethane, applied to a DFT of 2.0 to 3.0 mils in one coat

    a. Notes: Use contrasting colors to differentiate coats

C. Exterior: Steel / Concrete Base Interface

1. Base Coat: A single component formulated water based acrylic emulsion polymer.

2. Top Coat: Reinforcing sheet (such as Belzona 9311 or approved equivalent).

    a. Notes: This liquid base coat binds to the reinforcing sheet to form a tough, flexible and elastic polymeric film which is impermeable to liquid water, but permeable to water vapor.

D. Coating Application Accessories:

1. Accessories required for application of specified coatings according to manufacturer’s instructions, including thinners.

E. Colors

1. Interior finish coat shall be white or off-white as available from selected manufacturer.

2. Exterior colors will be selected by Owner. The Contractor shall submit manufacturer’s color samples showing full range of standard colors for selection by Owner.

3. Each coat shall be slightly lighter than preceding coat. Example, Red, Beige, White. Colors to be approved by Owner.

2.03 COATING AND LINING SYSTEMS– ALTERNATIVE 2

A. Interior
1. Phosphate Ceramic Conversion Coating (Eoncoat or approved equal) applied to a minimum DFT of 20 mils in one coat.

B. Exterior
1. Exterior Base: Phosphate Ceramic Conversion Coating (Eoncoat or approved equal) applied to a minimum DFT of 20 mils in one coat.
2. Exterior Finish: Generic Classification: Aliphatic Acrylic Polyurethane, applied to a DFT of 2.0 to 3.0 mils in one coat

a. Notes: Use contrasting colors to differentiate coats

2.04 ABRASIVES

A. The type and size of abrasive shall be selected to produce a surface profile that meets the coating manufacturer's recommendations. All abrasives shall be new, clean, and delivered to the project in unopened, weather resistant containers. Abrasive materials shall not be recycled for further use on this project unless approved by the Inspector.

B. All abrasives shall meet the requirements of the North Coast Unified Air Quality Management District. At no time will abrasives containing more than 1% free silica be allowed on the job site.

C. All abrasives shall be disposed of in accordance with all federal, state, and local laws at no cost to the Owner.

D. Abrasive material used for areas other than tank interiors shall be Kleen-Blast, or approved equal. Abrasive shall produce a profile as recommended by the paint manufacturer.

E. The abrasive to be used shall be sharp, angular, properly graded and brought to the job site in moisture-proof bags or airtight bulk containers, and shall be capable of producing the depth of profile specified by the paint manufacturer. Copper slag abrasives are not suitable.

PART 3 EXECUTION

3.01 EXAMINATION

A. The Owner or the Owner’s representative shall examine areas and conditions under which coating systems are to be applied. Notify Engineer of areas or conditions not acceptable. Do not begin surface preparation or application until unacceptable areas or conditions have been corrected.

3.02 PREPARATION

A. Protection of Surfaces Not Scheduled to be Coated

1. Protect surrounding areas and surfaces not scheduled to be coated from damage during surface preparation and application of coatings.

2. Immediately remove coatings that fall on surrounding areas and surfaces not scheduled to be coated.

B. Surface Preparation of Steel

1. Prepare steel surfaces according to manufacturer’s instructions.

2. Prepared areas should be blown down with clean compressed air and vacuumed to remove any remaining abrasive residue.

C. Fabrication Defects:

1. Correct steel and fabrication defects revealed by surface preparation. (If steel substrate conditions are questionable obtain direction and clarification in writing from the Engineer before continuing)
2. Remove all weld spatter and slag.
3. Round all sharp edges and corners of welds to a smooth contour
4. Smooth all weld undercuts, recesses or reverse ridges
5. Grind all down porous welds to pinhole-free metal.
6. Remove all weld flux from surface.
7. Ensure surfaces are dry, sound and free of foreign matter before proceeding with coating.
8. Remove visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter according to SSPC-SP10/NACE 2 AND SSPC-SP6/NACE 3
9. Abrasive Blast-Cleaned Surfaces: Coat abrasive blast-cleaned surfaces with primer before visible rust forms on surface. These areas should be completely clean, free of all residues contaminates etc, inspected by the Inspector and immediately coated following the inspection.

3.03 SURFACE PREPARATION - INTERIOR OF TANK

A. Comply with all confined space requirements.

B. Owner shall perform draining and initial removal of debris and sediment from the bottom of the tank. Contractor shall remove any residual debris and sediment from bottom of tank. Provide restrained temporary cover plate and seal over pipe to water main to prevent contamination of water system.

C. Blast Cleaning:

1. Abrasive blast tank surfaces without damage to structure to expose surface condition of existing steel. Abrasive blasting may be done in sections.
2. Surface preparation shall conform to:
    a. Interior Surfaces: SSPC SP10 - Near White Blast with a minimum angular anchor profile of 1.5 mils.
3. Entry points to be covered during cleaning to contain all blasting material.

D. Examination:

1. Notify Engineer after abrasive blasting and cleaning each section of tank.
2. Inspector will inspect existing conditions to determine extent of repairs and weld deposits required. If required, Owner will develop details for needed restoration.
3. After repairs are complete in each section, Inspector will inspect section to determine if additional blasting is required.

E. If surfaces to be painted cannot be put into proper condition for finishing by blasting procedure specified, report to Engineer, in writing, or assume total responsibility and correct unsatisfactory finish which results. Proceeding with work past preparation of surface shall indicate acceptance of improper surfaces.

F. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.

G. Prepare welds and adjacent areas so there is:

1. No undercutting or reverse ridges on weld bead.
2. No weld spatter on or adjacent to weld or other areas.
3. No sharp peaks or ridge along weld bead.

H. Perform pit welding repair as necessary per AWWA D101-53.

I. Perform patching and spot repairs by welding repair plates over weak points and areas for potential leaks.

J. Cleaning:

1. Surfaces shall be clean, dry, and free of foreign matter before painting.
2. Remove sand from metal surfaces prior to coating by means of brush or industrial vacuum. Surfaces not prime coated same day as sandblasted shall be reblasted prior to coating.
3. The surface cleanness and profile will be measured and recorded according to ASTM D4417 Method B.

3.04 SURFACE PREPARATION - EXTERIOR OF TANK

A. Previously coated tank exterior and other miscellaneous metals.

1. Spot clean all rusted / damaged bare metal areas per SSPC-SP2 Hand Tool and/or SSPC- SP3 Power Tool Cleaning
2. Where coatings are removed, all surrounding areas of the tightly adhering remaining coating shall be feather edged minimum 1" in. to provide a tightly adhering, sound and smooth transition from the exposed bare metal area to the remaining tightly adhering coating.

B. Round or chamfer sharp edges and grind smooth burns, jagged edges, and surface defects.

C. Prepare welds and adjacent areas so there is:

1. No undercutting or reverse ridges on weld bead.
2. Remove all weld spatter on or adjacent to any other area. This includes all previous non-removed weld spatter.
3. No sharp ridges or peaks along weld bead.

D. Surfaces shall be sound, dry, and free of foreign matter. Nothing can remain on the surface to be coated that could interfere with the penetration and adhesion of any of the applied coatings which could result in a premature coatings problem.

E. Sand out scratches and dings per SSPC SP2 and/or SP3

F. Spot prime by brush or roller any deficient or bare areas. Make flush and feathered with existing coating.

3.05 CONTAINMENT OF MATERIALS

A. Provide temporary wind shield to contain spent abrasive and paint to area immediately beneath structure.

3.06 APPLICATION

A. Apply materials by workers experienced in use of product involved.

B. Apply materials under adequate illumination, spread evenly, and flow on smoothly without runs or sags. Use SSPC Guide 12 Guide for Illumination of Industrial Projects.

C. Cure under conditions eliminating possibility of dust becoming impregnated into finish.

D. Use good painting practices according to SSPC Painting Manuel Volume 1 Fourth Edition (Good Painting Practice).

E. Before the application of any coating, ensure that the surface to be coated is dry, sound and free from any detrimental contamination that will prevent satisfactory penetration and/or adhesion of any of the applied coatings. Thus affecting the longer term protection and performance of the applied coating system

F. Apply coatings according to manufacturer's most current written instructions.

G. Mix and thin coatings, including multi-component materials, according to manufacturer's most current instructions.

H. Keep containers closed when not in use to avoid contamination.

I. Do not use mixed coatings beyond pot life limits.

J. Use application equipment, tools, pressure settings, and techniques according to manufacturer's most current instructions.

K. Uniformly apply coatings at spreading rate required to achieve specified DFT.

L. All coatings shall be applied in a monolithic uniform manner that is free of any conditions which can adversely affect the overall performance or appearance of the coating system. These conditions include but are not limited to the following: discontinuities, runs, sags, drips, paint splatter, and imbedded foreign materials.

M. Stripe coat each application with a brush in critical locations on all steel such as welds, corners, bolts, and edges. One stripe coat shall be applied between the first and second coat. Two stripe coats will apply too thick and risks solvent entrapment.

N. Coating will be inspected for aesthetics as well as for performance.

O. Noise dampening procedures such as hay bales should be employed around equipment such as sand pots and compressors. 110 dB shall be the maximum allowed sound level at a distance of 20 feet from equipment.

P. Comply with all ambient conditions requirements established by manufacturer's most current printed documents.

Q. The entire tank interior shall be holiday tested according to NACE – SP0188 (Standard Practice Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates)

3.07 REPAIR

A. Damaged Materials: Repair or replace damaged materials and surfaces not scheduled to be coated.

B. Damaged Coatings: Touch up or repair damaged coatings. Touch up of minor damage shall be acceptable where result is not visibly different from adjacent surfaces. Re-coat the entire surface where the touch up result is visibly different, either in sheen, texture, or color.

C. Coating Defects: Repair coatings that exhibit film characteristics or defects that would adversely affect performance or appearance of coating systems per manufacturer's instructions.

3.08 FIELD QUALITY CONTROL

A. Contractors QA/QC Responsibilities: Contractor will provide full-time, continuous, field quality control of Work. This includes, but is not limited to:

1. Maintain permanent written records of daily Work activities.
2. Verify and record that the coatings and other materials are as specified (i.e., manufacturer, product name & product batch dates).
3. Verify and record condition of coatings and material along with their storage procedures
4. Verify and record surface preparation and application of coatings are as specified.
5. Verify and record environmental conditions one half hour before work starting, then every 4 hours afterwards and once upon completion of work that day. Environmental readings shall be immediately taken should a sudden change in the climate be observed. Record results using sample forms or similar approved forms. The use of data loggers that capture temperature, humidity, dew point, and surface temperature, such as the Onsat HOBO portable data logger, or equal, shall be required. A minimum of three data loggers shall be used inside the tank. The Inspector shall upload data on a daily basis for recordkeeping. Data loggers shall be supplied by the Contractor.
6. Verify and record WFT and DFT of each coat of the coating system are as specified using new wet film gauges and certified dry film thickness gauges. DFT readings shall be done according to SSPC-PA 2.
7. All testing will be performed with Owner or Owner's Representative present.

B. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for surface preparation and application of coating systems.

C. If coverage does not meet thickness specified, Owner reserves the right to require extra application to no extra cost to the Owner prior to the application of the succeeding coat.

3.09 CLEANING

A. Remove temporary coverings and protection of surrounding areas and surfaces.

B. Allow time according to manufacturer's instructions and as directed by Engineer for full cure of coating systems on water contact surfaces before flushing or filling with water.

C. Contractor shall then clean the interior of the tank to the satisfaction of the Engineer. Note that disinfection is not required, as this tank does not store potable water.

3.10 PROTECTION OF COATING SYSTEMS

A. Protect surfaces of coating systems from damage from any possible surrounding activity.

END OF SECTION

SECTION 13 11 00

CATHODIC PROTECTION SYSTEM

PART 1 GENERAL

1.01 WORK OF THIS SECTION

A. The Work of this Section includes providing a galvanic anode cathodic protection system for the 1-million-gallon Samoa Reservoir water storage tank, as shown on the drawings and as specified herein. The Work includes testing of the system during installation, and final system check out.

B. The Work of this Section is only applicable if dielectric (epoxy) lining systems are selected by the District for the internal tank lining system.

C. If the products installed as part of this Section are found to be defective or damaged or if the Work of this Section is not in conformance with these Specifications, then the products and Work shall be corrected at the Contractor's expense.

D. Any retesting required due to inadequate installation or defective materials shall be paid for by the Contractor.

E. The Work also requires that one Supplier or Subcontractor accept responsibility for the Work as indicated, but without altering or modifying the Contractor's responsibilities under the Contract Documents.

F. The Work also requires coordination of assembly, installation and testing between the pipeline contractor and any cathodic protection material supplier or subcontractor.

1.02 RELATED SECTIONS

A. The Work of the following Sections applies to the Work of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this Work.
   1. Site Safety and Regulatory Requirements
   2. Coatings
   3. Piping

1.03 REFERENCED SPECIFICATIONS, CODES AND STANDARDS

A. The Work of this Section shall comply with the current editions of the following codes and standards:
   1. ASTM - ASTM International
      a. D1248 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
      b. D1785 Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.
      c. B3 Standard Specification for Soft or Annealed Copper Wire
      d. B8 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
      e. B843 Magnesium Alloy Anodes for Cathodic Protection
      f. B80 Magnesium-Alloy Sand Castings

g. D2220 Standard Specification for Polyvinyl Chloride (PVC) Insulation for Cable and Wire

2. NSF - National Sanitation Foundation
   a. NSF 61 Drinking Water System Components
3. NEC - National Electrical Code
4. NACE International, the Corrosion Society
   a. RP0196 Galvanic Anode Cathodic Protection of Internal Submerged Surfaces of Steel Water Storage Tanks
   b. RP0286 Electrical Insulation of Cathodically Protected Pipelines
   c. RP0375 Wax Coating Systems for Underground Piping Systems
   d. TM0497 Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping System
5. NEMA - National Electrical Manufacturers Association
   a. TC2 Electrical Polyvinyl Chloride (PVC) Tubing and Conduit
   b. TC3 PVC Fittings for Use with Rigid PVC Conduit and Tubing
6. UL - Underwriters Laboratories
   a. 6 Rigid Metal Conduits
   b. 514B Fittings for Cable and Conduit

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

1.04 QUALITY ASSURANCE

A. Installation of the cathodic protection equipment shall be performed by individuals having at least 5 years experience in the installation of the cathodic protection equipment described herein.

B. All the testing required to be performed by the “qualified corrosion technician” shall be performed under the supervision of a Corrosion Engineer. A Corrosion Engineer is a Registered Professional Corrosion engineer or a Certified NACE Cathodic Protection Specialist.

1.05 SUBMITTALS

A. The following shall be submitted to the Engineer prior to any equipment installation:
   1. Catalog cuts, bulletins, brochures, or data sheets for all materials specified herein.
   2. Certification that the equipment and materials proposed meet the Specifications and the intent of the Specifications.
   3. Written certification of experience required.

B. The following shall be submitted to the Engineer after completion of the Work.
   1. Wire connection testing.
   2. System checkout and report.

1.06 INTERFERENCE AND EXACT LOCATIONS

A. The locations of cathodic protection equipment, test stations, devices, outlets and appurtenances as indicated are approximate only. Exact locations shall be determined by the Contractor in the field subject to the approval of the Engineer.

B. The Contractor shall field verify all data and final locations of work done under other Sections of the Specifications required for placing of the Work.

C. In case of interference with other work or erroneous locations with respect to equipment or structures, the Contractor shall furnish all labor and materials necessary to complete the Work in an acceptable manner.

PART 2 PRODUCTS

2.01 GENERAL

A. All materials installed must be new. All equipment and materials supplied shall be similar to that which has been in satisfactory service for at least 5 years.

2.02 TANK GALVANIC ANODES

A. Suspended tank anodes shall be rod type, high potential magnesium anodes suitable for use in potable water (NSF 61 approved) having a diameter of 2.024 inches and a length of 24 feet. The anode shall have a minimum weight of 60 pounds. The anode shall meet the following chemical composition.

Aluminum	0.010 maximum
Manganese	0.50% to 1.30%
Zinc	0.000%
Silicon	0.000%
Copper	0.020% maximum
Nickel	0.001% maximum
Iron	0.030% maximum
Magnesium	Remainder
Lead	0.000%
Other	0.30% maximum

B. Anodes shall be cast with an iron wire core. One end of the anode shall be recessed to provide access to the rod for connection of the lead wire. The lead wire shall be silver brazed to the rod, making a mechanically secure connection. The connection shall be insulated to a 600-volt rating by filling the recess with asphalt. The asphalt material shall be extended over the lead wire insulation by not less than ½ inch. The Contractor shall replace anodes if the lead wire insulation is damaged.

2.03 JUNCTION BOXES

A. Junction boxes shall be NEMA Type 4, fiberglass construction. Junction boxes shall be sized as indicated on the drawings. Hinges shall be stainless steel and a neoprene gasket shall be furnished with the box to ensure a watertight seal. Junction boxes shall have a latch with a ¼-inch diameter hole for installation of a pad-lock.

B. Junction boxes shall be labeled with a black plastic tag bolted to the front panel of the box. This tag shall be engraved in a contrasting color with the identification of the junction box. Minimum height of lettering shall be ¾-inch.

2.04 PANEL BOARDS

A. Panel boards shall be made of ¼-inch thick phenolic plastic sized as indicated on the Drawings.

B. Connection hardware shall be brass or bronze. All connections shall be double nutted bolts with lock washers.

C. Copper bus bar shall be 1/8-inch thick and sized to fit.

2.05 WIREWOUND POWER RHEOSTAT

A. Wirewound power rheostat shall be Vishay MP6 12.5 Watts - 2 Ohm, or equivalent.

2.06 SOLDERLESS LUG CONNECTORS

A. Solderless lug connector shall be made of brass or copper with a brass screw.

2.07 SHUNTS FOR GALVANIC ANODES

A. Shunts shall be 0.01 ohm, 5 ampere, manganin wire type, as indicated. Shunts shall be Type RS as manufactured by Holloway or equivalent.

2.08 WIRE

A. Conductors shall consist of stranded copper of the gauge indicated. Wire sizes shall be based on American Wire Gauge (AWG). Copper wire shall be in conformance with ASTM Designations B3 and B8.

B. All wires terminating in a junction box or test station shall have a wire identifier attached within 2 inches from the end of wire at the terminal board, as specified under "Wire Identification".

C. Crosslinked polyethylene XLPE and high molecular weight polyethylene (HMWPE) insulating jackets shall conform to ASTM D-1248.

2.09 WIRE IDENTIFIERS

A. Wire identifiers shall be the wrap-around type with a high resistance to oils, solvents and mild acids. Wrap-around markers shall fully encircle the wire with imprinted alpha-numeric characters for pipe identification. The letters and numbers shall be printed, minimum 3/16-inch in size.

2.10 EXOTHERMIC WELDS

A. Exothermic welds shall be in accordance with the manufacturer’s recommendations. Exothermic welds shall be Cadweld, as manufactured by Erico Products, Inc. or Thermoweld as manufactured by Continental Industries, Inc., or approved equivalent. Duxseal packing as manufactured by Johns-Manville or approved equivalent shall be used where necessary to prevent leakage of molten weld metal.

B. The shape and charge of the exothermic weld shall be chosen based on the following parameters:
   1. Tank material
   2. Material radius
   3. Wire material/size and requirement for sleeves
   4. Number of strands to be welded
   5. Orientation of weld (vertical or horizontal)

2.11 BITUMASTIC COATING

A. Bitumastic coating shall be TC Mastic, as manufactured by Tapecoat Company, Bitumastic 50 as manufactured by Kopcoat Inc., or approved equivalent.

2.12 WELD CAPS

A. Weld caps shall be Royston Handy Cap, as manufactured by Royston Laboratories, Inc. Thermit Weld Cap, as manufactured by Phillips Petroleum Co., or approved equivalent.

2.13 ANODE HEADER CABLE TO ANODE LEAD WIRE SPLICE

A. A mechanical connection shall be used to splice the anode header cable to the anode lead wire as shown on the drawings. A copper split bolt or copper crimp shall be used. The connection shall be covered with a minimum of 2 layers of half lapped rubber splicing tape to create a smooth profile over the connection, bare copper wire and the wire insulation. The rubber tape shall be covered with 2 layers of half lapped PVC electrical tape.

2.14 CLEVIS ASSEMBLIES

A. Clevises shall be 1/8-inch flat, galvanized steel with a spool opening of 2-1/8 inches and shall be 4-1/2 inches long to the centerline of the spindle. Spools shall be porcelain, with an outside diameter of 2-1/4 inches and an overall height of 2-1/8 inches. Mounting bolt, nut and washer for clevis shall be galvanized steel.

2.15 PIN INSULATORS

A. Pin insulator assemblies shall be 4 inches long overall and have a 1/4-inch diameter galvanized steel bolt 3/4 of an inch long attached to the flat end with a galvanized steel and lock washer. The insulator shall be composed of a porcelain nonconducting material with a hard glazed finish. The insulator shall have a hole through the bottom no smaller than 1/2 inch in diameter.

2.16 CONDUIT AND FITTINGS

A. The minimum conduit size shall be 1 inch unless otherwise indicated.

B. Conduit and fittings placed above grade shall be rigid steel. Rigid Steel conduit shall be galvanized conforming to UL 6.

C. Conduit Straps shall be a two-hole galvanized steel conduit strap.

D. Fittings for use with rigid steel conduit shall be galvanized cast ferrous metal, with gasketed covers, Crouse Hinds Condulets, Appleton Unilets, or equivalent. Rigid metallic conduit fittings shall be galvanized conforming to UL 514B.

E. Union couplings for conduits shall be the Erickson or Appleton type EC or 0-Z Gedney 3-piece Series 4, or equivalent.

2.17 HANDHOLE ASSEMBLIES

A. Hand hole covers shall be galvanized steel, 6 inches in diameter and 1/8-inch thick and shall be connected to a rubber gasket, 6 inches in diameter and 1/8-inch thick. The handholes shall be cut 5 inches in diameter. The handhole assemblies shall have

1/2-inch stainless steel bolts and PVC clamping bars. The clamping bars shall be 1/2-inch thick and 8 inches long, minimum.

2.18 STATIONARY REFERENCE ELECTRODE

A. Reference electrodes shall be copper-copper sulfate and designed for continuous use in water for a minimum of 10 years. Reference electrodes shall be Stelth Model Number SRE-002-CFY as manufactured by Borin Manufacturing or equivalent. The reference electrode shall have a wire as indicated on the Drawings which extends from the reference electrode to the junction box without splicing.

2.19 FASTENERS

A. All screws, bolts and miscellaneous fasteners used to attach cathodic protection system components to the tank shell shall be galvanized steel.

PART 3 EXECUTION

3.01 ANODE HANDHOLE INSTALLATION

A. The anode handholes shall be mechanically cut with a 5-inch diameter hole saw prior to the final painting of the tank. The hand holes shall not be cut by burning or grinding. After the handholes are cut, the edges of the holes shall be filed by hand to remove burrs or sharp edges. Bare steel exposed by cutting or filing shall be coated to match the interior lining.

B. The 5-inch diameter holes shall be at the locations indicated in the drawings. The handholes may be adjusted by the Contractor to avoid conflicts with the rafters and support columns. The handhole locations shall not be moved more than 2 feet from the indicated locations without prior approval from the Engineer.

3.02 ANODE INSTALLATION

A. A clevis assembly and a pin insulator shall be installed adjacent to each handhole. The hole for the pin insulator shall be within 2 inches of the edge of the 5-inch diameter handhole. The anodes shall be suspended from the clevis assemblies bolted to the interior roof of the tank. The anode header cable shall be suspended from the pin insulators bolted in the interior roof of the tank. The anode lead wire shall be spliced to the anode header wire using the cable split bolt or copper crimp described below.

B. Wire splices shall be suspended from the roof and shall be above the water level.

3.03 ANODE JUNCTION BOX INSTALLATION

A. Anode Junction Box shall be installed at the approximate locations shown on the Drawings.

3.04 REFERENCE ELECTRODE INSTALLATION

A. The reference electrodes shall be suspended from the pin insulators bolted in the interior roof of the tank. A slotted PVC conduit shall be mounted to the interior ladder as shown on the drawings. The reference electrode shall be place inside and suspended at the heights indicated on the drawings.

3.05 WIRES

A. Wires shall be run inside the conduit from the junction box to the roof of the tank without kinks. Each wire run shall be continuous in length and free of joints or splices, unless otherwise indicated. Care shall be taken during installation to avoid punctures, cuts or other damage to the wire insulation. Damage to insulation shall require replacement of the entire length of wire at the Contractor's expense.

B. The wire conduits must be of sufficient diameter to accommodate the wires. This shall be determined by the number and size of wires in accordance with the applicable codes and standards.

3.06 ANODE HEADER CABLE TO ANODE LEAD WIRE SPLICES

A. Strip the insulation off of the wire to expose approximately 1-inch of the copper conductors. Tighten the copper split bolt, or copper crimp, onto the wires to secure the wires and provide electrical continuity between the anode lead wire and the anode header cable. Use the rubber splicing tape to cover the split bolt and form a smooth profile over the split bolt, exposed copper, and the wire insulation. The rubber tape shall extend a minimum of 2-inches over the wire insulation for a watertight seal. Cover the rubber tape with two layers of half lapped PVC electrical tape.

3.07 WIRE IDENTIFIERS

A. All wires shall be coded with wire identifiers.

3.08 EXOTHERMIC WELD CONNECTIONS

A. Exothermic weld connections shall be installed in the manner and at the locations indicated. Coating materials shall be removed from the surface over an area of sufficient size to make the connection. The surface shall be cleaned to bare metal by grinding or filing prior to welding the conductor. The use of resin impregnated grinding wheels will not be allowed. A copper sleeve shall be fitted over the conductor. Only enough insulation shall be removed such that the copper conductor can be placed in the welding mold.

B. The Contractor shall be responsible for testing the welds. The Engineer, at his or her discretion, shall witness these tests.

C. After the weld has cooled, all slag shall be removed and the metallurgical bond shall be tested for adherence by the Contractor. A 22-ounce hammer shall be used for adherence testing by striking a blow to the weld. Care shall be taken to avoid hitting the wires. All defective welds shall be removed and replaced.

D. The Contractor shall inspect both the interior and exterior of the tank to confirm that all coatings and linings removed or damaged as a result of the welding have been repaired. The Contractor shall furnish all materials, clean surfaces and repair protective coatings and linings damaged as a result of the welding. Repair of any coating or lining damaged during welding shall be performed in accordance with coating or lining manufacturer's recommendations.

E. All exposed surfaces of the copper and steel shall be covered with insulating materials as indicated.

3.09 SYSTEM CHECK-OUT

A. Upon completion of the installation, the Contractor shall provide testing of the completed system by a qualified corrosion technician and the data shall be reviewed by a Corrosion Engineer to ensure conformance with the Contract Documents, NACE RP0-196.

B. The testing described herein shall be in addition to and not substitution for any required testing of individual items at the manufacturer's plant and during installation.

C. Testing shall be performed at all test leads at the anode junction as soon as possible after installation of the cathodic protection system.

D. Testing shall include the following and shall be conducted in accordance with NACE TM0-497:
   1. Measure and record the native structure-to-water potentials. Potentials shall be measured at the anode junction box with the stationary reference electrodes and at each of the handholes with a portable reference electrode.
   2. Measure and record the “On” and “Instant Off” structure-to-water potentials at the anode junction box with the stationary reference electrodes and at the handholes with a portable reference electrode.
   3. Measure and record the current outputs of the anode strings.
   4. Adjust the rheostat to control the anode current output as required to meet NACE RP0-196.

E. Test results shall be analyzed to determine compliance with NACE RP0-196.

F. Once the cathodic protection system is determined to be operating properly, the anode header cables shall be disconnected from the panel board in the junction box to stop the flow of cathodic protection current. The anode header cables shall be left disconnected during the 1-year coating warranty period. The Owner will reconnect the anode header cable to the panel board at the end of the warranty period.

G. The Contractor shall provide a written report, prepared by the Corrosion Engineer documenting the results of the testing and recommending corrective work, as required to comply with the contract documents. Any deficiencies of systems tested shall be repaired and re-tested by the Contractor at no additional cost to the Owner.

END OF SECTION

SECTION 31 05 16

AGGREGATES FOR EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Coarse aggregate materials.
2. Fine aggregate materials.
3. Aggregate drain rock.

B. Related Sections:

1. Section 31 23 17 - Trenching.
2. Section 32 11 23 - Aggregate Base Courses.
3. Section 33 11 16 - Site Water Utility Distribution Piping.

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO M147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.
2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 10-lb Rammer and a 18-in. Drop.
3. AASHTO T210 – Standard Method of Test for Aggregate Durability Index.

B. ASTM International:

1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3).
4. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
5. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.03 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Submit name of imported fill material suppliers and Test Data.

1.04 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout the Work.

B. Perform Work in accordance with Caltrans Standard Plans.

PART 2 PRODUCTS

2.01 COARSE AGGREGATE MATERIALS

A. Class 2 Aggregate Base per Caltrans Standard Specifications 26-1.02B.

B. Coarse Aggregate Subbase: Crushed Gravel: Angular crushed; free of shale, clay, friable material and debris; Los Angeles abrasion 50% max; Durability index, AASHTO T210 of 35 minimum; Liquid limit 25% max; graded within the following limits:

Sieve Size	**Percent Passing**
2 ½ inches	100 (1)
2 inches	97-100 (1)
1 inch	65-79 (6)
1/2 inch	45-59 (7)
No. 4	28-42 (6)
No. 40	9-17 (4)
No. 200	4-8 (3)

C. ( ) The value in the parentheses is the allowable deviation (±) from the target values.

D. Coarse Aggregate Base: Crushed Gravel: Angular crushed; free of shale, clay, friable material and debris; Los Angeles abrasion 50% max; Durability index, AASHTO T210 of 35 minimum; Liquid limit 25% max; graded within the following limits:

Sieve Size	**Percent Passing**
2 inches	100 (1)
1 inch	80-100 (6)
3/4 inch	64-94 (6)
3/8 inch	40-69 (6)
No. 4	31-54 (6)
No. 200	4-7 (3)

E. ( ) The value in the parentheses is the allowable deviation (±) from the target values.

F. Class 2 Aggregate Base per Caltrans Standard Specifications 26-1.02B.

G. Aggregate Drain Rock: Natural stone; washed, free of clay, shale, organic matter; to the following limits:

1. Minimum Size: 1/4 inch.
2. Maximum Size: 1 1/2 inch.

2.02 FINE AGGREGATE MATERIALS

A. Fine Aggregate (Sand): Natural or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded in accordance within the following limits:

Sieve Size	**Percent Passing**
3/8 inch	100
No. 4	50
No. 14	6
No. 50	2

No. 200	1

2.03 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Testing and inspection services.

B. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D698. ASTM D4318. ASTM C136.

C. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D698. ASTM D4318. ASTM C136.

D. When tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.01 EXCAVATION

A. Excavate aggregate materials from on-site locations indicated.

B. Stockpile excavated material meeting requirements for coarse aggregate materials.

C. Remove excess excavated materials not intended for reuse from site.

D. Remove excavated materials not meeting requirements for coarse aggregate materials from site.

3.02 STOCKPILING

A. Stockpile materials on site at locations designated by Engineer.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.

D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.03 STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

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SECTION 31 23 16

EXCAVATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Soil densification.
2. Excavating for foundations.
3. Excavating for paving and parking areas.

B. Related Sections:

1. Section 31 23 17 - Trenching: Excavating for utility trenches.
2. Section 33 11 16 - Site Water Utility Distribution Piping.

1.02 REFERENCES

A. Local utility standards when working within 24 inches of utility lines.

1.03 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with Caltrans Standard Plans.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION

A. Notify affected utility companies and owner not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas. Conduct additional utility locating including ground penetrating radar, potholing and other means.

B. Identify required lines, levels, contours, and datum.

C. Protect utilities indicated to remain from damage.

D. Protect plant life, and other features remaining as portion of final landscaping.

E. Protect bench marks, survey control points and existing structures from excavating equipment and vehicular traffic.

3.02 EXCAVATION

A. Excavate subsoil to accommodate utilities, structures, channels, swales, and other improvements.

B. Compact backfills in accordance with Section 31 23 17.

C. Slope banks with machine to angle of repose or less until shored.

D. Do not interfere with 45 degree bearing splay of foundations.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

F. Trim excavation. Remove loose matter.

G. Remove lumped subsoil, boulders, and rock as required.

H. Notify Engineer of unexpected subsurface conditions.

I. Correct areas over excavated with structural fill as required.

J. Remove excess and unsuitable material from site.

K. Stockpile excavated material in areas designated on site by Owner.

L. Repair or replace items indicated to remain damaged by excavation.

3.03 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

3.04 PROTECTION

A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

B. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION

SECTION 31 23 17

TRENCHING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities.
2. Compacted fill from top of utility bedding to subgrade elevations.
3. Backfilling and compaction.

B. Related Sections:

1. Section 33 11 16 - Site Water Utility Distribution Piping

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 10-lb Rammer and a 18-in. Drop.

B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3).
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
5. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.03 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

1.04 SUBMITTALS (NOT USED)

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with Caltrans Standard Plans.

1.06 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.07 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. Structural Fill: Coarse Aggregate Base as specified in Section 31 05 16.

B. Granular Fill: Coarse Aggregate Subbase as specified in Section 31 05 16.

PART 3 EXECUTION

3.01 LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.

1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.02 PREPARATION

A. Notify affected utility companies not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, and other features remaining as portion of final landscaping.

D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

F. Establish temporary traffic control when trenching is performed in public right-of-way. Relocate controls as required during progress of Work.

3.03 TRENCHING

A. Excavate subsoil required for utilities to utility service.

B. Remove lumped subsoil, boulders, and rock.

C. Perform excavation within 24 inches of existing utility service in accordance with utility’s requirements.

D. Do not advance open trench more than 200 feet ahead of installed pipe. Access to all open trenches to be controlled by contractor. Open trenches shall be covered with plates when not directly monitored.

E. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.

F. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe.

G. Do not interfere with 45 degree bearing splay of foundations.

H. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this section. Provide shoring as required by OSHA.

I. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered.

J. Cut out soft areas of subgrade not capable of compaction in place. Backfill with course aggregate and compact to density equal to or greater than requirements for subsequent backfill material.

K. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

L. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Engineer.

M. Remove excess subsoil not intended for reuse, from site.

N. Stockpile subsoil in area designated on site to depth not exceeding 8 feet and protect from erosion.

3.04 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

3.05 BACKFILLING

A. Backfill trenches to contours and elevations with fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, or spongy subgrade surfaces.

C. Place fill material in continuous layers and compact.

D. Place material in continuous layers as follows:

1. Select Fill: Select Fill, maximum 8 inches loose depth.
2. Structural Fill: Coarse Aggregate Base, maximum 6 inches loose depth.
3. Granular Fill: Coarse Aggregate Subbase, maximum 6 inches loose depth.

E. Employ placement method that does not disturb or damage, utilities in trench.

F. Maintain optimum moisture content of fill materials to attain required compaction density.

G. Do not leave more than 50 feet of trench open at end of working day. Any trenches left open at the end of the working day are to be covered by plates.

H. Protect open trench to prevent danger to the public.

3.06 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Top Surface of Backfilling Under Paved Areas: Plus or minus ½ inch (0.04 feet) from required elevations.

C. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.07 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Perform laboratory material tests in accordance with ASTM D698.

C. Perform in place compaction tests in accordance with the following:

1. Density Tests: ASTM D1556, or ASTM D6938.

2. Moisture Tests: ASTM D6938.

D. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.

E. Frequency of Tests: Minimum of one test in each 1-foot of backfill, for every 200 feet of trench.

3.08 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.

B. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Design, construction, operation and maintenance of effective dewatering operations.
2. Dewatering pumping control.
3. Disposal of extracted groundwater.
4. Removal and relocation of equipment and clean-up of sites.

1.02 RELATED SECTIONS

A. Related work specified in other sections:

1. Section 31 23 30 Shoring and Trench Safety

1.03 QUALITY ASSURANCE

A. Qualifications. Furnish the services of an experienced, qualified, and equipped Dewatering Subcontractor to design and operate the dewatering required for the Work. In lieu of the above, the General Contractor may do the dewatering in accordance with a system approved by the Owner and designed by a Civil Engineer who is registered in the State of California and who has experience in this type of work.

B. Data Available for Examination. Reports of subsurface are available to the Contractor for examination. This data will be made available for information only.

C. Monitoring. The Contractor shall qualitatively monitor for odor or visual discrepancies indicative of hydrocarbon contamination in groundwater during dewatering operations. The Contractor shall notify the Owner immediately if potential contamination is encountered.

1.04 SUBMITTALS

A. Dewatering Plan: Submit for record purposes only and not for review or approval, shop drawings and data showing the intended plan for dewatering operations. Dewatering systems shall be designed and maintained by the Contractor and shall be coordinated with the design of shoring specified in Section 31 23 30. The plan should contain at a minimum the sizes of pumps, tanks, filtration devices, and the points of disposal. The plan should also include alternate (contingent) systems, and the Contractor should be prepared to alter the initial dewatering or shoring systems to meet the specified requirements. Submit the referenced intended plan not less than 15 days prior to start of dewatering operations.

B. Product Data: Submit data for each of the following:

1. Dewatering Pumps: Indicate sizes, capacities, priming methods, and engine or motor characteristics.
2. Pumping equipment for control of discharge.
3. Size of tank(s) used for storage.

4. Specifications and size and type of filters and any other materials used for filtration.

5. Traffic Control Plan: Provide traffic control plans around tanks, hoses and other dewatering equipment. Refer to Section 01 55 50 – Temporary Traffic Control System

PART 2 PRODUCTS

2.01 COMPONENTS OF THE DEWATERING SYSTEM

A. Provide units of standard manufacture and in good working order. Remove from the job site unserviceable parts and equipment. Major equipment for which repair parts are unavailable from local suppliers shall be considered obsolete and not acceptable.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordination. Lay out and install dewatering installations beyond the limits of the permanent works. Avoid interference with access or other necessary activities.

B. Barricades, Shelters, and Safety. Provide protection for vital parts of the employed dewatering system from accidental damage, and erect signs and barricades to isolate hazardous areas.

3.02 PERFORMANCE

A. Dewatering. Perform dewatering operations as required so all underground and below grade Work is performed or installed in dry excavations. Maintain dewatering systems in continuous operation until the involved work is completed, including the placing and compaction of backfill materials in the dry.

B. Protection of Existing Facilities. Provide standby equipment of sufficient size and capacity to ensure continuous operation of the dewatering systems. Where any sloped excavation infringes on or potentially endangers any existing facilities or structures, provide shoring, sheeting, and bracing according to shop drawings and calculations signed and stamped by a Structural or Civil Engineer registered in the State of California. File a copy of such plans and calculations with the Owner for record purposes. Repair and make good all damage or settlement to the foundation or other portion of any new or any existing facilities or structures caused by permanent or temporary failure, operation of the dewatering systems, or by failure to maintain the existing groundwater level outside the dewatered areas. Such repair work shall be performed at no additional expense to the Owner.

C. Drainage. Contractor shall provide and maintain ample means to promptly and effectively remove water from all areas of work, to prevent the entry of harmful quantities of water into the excavations and to dispose of the water removed. Avoid environmental damage and nuisance.

D. Disposal of Extracted Ground Water. Dispose of groundwater extracted by the dewatering system employed at the construction site as described as follows:

1. Reuse the water on-site for dust control, compaction, or irrigation, as appropriate.

2. Retain the water on-site in a grassy or porous area to allow infiltration/evaporation.

3. Discharge (by permit) to a sanitary sewer or storm drain (this option may require a temporary method to filter sediment-laden water prior to discharge). If discharge to a storm drain (i.e., surface waters) is the only feasible option, the Project will comply with Water Board requirements for construction dewatering. Measures may include characterizing the discharge and receiving waters and developing a Best Management Practices Plan including filtering methods and monitoring and reporting requirements.

E. Contractor shall submit a dewatering plan.

F. Removal. Remove equipment when no longer required for dewatering or water controlling operations. Maintain operation of monitoring systems until their removal is approved. Remove all temporary works and dewatering facilities in a manner satisfactory to the Owner and the permits for the Project.

3.03 DEWATERING PUMPING CONTROL

A. For dewatering pumping outside normal working hours, engines shall be equipped and/or shielded in a manner to keep noise to a minimum. Testing is required to show compliance with local ordinances. The Contractor shall conduct all work to minimize the impact of construction noise on nearby business and residential neighborhoods. Measures to reduce construction noise are listed in the Specification Section 01 57 00 in addition to those measures listed below.

B. To minimize noise levels, the Contractor shall attempt to obtain electrical power from PG&E in lieu of providing power by portable generator. If use of utility power is not practicable, generator power may be provided by sound-attenuated electrical generators.

C. Diesel generators shall not be utilized unless they are provided with sound barriers or enclosures, as necessary, to comply with local ordinances.

D. Open pumping from sumps shall not result in boils, softening of the ground, or loss of fines. Sumps, subdrains, drain blankets, wells and well points shall be installed with suitable filters or screens so that fines are not removed from the formation.

E. Groundwater control operations shall be prosecuted and maintained 24 hours a day, 7 days a week. Qualified personnel shall be on-site at all times to monitor system operations and to perform maintenance as necessary to keep the system in operation.

F. Provide a generator and all equipment necessary to provide a backup electrical power source in the event of a power service interruption.

G. Maintain temporary drainage facilities of adequate size, with standby pumps and adequate back-up power for emergency use, to collect and dispose of water which enters the pipeline trench or structure excavation.

3.04 CLEANUP

A. Upon completion of the work in this Section, remove rubbish and debris and leave the entire area affected by the work in a neat, clean and acceptable condition.

END OF SECTION

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SECTION 31 23 30

SHORING AND TRENCH SAFETY

PART 1 GENERAL

1.01 SUMMARY OF SECTION

A. Principle items specified herein are:

1. Shoring required for general safety, worker protection and protection of adjacent property from the hazards of caving ground.
2. Trench excavations
3. Structural excavations

1.02 RELATED SECTIONS

A. Related work specified in other sections:

1. Section 31 23 19 Dewatering

1.03 REFERENCED CODES AND SPECIFICATIONS

A. The following standards apply:

1. Cal/OSHA, State of California Administrative Code, Title 8; Industrial Relations, Chapter 4, Subchapter 4, Construction Safety Orders.
2. Occupational Safety and Health Administration (OSHA) Regulations, 29 CPR Part 1926 Subpart P - Excavations.

1.04 CONTRACTOR'S RESPONSIBILITIES FOR SAFETY

A. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons (including employees) and property during performance of the Work. This requirement shall apply continuously and not be limited to normal working hours.

B. The duty of the Engineer to conduct construction review of the Contractor's performance is not intended to include a review or approval of the adequacy of the Contractor's safety supervisor, the safety program, or any safety measures taken in, on, or near the construction site.

C. The Engineer will review the submittal of the Contractor's proposed shoring system to verify the general scope of the Work, to determine that qualified professional engineering services are used and to determine that appropriate construction techniques are proposed for use. This review shall not in any way be construed to relieve the Contractor from sole responsibility for the design and safety of such shoring.

D. The Contractor shall appoint a supervisory employee who shall be responsible for determining which of the engineered shoring systems (if alternates are provided) shall be used depending on local soil type, water table, etc.

1.05 PERMIT

A. For trenches or excavations five (5) - feet or more in depth, obtain from the State Division of Industrial Safety a permit for such excavation; submit a copy of the permit to the Engineer, prior to initiating any Work requiring said permit.

1.06 SAFETY ORDERS

A. The Contractor shall have at the Work site, copies or suitable extracts of the Construction Safety Orders of Cal-OSHA.

B. All Work shall comply with the provisions of these and all other applicable laws, ordinances, and regulations.

1.07 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – “Submittal Procedures”:

1. Trench Safety Plan:

a. For trenches or excavations five feet or more in depth, the Contractor shall submit to the Engineer a detailed plan design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazards of caving ground. The design shall be coordinated with the dewatering plan (Section 31 23 19).

b. Such plans shall be submitted at least 10 working days before the Contractor intends to begin trenching or excavation work. Submittal shall be for trench work and work at vaults, and other cuts 5 feet or more in depth. NOTE: Water table and moisture content will vary with rainfall and cause varying soil strength.

c. Groundwater will be present in trench backfill of existing utilities. Contractor shall design shoring and dewatering systems to mitigate against washout of materials from existing utility trenches. Reconstruction of the structural section of the road will be completed at the Contractor’s expense.

d. The trench safety plans shall be prepared, stamped and signed by a civil or structural engineer registered in California. Stamped and sealed copies of calculations necessary to obtain approval of the systems shall be submitted also. These plans shall be posted on the job site.

e. Nothing herein 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.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

1.01. REMOVAL OF SHORING

A. Removal of shoring shall not damage pipes or structures, cause settlement or heave the ground surface, or produce vibrations that could damage adjacent pipe or structures.

B. Minimum compaction requirements must be met after shoring is removed.

PART 4 TESTING

No field testing is required.

END OF SECTION

SECTION 31 25 13

EROSION CONTROLS

PART 1 GENERAL

1.01 GENERAL

A. The work of this section consists of furnishing and installing temporary erosion and sediment control measures necessary to prevent, control and abate water, mud, and erosion damage to public and private property as a result of the construction project.

B. Implementing measures to prevent storm water pollution during construction activities, in accordance with federal, state, and local regulations.

C. Minimize the extent of all ground disturbing activities and avoid work in any drainage channels if at all feasible.

D. Heavy equipment shall be placed outside of drainage channels except when absolutely necessary to perform the work.

E. Upon completion of construction activities, natural drainage shall be restored and re-contoured as nearly as practicable to pre-project conditions, and shall match adjacent natural channel contours.

1.02 RELATED SECTIONS

A. Related Sections:

1. Section 31 05 16 - Aggregates for Earthwork.
2. Section 31 23 16 - Excavation.
3. Section 32 92 19 - Seeding.

1.03 MEASUREMENT AND PAYMENT

A. Refer to Section 01 15 00 Measurement and Payment.

1.04 SUBMITTALS

A. Mill Certificate or Affidavit. A mill certificate or affidavit shall be provided attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified below.

1.05 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

B. American Society for Testing and Materials (ASTM)

1. ASTM D4439-04 - Standard Terminology for Geosynthetics.
2. ASTM D4491-99a(2009) - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
3. ASTM D4533- 04(2009) - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
4. ASTM D4632-08 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

5. ASTM D4751-04 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.

6. ASTM D4873-02(2009) - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.

1.06 EROSION AND SEDIMENT CONTROLS

A. The controls and measures required by the Contractor are described but not limited to the items below.

1. Structural Practices: Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Structural practices shall be implemented in a timely manner during the construction process to minimize erosion and sediment runoff. Structural practices shall include the following devices.

a. Silt Fences. The Contractor shall provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly placed and installed to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, trench excavation, backfilling, and grading). Silt fences shall be installed in the locations as directed by the Engineer. Final removal of silt fence barriers shall be upon approval by the Engineer.

b. Straw Wattles (Fiber Rolls): Contractor shall provide fiber rolls as temporary structural practice to minimize erosion and sediment runoff. Fiber rolls shall be properly placed and installed to effectively retain sediment immediately after completing each phase of work (e.g., clearing and grubbing, trench excavation, backfill, and grading) in each independent runoff area (e.g., after clearing and grubbing in an area between a ridge and drain, fiber rolls shall be placed as work progresses; fiber rolls shall be removed/replaced/relocated as needed for work to progress in the drainage area). Final removal of fiber roll barriers shall be upon approval by the Engineer. Fiber Rolls shall be installed as directed by the Engineer and as shown in the Project Drawings.

c. Seed and Mulch: per plans and specifications.

PART 2 PRODUCTS

2.01 SILT FENCES

A. Ultraviolet stabilized woven polypropylene face. The filter fabric shall meet the following requirements:

Physical Property	**Test Procedure**	**Required Value**
Grab Tensile	ASTM D 4632	160 lbs. min.
Elongation (%)	ASTM D 1682	25 % max.
Mullen Burst Strength, psi, min.	ASTM D 3876	350
Equivalent Opening Size, max.	US Standard Sieve	30-70
Ultraviolet Radiation Resistance, %	ASTM D 4355	70

Strength Retention		
Weight oz./sq. yd.	ASTM D 3776	4

B. Mill Certificate or Affidavit. A mill certificate or affidavit shall be provided attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above.

C. The Contractor may use either wooden stakes or steel posts for silt fence construction

2.02 FIBER ROLLS (SEDIMENT LOGS OR WATTLES)

A. Composed of bio-degradable materials.

B. The Contractor shall use wooden stakes for fiber roll installation. Wooden stakes utilized for fiber roll installation, shall have a minimum cross section of 1 inch by 2 inches, or as suggested by the fiber roll manufacturer.

PART 3 EXECUTION

3.01 SPECIAL CONSTRUCTION REQUIREMENTS

A. It is the responsibility of the Contractor to minimize erosion and prevent the transport of sediment to the adjacent stream and sensitive areas.

B. At a minimum, the Contractor shall employ best management practices (BMPs) as described in the Project Plans.

C. If discrepancies occur between these specifications, plans, material referenced herein or manufacturer's recommendations, then the most protective shall apply.

D. It is the responsibility of the Contractor to fix any erosion, sediment, pollution, & waste control deficiencies identified by the Engineer.

E. Other selected disturbed earth areas shall be treated using appropriate erosion control measures per plans and specifications.

F. Additional erosion/sediment BMPs beyond what is shown on the plans may be required to comply with project permits and it shall be the responsibility of the contractor to implement additional BMPs as needed and as directed by the construction manager at no additional expense to the District.

G. Changes to the Plans may be made to respond to field conditions. Changes shall be noted on the plan when made.

H. At the conclusion of construction of certain task elements, the contractor will be required to implement additional post-construction erosion control measures where specified in the plans or where directed by the Engineer in order to protect natural resources. These measures include, but are not limited to, installing seed, weed-free straw mulch and tackifier, weed-free straw wattles or fiber rolls, and erosion control blanket consistent with the Project Plans.

I. Contractor shall comply with the project permits as required to ensure that water quality in Mad River and tributaries is not degraded during construction activities and until the disturbed areas are stabilized and erosion potential is minimized. The Plans detail erosion and sediment BMPs that will be implemented to prevent entry of storm water runoff into the excavation site, entrainment of excavated contaminated materials leaving the site, and entry of polluted storm water runoff into waters during transportation and storage of excavated materials. BMPs that the Contractor shall implement include:

1. Preservation of existing vegetation shall occur to the maximum extent practicable.

2. Appropriate energy dissipation devises will be utilized to reduce or prevent erosion at discharge end of dewatering activity.
3. Silt fences and or turbidity curtains shall be deployed as necessary during installation of selected coffer dams.
4. Sediment sources shall be controlled using materials and methods specified in the Plans.
5. Erosion control may include seeding, mulching, erosion control blankets, plastic coverings, and geotextiles that shall be implemented after completion of construction activities.
6. Stockpiled material will be covered or watered to eliminate excessive dust, as necessary.
7. Fiber rolls or similar products will be utilized in appropriate locations to reduce sediment runoff from disturbed soils, as necessary.
8. Excess water shall be pumped into the surrounding upland areas approved by the Engineer.
9. Silt fences or water diversion structures shall be used to contain sediment. If sediment is not being contained adequately, as determined by visual observation, the activity shall cease.
10. Construction materials, debris, and waste will not be placed or stored where it can enter into or be washed by rainfall into waters of the U.S./State.
11. Appropriate vehicle storage, fueling, maintenance and cleaning areas shall be designated and maintained to prevent discharge of pollutants. Upland areas will be used for equipment refueling. If equipment must be washed, washing shall occur where wash water cannot flow into wetlands or waters of the U.S./States.
12. Operators of heavy equipment, vehicles, and construction work will be instructed to avoid sensitive habitat/resource areas. To ensure construction occurs in the designated areas and does not impact environmentally sensitive areas, the boundaries of the work area shall be fenced or marked with flagging by the Contractor.
13. Equipment when not in use shall be stored outside of wetlands and outside areas with drainage paths to wetlands and water ways.
14. All construction equipment will be maintained to prevent leaks of fuels, lubricants or other fluids into the drainage channels and drainage paths. Service and refueling procedures will not be conducted where there is potential for fuel spills to seep or wash into water ways.
15. Stationary equipment such as motors, pumps, generators, compressors, and welders, located within a dry portion of the drainage channels or adjacent to the drainage channels shall be positioned over drip pans. The Contractor shall have spill containment materials located at the site, with operators trained in spill control procedures.
16. Extreme caution will be used when handling and/or storing chemicals and hazardous wastes (e.g., fuel and hydraulic fluid) near waterways, and any and all applicable laws and regulations will be followed. Appropriate materials shall be on site to prevent and manage spills. Contractor shall comply with the Emergency Spill Plan and Emergency Spill Response Plan and other relevant permit conditions.

17. Covered and secured storage areas for potentially toxic materials shall be provided. All hazardous material containers should be placed in secondary containment.

18. All construction vehicles or equipment shall be checked and maintained daily to prevent leaks of fuels and/or lubricants.

19. No debris, soil, silt, sand, bark, slash, sawdust, rubbish, oil or petroleum products, other organic material or earthen material from any construction related activity shall be allowed to enter into any waterways.

20. Soil and material stockpiles shall be properly protected to minimize sediment and pollutant transport from the construction site.

21. If, at any time, an unauthorized discharge of debris to surface water occurs, or any water quality problem arises, the associated project activities shall cease immediately until adequate BMPs are implemented, including stopping work. The regional water board will be notified by the Engineer promptly and in no case more than 24 hours after the unauthorized discharge or water quality problem arises.

22. The plans may not cover all the situations that arise during construction due to unanticipated field conditions. Variations may be made to the plan in the field subject to the approval of or at the direction of the Engineer.

23. Prior to final acceptance, all areas of the site will be vegetated or permanently stabilized and all temporary sediment control measures shall be removed.

3.02 INSTALLATION OF SILT FENCES

A. Silt fences shall extend a minimum of 16 inches above the ground surface and shall not exceed 34 inches above the ground surface. Filter fabric shall be from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric shall be spliced together at a support post, with a minimum 6 inch overlap, and securely sealed. A trench shall be excavated approximately 4 inches wide and 4 inches deep on the upslope side of the location of the silt fence. The 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed upon approval by the Engineer.

B. Maximum spacing for post supports shall be 6 feet on center. Posts shall be buried 12 inches minimum and shall not exceed 36-inches above the ground surface.

3.03 INSTALLATION OF FIBER ROLLS (SEDIMENT LOGS OR WATTLES)

A. Fine grade the subgrade by hand, dressing where necessary to remove local deviations and to remove larger stones or debris that will inhibit intimate contact of the fiber roll with the subgrade. Prior to roll installation, contour a concave key trench 2 to 4 inches deep along the proposed installation route. Soil excavated in trenching should be placed on the uphill or flow side of the roll to prevent water from undercutting the roll.

B. Place fiber rolls into the key trench and stake on both sides of the roll within 6 feet of each end. Spacing for stakes shall be 3 to 5 feet. Stakes are typically driven in on alternating sides of the roll. Stakes shall be buried 12 inches minimum.

C. When more than one fiber roll is placed in a row, the rows should be abutted securely to one another to provide a tight joint, not overlapped. Fiber rolls shall be placed in a single row, lengthwise on the contour.

3.04 MAINTENANCE

A. The Contractor shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. The following procedures shall be followed to maintain the protective measures.

1. Silt Fence Maintenance. Silt fences shall be inspected in accordance with paragraph INSPECTIONS. Any required repairs shall be made promptly. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-third of the height of the barrier. When a silt fence is no longer required, it shall be removed. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be re-vegetated.

2. Fiber Roll Maintenance. Fiber roll barriers shall be inspected in accordance with paragraph INSPECTIONS. Close attention shall be paid to the repair of damaged rolls, end runs and undercutting beneath rolls. Necessary repairs to barriers or replacement of rolls shall be accomplished promptly. Sediment deposits shall be removed when deposits reach one-half of the height of the barrier. Roll rows used to retain sediment shall be turned uphill at each end of each row. When a fiber roll barrier is no longer required, it shall be removed. The immediate area occupied by the roll and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be re-vegetated.

3.05 INSPECTIONS AND ACCEPTANCE

A. General. The Contractor shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and areas where vehicles exit the site, at least once every seven (7) calendar days, within two (2) calendar days of forecasted rains, and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site.

B. Inspection Details. Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

END OF SECTION

SECTION 31 62 99

HELICAL PILE FOUNDATION

PART 1 GENERAL

1.01 PURPOSE OF SPECIFICATION

A. The purpose of this specification is to detail the furnishing of all designs, materials, tools, equipment, labor and supervision, and installation techniques necessary to install Helical Piles as detailed on the drawings, including connection details. This shall include provisions for load testing that may be part of the scope of work

1.02 SCOPE OF WORK

A. This work consists of furnishing all necessary engineering and design services (if required), supervision, labor, tools, materials, and equipment to perform all work necessary to install the Helical Piles, at the Samoa tank site for Humboldt Bay Municipal Water District (HBMWD) per the specifications described herein, and as shown on the drawings. The Contractor shall install a Helical Pile that will develop the load capacities as detailed on the drawings. This includes provisions for load testing to verify Helical Pile capacity and deflection, if part of the scope of work. The responsibilities and duties of the respective parties for this project are summarized in Table-1.

B. For the purpose of this Section, Owner is defined as HBMWD, Structural Engineer of Record (SEOR) is defined as GHD, and Contractor is defined as the Prime Contractor or his/her Subcontractors.**Table-1.** Tasks and Responsibilities to be Allocated for Helical Pile Work

	TASK	**RESPONSIBLE PARTY***
1	Site Investigation, Geotechnical Investigation, Site Survey, and potential work restrictions	Owner
2	Type of specification, requirement for a pre-contract testing program, and procurement method	Owner
3	Obtaining easements	Owner
4	Overall scope of work, design of the Helical Pile structure – including design loads (vertical, horizontal, etc.), pile locations, and pile spacing and orientation	Contractor/SEOR
5	Definition and qualification of safety factors	Contractor/SEOR
6	Calculation/estimation of allowable structural and/or Helical Pile movement in service (acceptance criteria)	Contractor/SEOR
7	Definition of service life (temporary – months or permanent - years) and required degree of corrosion protection based on site conditions	SEOR
8	Type and number of tests (pre-contract, pre-production and production)	Contractor
9	Minimum total Helical Pile length, depth to bearing stratum	Contractor
10	Helical Pile components and details	Contractor
11	Details of corrosion protection, if required	Contractor
12	Details of pile connection to structure (e.g., for static and seismic conditions)	Contractor/SEOR
13	Preparation of Helical Pile Shop Drawings and test reports	Contractor

14	Evaluation of test results	Owner
15	Construction methods, schedule, sequencing, and coordination of work	Contractor
16	Requirements of field production control, including logging of installation torque vs. installed depth	Contractor/Owner
17	Supervision of work	Contractor/Owner
18	Long-term monitoring	Owner

* To be filled in by specification writer.

1.03 QUALIFICATIONS OF THE HELICAL PILE CONTRACTOR

A. The Helical Pile Contractor shall be experienced in performing design and construction of Helical Piles and shall furnish all materials, labor, and supervision to perform the work. The Contractor shall be trained and certified by CHANCE Civil Construction or other qualified firm in the proper methods of design and installation of Helical Piles. The Contractor shall provide names of on-site personnel materially involved with the work, including those who carry documented certification from CHANCE Civil Construction or other qualified firm. At a minimum, these personnel shall include foreman, machine operator, and project engineer/manager.

B. The Helical Pile Contractor shall not sublet the whole or any part of the contract without the express written permission of the Owner.

1.04 DEFINITIONS

A. A partial list follows.

1. **Contractor:** The person/firm responsible for performing the Helical Pile work.

2. **Coupling:** Central steel shaft connection means formed as integral part of the plain extension shaft material. For Type SS & RS Helical Piles, couplings are internal or external sleeves, or hot upset forged sockets.

3. **Coupling Bolt(s):** High strength, structural steel fasteners used to connect Helical Pile segments together. For Type SS segments, the coupling bolt transfers axial load. For Type RS segments, the coupling bolts transfer both axial and torsional forces.

4. **Helical Extension:** Helical Pile foundation component installed immediately following the lead or starter section, if required. This component consists of one or more helical plates welded to a central steel shaft of finite length. Function is to increase bearing area.

5. **Helix Plate:** Generally round steel plate formed into a ramped spiral. The helical shape provides the means to install the helical pile, plus the plate transfers load to soil in end bearing. Helix plates are available in various diameters and thickness.

6. **HELICAL PULLDOWN® Micropile:** A small diameter, soil displacement, cast-in-place Helical Pile, in which most of the applied load is resisted by the central steel shaft and steel reinforcement, if installed. Load transfer to soil is both end bearing and friction.

7. **Helical Pile:** A bearing type foundation element consisting of a lead or starter section, helical extension (if so required by site conditions), plain extension

section(s), and a pile cap. A.k.a. helical screw pile, screw pile, helical screw foundation.

8. **Installation Torque(T):** The resistance generated by a Helical Pile when installed into soil. The installation resistance is a function of the soil type, and size and shape of the various components of the Helical Pile.

9. **Lead Section:** The first Helical Pile foundation component installed into the soil, consisting of single or multiple helix plates welded to a central steel shaft. A.k.a. Starter Section.

10. **Pile Cap:** Connection means by which structural loads are transferred to the Helical Pile. The type of connection varies depending upon the requirements of the project and type of Helical Pile material used.

11. **Round Shaft (RS): Round** steel pipe central **S**haft elements ranging in diameter from 2-7/8" to 10". A.k.a. Hollow Shaft (Type HS), Type T/C, Type PIF.

12. **Plain Extension:** Central steel shaft segment without helix plates. It is installed following the installation of the lead section or helical extension (if used). The segments are connected with integral couplings and bolts. Plain extensions are used to extend the helix plates beyond the specified minimum depth and into competent load bearing stratum.

13. **Safety Factor:** The ratio of the ultimate capacity to the working or design load used for the design of any structural element.

14. **Square Shaft (SS):** Solid steel, round-cornered-**S**quare central **S**haft elements ranging in size from 1-1/4" to 2-1/4". A.k.a. Type SQ.

15. **Torque Strength Rating:** The maximum torque energy that can be applied to the helical pile foundation during installation in soil, a.k.a. allowable, or safe torque.

1.05 ALLOWABLE TOLERANCES

A. The tolerances quoted in this section are suggested maximums. The actual values established for a particular project will depend on the structural application.

B. Centerline of Helical Piles shall not be more than 1.25 inches from indicated plan location.

C. Helical Pile plumbness shall be within 1° of design alignment.

D. Top elevation of Helical Pile shall be within +1 inch to –2 inches of the design vertical elevation.

1.06 QUALITY ASSURANCE

A. Helical Piles shall be installed by authorized CHANCE Civil Construction certified Contractor or approved equal. These Contractors shall have satisfied the certification requirements relative to the technical aspects of the product and installation procedures as therein specified. Certification documents shall be provided upon request to the Owner or their representative.

B. The Contractor shall employ an adequate number of skilled workers who are experienced in the necessary crafts and who are familiar with the specified requirements and methods needed for proper performance of the work of this specification.

C. All Helical Piles shall be installed in the presence of a designated representative of the Owner unless said representative informs the Contractor otherwise. The designated representative shall have the right of access to any and all field installation records and test reports.

D. Helical Pile components as specified therein shall be manufactured by a facility whose quality systems comply with ISO (International Organization of Standards) 9001 requirements. Certificates of Registration denoting ISO Standards Number shall be presented upon request to the Owner or their representative.

E. Manufacturer shall provide a standard one-year warranty on materials and workmanship of the product. Any additional warranty provided by the Contractor shall be issued as an addendum to this specification.

F. Design of Helical Piles shall be performed by an entity as required in accordance with existing local code requirements or established local practices. This design work may be performed by a licensed professional engineer, a certified CHANCE Civil Construction Contractor, or other qualified designer.

1.07 DESIGN CRITERIA

A. Helical Piles shall be designed to meet the specified loads and acceptance criteria as shown on the drawings. The calculations and drawings required from the Contractor or Engineer shall be submitted to the Owner for review and acceptance in accordance to Section 3.1 “Construction Submittals”.

B. The allowable working load on the Helical Piles shall not exceed the following values:

1. For compression loads:

$$P_{allowc} = 0.4 * f_{yshaft} * A_{shaft}$$

Where: P_{allowc} = allowable working load in compression (kip)
f_{yshaft} = minimum yield strength of central steel shaft (ksi)
A_{shaft} = area of central steel shaft (with corrosion allowance if required) ($in.^2$)

2. For tension loads:

$$P_{allowt} = S_{ut} / FS$$

Where: P_{allowt} = allowable working load in tension (kip)
S_{ut} = Min. ultimate tensile strength of central steel shaft segment (at coupling joint) (kip)
FS = factor of safety suitable for application, i.e. temporary or permanent structures

C. The ultimate structural capacity shall be determined as:

1. For compression loads:

$$P_{ultc} = f_{yshaft} * A_{shaft}$$

Where: P_{ultc} = ultimate structural capacity in compression (kip)
f_{yshaft} = minimum yield strength of central steel shaft (ksi)
A_{shaft} = area of central steel shaft (with corrosion allowance if required) ($in.^2$)

2. For tension loads:

$$P_{ultt} = S_{ut}$$

Where: P_{ultt} = Ultimate structural capacity in tension (kip)
S_{ut} = Minimum ultimate tensile strength of central steel shaft (kip)

D. The overall length and installed torque of a Helical Pile shall be specified such that the required in-soil capacity is developed by end-bearing on the helix plate(s) in an appropriate strata(s).

E. It is recommended that the theoretical end-bearing capacity of the helix plates be determined using HeliCAP® Engineering Software or equal commercially available software. The required soil parameters (c, ϕ, γ, or N-values) for use with HeliCAP® or equal shall be provided in the geotechnical reports. The Owner shall determine the allowable response to axial loads.

F. Lateral Load and Bending: Where Helical Piles are subjected to lateral or base shear loads as indicated on the plans, the bending moment from said loads shall be determined using lateral load analysis program such as LPILE or equal commercially available software. The required soil parameters (c, ϕ, γ, and k_s) for use with LPILE or equal shall be provided in the geotechnical reports. The Owner shall determine the allowable response to lateral loads. The combined bending and axial load factor of safety of the Helical Pile shall be as determined by the Owner.

G. Critical Buckling Load: Where Helical Piles are installed into low strength soil, the critical buckling load shall be determined using lateral load analysis program such as LPILE or equal commercially available software, or various other methods. The required soil parameters (c, ϕ, γ, and k_s) for use with LPILE or equal shall be provided in the geotechnical reports.

H. Expansive Soils: Helical Pile used in areas where expansive soils are present may require the use of special construction methods to mitigate possible shrink/swell effects. Helical Pile shafts should be isolated from the concrete footing if said footing is in contact with the expansive soil.

I. Down-Drag/Negative Skin Friction: Type SS and Type RS Helical Piles are slender shaft foundation elements and are not practically affected by down-drag/negative skin friction. If Helical Piles with central steel shafts >4" in diameter are used in areas where compressible or decomposing soils overlie bearing stratum, or where expansive or frozen soils can cause pile jacking, Helical Pile shafts should be provided with a no-bond zone along a specified length to prevent load transfer that may adversely affect pile capacity. Alternately, Helical Piles can be provided with sufficient axial load capacity to resist down drag/negative skin friction forces.

J. The Helical Pile attachment (pile cap) shall distribute the design load (DL) to the concrete foundation such that the concrete bearing stress does not exceed those in the ACI Building Code and the stresses in the steel plates/welds does not exceed AISC allowable stresses for steel members.

K. Corrosion Protection

1. **Structure Type:** Permanent
2. **Service Life:** 50 years
    a. Corrosion protection requirements for the various Helical Pile elements shall be provided meeting the requirements of Table-2 in the Appendix for:
3. **Soil:** Aggressive

TABLE-2

CORROSION PROTECTION				
LOADING	TENSION		COMPRESSION	
SOIL	**AGGRESSIVE[1]**	**NON-AGGRESSIVE**	**AGGRESSIVE[1]**	**NON-AGGRESSIVE**
CENTRAL STEEL SHAFT (Lead Section)	a. Galvanization OR b. Minimum 1/8" corrosion loss on outside	a. Bare steel OR b. Galvanization OR c. Minimum 1/8" corrosion loss on outside	a. Galvanization OR b. Minimum 1/8" corrosion loss on outside	a. Bare steel OR b. Galvanization OR c. Minimum 1/8" corrosion loss on outside
CENTRAL STEEL SHAFT (Extension Section)	a. Galvanization OR b. Epoxy coating OR c. a. or b. + Grout cover[2] The Specifier may elect to use a grout case.	a. Bare steel OR b. Galvanization OR c. Epoxy coating	a. Galvanization OR b. Epoxy coating OR c. a. or b. + Grout cover[2] The Specifier may elect to use a grout case.	a. Bare steel OR b. Galvanization OR c. Epoxy coating
STEEL PILE CAP	a. Galvanization OR b. Epoxy coating	d. Bare steel OR e. Galvanization OR f. Epoxy coating	c. Galvanization OR d. Epoxy coating	g. Bare steel OR h. Galvanization OR i. Epoxy coating

NOTES:
Lettered items are options.
For guidance on aggressiveness classification, see Table-2 of the Appendix.
1. Corrosion protection shall extend 15'-0 below corrosive material.
2. Minimum 1" in soil. If protective coatings (galvanization, epoxy) are provided in compression, minimum cover may be 0.25" in soil. Grout column can be installed using the HELICAL PULLDOWN® Micropile method.

1.08 GROUND CONDITIONS

A. The Geotechnical Report, including logs of soil borings as shown on the boring location plan, shall be considered to be representative of the in-situ subsurface conditions likely to be encountered on the project site. Said Geotechnical Report shall be the used as the basis for Helical Pile design using generally accepted engineering judgement and methods.

B. The Geotechnical Report shall be provided for purposes of bidding. If during Helical Pile installation, subsurface conditions of a type and location are encountered of a frequency that were not reported, inferred and/or expected at the time of preparation of the bid, the additional costs required to overcome such conditions shall be considered as extras to be paid for.

PART 2 REFERENCED CODES AND STANDARDS

Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title, or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation. In case of conflict, the particular requirements of this specification shall prevail. The latest publication as of the issue of this specification shall govern, unless indicated otherwise.

2.01 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM):

A. ASTM A29/A29M Steel Bars, Carbon and Alloy, Hot-Wrought and Cold Finished.

B. ASTM A36/A36M Structural Steel.

C. ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

D. ASTM A153 Zinc Coating (Hot Dip) on Iron and Steel Hardware.

E. ASTM A252 Welded and Seamless Steel Pipe Piles.

F. ASTM A775 Electrostatic Epoxy Coating

G. ASTM A193/A193M Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service.

H. ASTM A320/A320M Alloy-Steel Bolting Materials for Low Temperature Service.

I. ASTM A325 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

J. ASTM A500 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

K. ASTM A513 Standard Specification for Electric Resistance Welded Carbon and Alloy Steel Mechanical Tubing.

L. ASTM A536 Standard Specifications for Ductile Iron Castings

M. ASTM A572 HSLA Columbium-Vanadium Steels of Structural Quality.

N. ASTM A618 Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing.

O. ASTM A656 Hot-Rolled Structural Steel, High-Strength Low-Alloy Plate with Improved Formability.

P. ASTM A958 Standard Specification for Steel Castings, Carbon, and Alloy, with Tensile Requirements, Chemical Requirements Similar to Wrought Grades.

Q. ASTM A1018 Steel, Sheet and Strip, Heavy Thickness Coils, Hot Rolled, Carbon, Structural, High-Strength Low-Alloy, Columbium or Vanadium, and High-Strength Low-Alloy with Improved Formability.

R. ASTM D1143 Method of Testing Piles Under Static Axial Compressive Load.

S. ASTM D3689 Method of Testing Individual Piles Under Static Axial Tensile Load.

2.02 AMERICAN WELDING SOCIETY (AWS):

A. AWS D1.1 Structural Welding Code – Steel.

B. AWS D1.2 Structural Welding Code – Reinforcing Steel.

2.03 AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE):

A. ASCE 20-96 Standard Guidelines for the Design and Installation of Pile Foundations.

2.04 DEEP FOUNDATIONS INSTITUTE (DFI):

A. Guide to Drafting a Specification for High Capacity Drilled and Grouted Micropiles for Structural Support, 1st Edition, Copyright 2001 by the Deep Foundation Institute (DFI).

2.05 SOCIETY OF AUTOMOTIVE ENGINEERS (SAE):

A. SAE J429 Mechanical and Material Requirements for Externally Threaded Fasteners.

PART 3 SUBMITTALS

3.01 CONSTRUCTION SUBMITTALS

A. The Contractor or Engineer shall prepare and submit to the Owner, for review and approval, working drawings and design calculations for the Helical Piles intended for use at least 14 calendar days prior to planned start of construction (but note also Paragraph 3.1.8). All submittals shall be signed and sealed by a Registered Professional Engineer currently licensed in the State of California.

B. The Contractor shall submit a detailed description of the construction procedures proposed for use to the Owner for review. This shall include a list of major equipment to be used.

C. The Working Drawings shall include the following:

a. Helical Pile number, location and pattern by assigned identification number

b. Helical Pile design load

c. Type and size of central steel shaft

d. Helix configuration (number and diameter of helix plates)

e. Minimum effective installation torque

f. Minimum overall length

g. Inclination of Helical Pile

h. Cut-off elevation

i. Helical Pile attachment to structure relative to grade beam, column pad, pile cap, etc.

D. The Contractor shall submit shop drawings for all Helical Pile components, including corrosion protection and pile top attachment to the Owner for review and approval. This includes Helical Pile lead/starter and extension section identification (manufacturer's catalog numbers).

E. If required, the Contractor shall submit certified mill test reports for the central steel shaft, as the material is delivered, to the Owner for record purposes. The ultimate strength, yield strength, % elongation, and chemistry composition shall be provided.

F. The Contractor shall submit plans for pre-production (optional) and production testing for the Helical Piles to the Owner for review and acceptance prior to beginning load tests. The purpose of the test is to determine the load versus displacement response of the Helical Pile and provide an estimation of ultimate capacity.

G. The Contractor shall submit to the Owner copies of calibration reports for each torque indicator or torque motor, and all load test equipment to be used on the project. The calibration tests shall have been performed within forty five (45) working days of the date submitted. Helical Pile installation and testing shall not proceed until the Owner has received the calibration reports. These calibration reports shall include, but are not limited to, the following information:

a. Name of project and Contractor

b. Name of testing agency

c. Identification (serial number) of device calibrated

d. Description of calibrated testing equipment

e. Date of calibration

f. Calibration data

H. Work shall not begin until all the submittals have been received and approved by the Owner. The Contractor shall allow the Owner a reasonable time to review, comment, and return the submittal package after a complete set has been received. All costs associated with incomplete or unacceptable submittals shall be the responsibility of the Contractor.

3.02 INSTALLATION RECORDS

A. The Contractor shall provide the Owner copies of Helical Pile installation records within 24 hours after each installation is completed. Records shall be prepared in accordance with the specified division of responsibilities as noted in Table-1. Formal copies shall be submitted on a weekly basis. These installation records shall include, but are not limited to, the following information.

1. Name of project and Contractor
2. Name of Contractor’s supervisor during installation
3. Date and time of installation
4. Name and model of installation equipment
5. Type of torque indicator used
6. Location of Helical Pile by assigned identification number
7. Actual Helical Pile type and configuration – including lead section (number and size of helix plates), number and type of extension sections (manufacturer’s SKU numbers)
8. Helical Pile installation duration and observations
9. Total length of installed Helical Pile
10. Cut-off elevation
11. Inclination of Helical Pile
12. Installation torque at one-foot intervals for the final 10 feet
13. Comments pertaining to interruptions, obstructions, or other relevant information
14. Rated load capacities

3.03 TEST REPORTS

A. The Contractor shall provide the Owner copies of field test reports within 24 hours after completion of the load tests. Records shall be prepared in accordance with the specified

division of responsibilities as noted in Table-1. Formal copies shall be submitted within a reasonable amount of time following test completion. These test reports shall include, but are not limited to, the following information (note Section 6 – Helical Pile Load Tests).

1. Name of project and Contractor
2. Name of Contractor's supervisor during installation
3. Name of third party test agency, if required
4. Date, time, and duration of test
5. Location of Helical Pile by assigned identification number
6. Type of test (i.e. tension or compression)
7. Description of calibrated testing equipment and test set-up
8. Actual Helical Pile type and configuration – including lead section, number and type of extension sections (manufacturer's SKU numbers)
9. Steps and duration of each load increment
10. Cumulative pile-head movement at each load step
11. Comments pertaining to test procedure, equipment adjustments, or other relevant information
12. Signed by third party test agency rep., registered professional engineer, or as required by local jurisdiction

3.04 CLOSEOUT SUBMITTALS

A. Warranty: Warranty documents specified herein

1. Project Warranty: Refer to Conditions of the Contract for project warranty provisions
    a. Warranty Period: (*Specify Term*) years commencing on date of Substantial Completion
2. Manufacturer's Warranty: Submit, for Owner's Acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights the Owner may have under Contract Document.

PART 4 PRODUCTS AND MATERIALS

4.01 CENTRAL STEEL SHAFT:

A. The central steel shaft, consisting of lead sections, helical extensions, and plain extensions, shall be Type SS (Square Shaft) or RS (Round Shaft) or a combination of the two (SS to RS Combo Pile) as manufactured by CHANCE Civil Construction (Centralia and Independence, MO) or equal.

1. *SS5 1-1/2" Material*: Shall be hot rolled Round-Cornered-Square (RCS) solid steel bars meeting dimensional and workmanship requirements of ASTM A29. The bar shall be modified medium carbon steel grade (similar to AISI 1044) with improved strength due to fine grain size.
    a. Torque strength rating = 5,500 ft-lb
    b. Minimum yield strength = 70 ksi

2. *SS125 1-1/4"; SS1375 1-3/8"; SS150 1-1/2"; SS175 1-3/4; SS200 2"; SS225 2-1/4" Material*: Shall be hot rolled Round-Cornered-Square (RCS) solid steel bars meeting the dimensional and workmanship requirements of ASTM A29. The bar shall be High Strength Low Alloy (HSLA), low to medium carbon steel grade with improved strength due to fine grain size.

    a. Torque strength rating: SS125 = 4,000 ft-lb; SS1375 = 5,500 ft-lb; SS150 = 7,000 ft-lb; SS175 = 11,000 ft-lb; SS200 = 16,000 ft-lb; SS225 = 23,000 ft-lb

    b. Minimum yield strength = 90 ksi

3. *Type RS2875 2-7/8" OD Material*: Structural steel tube or pipe, welded or seamless, in compliance with ASTM A500 or A513. Wall thickness is 0.165", 0.203" or 0.262".

    a. Torque strength rating: RS2875.165 = 4,500 ft-lb; RS2875.203 = 5,500 ft-lb; RS2875.262 = 7,500 ft-lb.

    b. Minimum yield strength = 50 ksi

4. *Type RS3500 3-1/2" OD Material*: Shall be structural steel tube or pipe, seamless or straight-seam welded, per ASTM A53, A252, ASTM A500, or ASTM A618. Wall thickness is 0.300" (schedule 80).

    a. Torque strength rating = 13,000 ft-lb

    b. Minimum yield strength = 50 ksi

5. *Type RS4500 4-1/2" OD Material*: Shall be structural steel tube or pipe, seamless or straight-seam welded, per ASTM A500 or A513. Wall thickness is 0.337" (schedule 80).

    a. Torque strength rating = 23,000 ft-lb

    b. Minimum yield strength = 50 ksi

6. *SS to RS2875 Combo Pile Material*: Shall be Type SS and RS2875 material as described above with a welded adapter for the transition from SS to RS2875.

7. *SS to RS3500 Combo Pile Material*: Shall be Type SS and RS3500 material as described above with a welded adapter for the transition from SS to RS3500.

8. *SS to RS4500 Combo Pile Material*: Shall be Type SS and RS4500 material as described above with a welded adapter for the transition from SS to RS4500.

4.02 HELIX BEARING PLATE:

A. Shall be hot rolled carbon steel sheet, strip, or plate formed on matching metal dies to true helical shape and uniform pitch. Bearing plate material shall conform to the following ASTM specifications.

1. *SS5 Material*: Per ASTM A572, or A1018, or A656 with minimum yield strength of 50 ksi. Plate thickness is 3/8".

2. *SS125 and SS1375 Material*: Per ASTM A572 with minimum yield strength of 50 ksi. Plate thickness is 3/8" or ½".

3. *SS150 and SS175 Material*: Per ASTM A656 or A1018 with minimum yield strength of 80 ksi. Plate thickness is 3/8" or ½".

4. *SS200 and SS225 Material*: Per ASTM A656 or A1018 with minimum yield strength of 80 ksi. Plate thickness is ½".

5. *RS2875 Material*: Per ASTM A36, or A572, with minimum yield strength of 36 ksi. Plate thickness is 3/8" or ½".
6. *RS3500 Material*: Per ASTM A36, or A572, or A1018, or A656 depending on helix diameter, per the minimum yield strength requirements cited above. Plate thickness is 3/8" or ½".
7. *RS4500 Material*: Per ASTM A572 with minimum yield strength of 50 ksi. Plate thickness is ½".

4.03 BOLTS:

A. The size and type of bolts used to connect the central steel shaft sections together shall conform to the following ASTM specifications.

1. *SS125 1-1/4" Material*: 5/8" diameter bolt (2 per coupling) per SAE J429 Grade 8.
2. *SS1375 1-3/8" Material*: ¾" diameter bolt (2 per coupling) per SAE J429 Grade 8.
3. *SS5 and SS150 1-1/2" Material*: ¾" diameter bolt per ASTM A320 Grade L7 or ASTM A325.
4. *SS175 1-3/4" Material*: 7/8" diameter bolt per ASTM A193 Grade B7.
5. *SS200 2" Material*: 1-1/8" diameter bolt per ASTM A193 Grade B7.
6. *SS225 2-1/4" Material*: 1-1/4" diameter bolt per ASTM A193 Grade B7.
7. *RS2875 2-7/8" OD Material*: ¾" diameter bolts (2 or 4 per coupling) per SAE J429 Grade 5 or 8.
8. *RS3500 3-1/2" OD Material*: ¾" diameter bolts (3 or 4 per coupling) per SAE J429 Grade 5 or 8.
9. *RS4500 4-1/2" OD Material*: ¾" diameter bolts (4 per coupling) per SAE J429 Grade 8.

4.04 COUPLINGS

A. For type SS5, SS150, SS175, SS200, and SS225 material, the coupling shall be formed as an integral part of the plain and helical extension material as hot upset forged sockets. For Type SS125 and SS1375 material, the coupling shall be a cast steel sleeve with two holes for connecting shaft sections together.

B. For Type RS2875, RS3500, and RS4500 material, the couplings shall either be formed as an integral part of the plain and helical extension material as hot forge expanded sockets, or as internal sleeve wrought steel connectors. The steel connectors can be either tubing or solid steel bar with holes for connecting shaft sections together.

4.05 PLATES, SHAPES, OR PILE CAPS:

A. Depending on the application, the pile cap shall be a welded assembly consisting of structural steel plates and shapes designed to fit the pile and transfer the applied load. Structural steel plates and shapes for HELICAL PILE top attachments shall conform to ASTM A36 or ASTM A572 Grade 50.

4.06 CORROSION PROTECTION (OPTIONAL):

A. Epoxy Coating: If used, the thickness of coating applied electrostatically to the central steel shaft shall be 7-12 mils. Epoxy coating shall be in accordance with ASTM A775. Bend test requirements are not required. Coupling bolts and nuts are not required to be epoxy coated.

B. Galvanization: If used, all Hubbell Power Systems, Inc./A. B. Chance Type SS material or equal shall be hot-dipped galvanized in accordance with ASTM A153 after fabrication. All Hubbell Power Systems, Inc./A. B. Chance Type RS material or equal shall be hot-dipped galvanized in accordance with ASTM A153 or A123 as specified after fabrication.

PART 5 EXECUTION

5.01 SITE CONDITIONS

A. Prior to commencing Helical Pile installation, the Contractor shall inspect the work of all other trades and verify that all said work is completed to the point where Helical Piles may commence without restriction.

B. The Contractor shall verify that all Helical Piles may be installed in accordance with all pertinent codes and regulations regarding such items as underground obstructions, right-of-way limitations, utilities, etc.

C. In the event of a discrepancy, the Contractor shall notify the Owner. The Contractor shall not proceed with Helical Pile installation in areas of discrepancies until said discrepancies have been resolved. All costs associated with unresolved discrepancies shall be the responsibility of the Owner.

5.02 INSTALLATION EQUIPMENT

A. Shall be rotary type, hydraulic power driven torque motor with clockwise and counter-clockwise rotation capabilities. The torque motor shall be capable of continuous adjustment to revolutions per minute (RPM's) during installation. Percussion drilling equipment shall not be permitted. The torque motor shall have torque capacity 15% greater than the torsional strength rating of the central steel shaft to be installed.

B. Equipment shall be capable of applying adequate down pressure (crowd) and torque simultaneously to suit project soil conditions and load requirements. The equipment shall be capable of continuous position adjustment to maintain proper Helical Pile alignment.

5.03 INSTALLTION TOOLING

A. Shall consist of a Kelly Bar Adapter (KBA) and Type SS or RS drive tools as manufactured by CHANCE Civil Construction or equal and used in accordance with the manufacturers written installation instructions.

B. A torque indicator shall be used during Helical Pile installation. The torque indicator can be an integral part of the installation equipment or externally mounted in-line with the installation tooling.

1. Shall be capable of providing continuous measurement of applied torque throughout the installation.
2. Shall be capable of torque measurements in increments of at least 500 ft-lb
3. Shall be calibrated prior to pre-production testing or start of work. Torque indicators which are an integral part of the installation equipment, shall be calibrated on-site. Torque indicators which are mounted in-line with the installation tooling, shall be calibrated either on-site or at an appropriately equipped test facility. Indicators that measure torque as a function of hydraulic pressure shall be calibrated at normal operating temperatures.
4. Shall be re-calibrated, if in the opinion of the Owner and/or Contractor reasonable doubt exists as to the accuracy of the torque measurements.

5.04 INSTALLATION PROCEDURES

A. Central Steel Shaft: (Lead and Extension Sections)

1. The Helical Pile installation technique shall be such that it is consistent with the geotechnical, logistical, environmental, and load carrying conditions of the project.

2. The lead section shall be positioned at the location as shown on the working drawings. Battered Helical Piles can be positioned perpendicular to the ground to assist in initial advancement into the soil before the required batter angle shall be established. The Helical Pile sections shall be engaged and advanced into the soil in a smooth, continuous manner at a rate of rotation of 5 to 20 RPM's. Extension sections shall be provided to obtain the required minimum overall length and installation torque as shown on the working drawings. Connect sections together using coupling bolt(s) and nut torqued to 40 ft-lb.

3. Sufficient down pressure shall be applied to uniformly advance the Helical Pile sections approximately 3 inches per revolution. The rate of rotation and magnitude of down pressure shall be adjusted for different soil conditions and depths.

5.05 TERMINATION CRITERIA

A. The torque as measured during the installation shall not exceed the torsional strength rating of the central steel shaft.

B. The minimum installation torque and minimum overall length criteria as shown on the working drawings shall be satisfied prior to terminating the Helical Pile installation.

C. If the torsional strength rating of the central steel shaft and/or installation equipment has been reached prior to achieving the minimum overall length required, the Contractor shall have the following options:

1. Terminate the installation at the depth obtained subject to the review and acceptance of the Owner, or:

2. Remove the existing Helical Pile and install a new one with fewer and/or smaller diameter helix plates. The new helix configuration shall be subject to review and acceptance of the Owner. If re-installing in the same location, the top-most helix of the new Helical Pile shall be terminated at least (3) three feet beyond the terminating depth of the original Helical Pile.

D. If the minimum installation torque as shown on the working drawings is not achieved at the minimum overall length, and there is no maximum length constraint, the Contractor shall have the following options:

1. Install the Helical Pile deeper using additional extension sections, or:

2. Remove the existing Helical Pile and install a new one with additional and/or larger diameter helix plates. The new helix configuration shall be subject to review and acceptance of the Owner. If re-installing in the same location, the top-most helix of the new Helical Pile shall be terminated at least (3) three feet beyond the terminating depth of the original Helical Pile.

3. De-rate the load capacity of the Helical Pile and install additional Helical Pile(s). The de-rated capacity and additional Helical Pile location shall be subject to the review and acceptance of the Owner.

E. If the Helical Pile is refused or deflected by a subsurface obstruction, the installation shall be terminated and the pile removed. The obstruction shall be removed, if feasible, and the Helical Pile re-installed. If the obstruction can't be removed, the Helical Pile shall be installed at an adjacent location, subject to review and acceptance of the Owner.

F. If the torsional strength rating of the central steel shaft and/or installation equipment has been reached prior to proper positioning of the last plain extension section relative to the final elevation, the Contractor may remove the last plain extension and replace it with a shorter length extension. If it is not feasible to remove the last plain extension, the Contractor may cut said extension shaft to the correct elevation. The Contractor shall not reverse (back-out) the Helical Pile to facilitate extension removal.

G. The average torque for the last three feet of penetration shall be used as the basis of comparison with the minimum installation torque as shown on the working drawings. The average torque shall be defined as the average of the last three readings recorded at one-foot intervals.

END OF SECTION

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SECTION 32 11 23

AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Aggregate subbase.
2. Aggregate base course.

B. Related Sections:

1. Section 31 23 17 - Trenching: Compacted fill under base course.
2. Section 32 12 16 - Asphalt Paving: Binder and finish asphalt courses.

1.02 REFERENCES

A. ASTM International:

1. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
2. ASTM D2940 - Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports.
3. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.03 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Materials Source: Submit name of imported materials suppliers and Test Data.

1.04 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout the Work.

B. Perform Work in accordance with Caltrans Standard Plans.

PART 2 PRODUCTS

2.01 AGGREGATE MATERIALS

A. Aggregates for Earthwork: As specified in Section 31 05 16.

PART 3 EXECUTION

3.01 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify compacted substrate is dry and ready to support paving and imposed loads.

1. Proof roll substrate with fully loaded 10 cu yd. dump truck in minimum two perpendicular passes to identify soft spots.
2. Remove soft substrate and replace with compacted fill

C. Verify substrate has been inspected, gradients and elevations are correct.

3.02 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place fill on soft or muddy surfaces.

3.03 AGGREGATE PLACEMENT

A. Spread aggregate over prepared substrate to total compacted thickness of minimum 6 inches as indicated on Drawings.

B. Roller compact aggregate to 95 percent maximum density per ASTM D698.

C. Level and contour surfaces to elevations, profiles, and gradients indicated.

D. Add small quantities of fine aggregate to coarse aggregate when required to assist compaction.

E. Maintain optimum moisture content of fill materials to attain specified compaction density.

F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Elevation: 1/4 inch measured with 10-foot straight edge.

3.05 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Perform in place compaction tests in accordance with the following:

1. Density Tests: ASTM D1556 or ASTM D6938.
2. Moisture Tests: ASTM D6938.

C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

D. Frequency of Tests: One test for every 1000 square feet of each layer compacted aggregate.

3.06 COMPACTION

A. Compact materials to 95 percent of maximum density.

END OF SECTION

SECTION 32 12 16

HOT MIX ASPHALT PAVEMENT AND OVERLAYS

PART 1 GENERAL

1.01 DESCRIPTION

A. This section covers all material, equipment and labor required to construct hot mix asphalt pavement, including, but not limited to, placement of hot mix asphalt paving, and tack coat.

B. Note: Aggregate base placed for street reconstruction is not covered in this section. Refer to Section 39-1.09B, “Subgrade” of the Caltrans Standard Specifications, and Section 31 23 16 - “Excavation” of these specifications for aggregate base roadbed specifications and additional requirements.

1.02 QUALITY ASSURANCE

A. All materials shall conform to the applicable sections of the Caltrans Standard Specifications unless otherwise specified in these Specifications or on the Plans. In addition, all materials testing performed to provide quality assurance shall be performed in accordance with Section 01 40 00 Quality Requirements of these specifications.

1.03 SUBMITTALS

A. Submittals shall include, but not be limited to, the following items:

1. Job mix formula per Caltrans Standard Specifications Section 39-1.03C for all hot mix asphalt material being used on the project.

2. Load slips for all material delivery trucks shall be delivered to the job site with the truck. The Contractor shall retain all load slips, and shall make them available to the Engineer upon request.

PART 2 PRODUCTS

2.01 TYPE “A” HOT MIX ASPHALT

A. Type “A” hot mix asphalt shall conform to the requirements for Type “A” hot mix asphalt with 1/2-inch HMA Type grading as specified in Section 39, “Hot Mix Asphalt” of the Caltrans Standard Specifications.

B. Asphalt binder for Type “A” hot mix asphalt shall be PG 64-16, as specified in Section 92, “Asphalts” of the Caltrans Standard Specifications. The amount of asphalt binder shall be determined by California Test 367 and provide a mix in conformance with Section 39-1.03B and approved by the Engineer.

2.02 OPEN GRADED FRICTION COURSE

A. Open graded friction course (OGFC), when specified, shall conform to the provisions of Section 39, “Hot Mix Asphalt” of the Caltrans Standard Specifications. Aggregate for OGFC shall conform to Section 39-1.02E OGFC table per the size shown on the plans.

B. Asphalt binder used for Open Graded hot mix asphalt pavement shall be PG 64-16 as specified in Section 92: “Asphalts” of the Caltrans Standard Specifications. The optimum amount of asphalt binder shall be determined by California Test 368 and approved by the Engineer.

2.03 PRIME COAT

A. Prime coat on aggregate base course will not be required.

2.04 TACK COAT

A. Paint binder (tack coat) shall be applied in one application at a rate of from 0.02-gallon to 0.10-gallon per square yard of surface covered. Tack coat shall conform with, and applied in conformance with Section 94, “Asphaltic Emulsions” of the Caltrans Standard Specifications. Tack Coat shall be type SS1 or RS1, and shall be applied to all vertical surfaces of existing pavement, curbs, gutters and construction joints.

2.05 SEAL COAT

A. No seal coat will be required.

2.06 PAVEMENT REINFORCING FABRIC

A. Pavement reinforcing fabric, if required, shall conform to Section 88-1.02J, “Paving Fabric” of the Caltrans Standard Specifications.

2.07 AGGREGATE BASE and SUBBASE

A. Aggregate base shall be Class 2 aggregate base and shall conform to the provisions in Section 26 “Aggregate Bases” of the Caltrans Standard Specifications and in addition the aggregate shall have at least 50% crushed coarse particles with at least one fractured face using Caltrans Test Method 205.

B. Aggregate for Class 2 aggregate base shall be free from organic matter and other deleterious substances and shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base.

PART 3 EXECUTION

3.01 PAVEMENT REMOVAL

A. Pavement Grinding

1. Pavement grinding, when required, shall be performed in accordance with the requirements of Section 42-3, “Grinding,” of the Caltrans Standard Specifications, as specified in these Special Provisions, and as directed by the Engineer.

2. The Contractor shall exercise care to avoid damaging existing concrete curbs and drainage facilities during all grinding operations. Damage to existing improvements shall be repaired at the Engineer’s direction, and at the sole expense of the Contractor.

3. Prior to conducting grinding operations, the Contractor shall remove all weeds and dirt in the gutters and in cracks in the existing pavement surface to the satisfaction of the Engineer. The Contractor will not be permitted to use herbicides, and the method of weed removal shall be subject to the approval of the Engineer.

4. The Contractor shall completely remove all existing raised reflective markers from the street areas being ground.

5. The street shall be swept throughout the course of the grinding operations and shall be left thoroughly clean and clear of all grindings at the end of each working day. The Contractor shall exercise care to avoid spilling grindings into drainage

inlets and cross-corner or cross-street culverts, and shall promptly clean out any grindings that do spill into inlets or culverts.

6. Prior to initiation of grinding operations, the Contractor shall lower all traffic boxes and manhole lids and frames within the limits of the work.

7. Abrupt edges shall not be left in place when traffic is allowed back into the grinding area. Where abrupt edges exist (mid-block or on cross streets or alleys), or where directed by the Engineer, the Contractor shall build a transition ramp no shorter than 25 feet long that spans the entire length or width of the abrupt edge, lifting traffic out of the ground area and onto the surrounding pavement.

8. All A.C. grindings shall be disposed of by the Contractor.

B. Pavement Sawcutting

1. General

a. Pavement sawcutting shall be performed with a wheel roller, pneumatic pavement cutter, or other sawcutting equipment approved by the Engineer. Depending upon the nature of the work, the sawcutting may be divided into two parts - initial sawcutting and final sawcutting

2. Initial Sawcutting

a. All initial pavement sawcutting shall be to the full width required for the excavation, and to the full depth of the pavement, regardless of depth. All pavement material inside the sawcut limits shall be completely removed.

b. Initial pavement sawcuts shall be straight and shall provide clean, solid, vertical faces free from loose or cracked material. All damaged or disturbed adjoining pavement shall be sawcut and removed.

3. Final Sawcutting

a. Final sawcutting shall only be required where “T”-section trenches are shown on the Plans.

b. All final sawcutting shall be made 6 inches wider on all sides than the width of the excavation, to the full depth of the pavement, regardless of depth, and after excavations have been backfilled. All pavement material inside the sawcut limits shall be completely removed. Final sawcutting shall be performed on all cross-street and cross-corner culverts, curbs, gutters, sidewalks, driveways, as shown on the Plans, and as directed by the Engineer.

c. Final pavement sawcuts shall be straight and shall provide clean, solid, vertical faces free from loose or cracked material. All damaged or disturbed adjoining pavement shall be sawcut and removed. When possible, sawcuts shall be either parallel or perpendicular to the roadway centerline.

d. The number of jogs in the sawcut lines shall be held to minimum and shall be subject to approval by the Engineer. The Contractor may be required to remove additional undisturbed pavement if, in the opinion of the Engineer, the lines are too erratic or contain too many jogs.

3.02 PERMANENT PAVEMENT CONSTRUCTION

A. The production, hauling, placing, compacting, and finishing of hot mix asphalt shall conform to Section 39, “Hot Mix Asphalt” of the Caltrans Standard Specifications.

1. Subgrade Preparation

    a. Subgrade shall be prepared in accordance with Section 39-1.09, “Subgrade, Tack Coat, and Geosynthetic Pavement Interlayer” of the Caltrans Standard Specifications and Section 31 23 17 Trenching of these specifications.

2. Roadway Base Placement

    a. Roadway base shall be placed and compacted in accordance with Section 26, “Aggregate Bases” of the Caltrans Standard Specifications and Section 32 11 23 Aggregate Base Courses of these specifications.

3. Tack Coat

    a. Prior to placing tack coat on existing pavement surfaces, the existing surface shall be swept clean of all dirt and dust.

    b. Tack coat (paint binder) shall be applied to all surfaces against which new hot mix asphalt pavement is to be placed in accordance with Section 39-1.09, “Subgrade, Tack Coat, and Geosynthetic Pavement Interlayer” of the Caltrans Standard Specifications. When being applied for paving fabric installation, tack coat shall extend 3 inches beyond the width of the paving fabric on all sides.

4. Pavement Reinforcing Fabric

    a. Pavement reinforcing fabric, when specified, shall be installed immediately after the tack coat is applied, in accordance with Section 39-1.09, “Subgrade, Tack Coat, and Geosynthetic Pavement Layer” of the Caltrans Standard Specifications. The fabric shall be aligned and placed with no wrinkles that lap. Adjacent borders of the fabric shall be lapped 2 to 4 inches.

    b. Seating of the fabric with rolling equipment after placement will be permitted. Turning of material trucks and the paving machine shall be kept to a minimum to avoid pulling the fabric away from the tack coat.

5. Hot Mix Asphalt Placement

    a. All hot mix asphalt shall be installed in accordance with Section 39, “Hot Mix Asphalt” of the Caltrans Standard Specifications. Unless lower temperatures are approved by the Engineer, all mixtures (except OGFC) shall be spread, and the first coverage of initial and breakdown compaction performed, when the temperature is not less than 250°F (120°C), and all breakdown compaction shall be completed before the temperature of the mixture drops below 200°F (95°C). Type “A” hot mix asphalt shall be placed only when the atmospheric temperature is above 50°F (10°C). Failure to meet temperature restrictions is grounds for rejection of the work by the Engineer.

    b. OGFC shall be spread at a temperature of not less than 200°F (95°C) and not more than 250°F(120°C), measured in the hopper of the paving machine. OGFC shall be placed only when the atmospheric temperature is above 50°F (10°C). Failure to meet temperature restrictions is grounds for rejection of the work by the Engineer.

    c. When spreading hot mix asphalt, the maximum screed width of any one pass shall be as directed by the Engineer. Compaction shall conform to Section 39-3, “Method Construction Process” of the Caltrans Standard Specifications.

d. The completed surface shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities. Any ridges, indentations or other objectionable marks left in the surface of the hot mix asphalt by rollers, rakes, or other equipment shall be eliminated immediately.

6. Surface Tolerance

a. The finished surface of all permanent hot mix asphalt and OGFC shall conform to Section 39-1.12, “Smoothness” of the Caltrans Standard Specifications.

END OF SECTION

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SECTION 33 11 16

SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Valves.
3. Backflow preventers.
4. Underground pipe markers.
5. Bedding and cover materials.

B. Related Requirements:

1. Section 03 30 00 - Cast-In-Place Concrete: Concrete for thrust restraints.
2. Section 31 05 16 - Aggregates for Earthwork: Aggregate for backfill in trenches.
3. Section 31 23 16 - Excavation: Product and execution requirements for excavation and backfill required by this section.
4. Section 31 23 17 - Trenching: Execution requirements for trenching required by this section.
5. Section 33 14 19 – Valves
6. Section 33 14 20 – Rubber Expansion Joints

1.02 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 10-lb Rammer and a 18-in. Drop.

B. American Society of Sanitary Engineering:

1. ASSE 1012 - Backflow Preventer with Intermediate Atmospheric Vent.
2. ASSE 1013 - Reduced Pressure Principle Backflow Preventers.

C. ASTM International:

1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
2. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
3. ASTM C858 - Standard Specification for Underground Precast Concrete Utility Structures.
4. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
5. ASTM D1785 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
6. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

7. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
10. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

D. American Society of Mechanical Engineers:

1. ASME B16 – Standards of Pipes and Fittings

E. American Welding Society:

1. AWS A5.8/A5.8M – Specification for Filler Metals for Brazing and Braze Welding.

F. American Water Works Association:

1. AWWA C200 – Steel Water Pipe 6 In. and Larger.
2. AWWA C205 – Cement Mortar Protective Lining and Coating for Steel Water Pipe – 4 In. and Larger.
3. ANSI/AWWA C206 – AWWA Standard for Field Welding of Steel Water Pipe.
4. ANSI/AWWA C207 – Standard for Steel Pipe Flanges for Waterworks Service – Sizes 4 In. Through 144 In.
5. ANSI/AWWA C213 - Fusion - Bonded Epoxy Coating for the Interior and Exterior of Steel Waterlines.
6. ANSI/AWWA C208 – Dimensions for Fabricated Steel Water Pipe Fittings
7. ANSI/AWWA C303 – Concrete Pressure Pipe, Bar-Wrapped, Steel-Cylinder Type.
8. AWWA C508 - Swing-Check Valves for Waterworks Service, 2 in. (50 mm) Through 24 in. (600 mm) NPS.
9. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water Distribution.
10. AWWA M9 – Concrete
11. AWWA M11 – Steel Pipe – A Guide for Design and Installation

G. Underwriters Laboratories Inc.:

1. UL 246 - Hydrants for Fire - Protection Service.

1.03 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate piping layout, fittings, surface preparation, welding plan, and surface coating (mortar or paint) at all steel cylinder pipe connections.

C. Product Data: Submit data on pipe materials, fittings, and accessories.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

E. Manufacturer’s Recommendation: Submit four copies of Manufacturer’s current recommended Method of Installation.

F. Submit detailed written procedures outlining the methods, tools, and protective equipment to be used and required training and certifications (if any) for all work associated with asbestos cement pipe.

G. Pressure Testing Plan.

H. Disinfection and Chlorinated Water Disposal Plan.

I. Connection Transfer Plan and Schedule for all connections and final tie-ins.

1.04 CLOSEOUT SUBMITTALS

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

B. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.05 QUALITY ASSURANCE

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Perform Work in accordance with California Waterworks Standards.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Deliver and store valves in shipping containers with labeling in place.

PART 2 PRODUCTS

2.01 WATER PIPING

A. Copper Tubing: ASTM B88, Type K, annealed:

1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.

2. Joints: Compression connection or AWS A5.8, BCuP silver braze.

B. PVC Pipe: Schedule 40, SDR-26 for 160 psig pressure rating:

1. Fittings: ASTM D2466, PVC.

2. Joints: ASTM D2855, solvent weld.

C. PVC Pipe: AWWA C900 Class 125:

1. Fittings: AWWA C111, cast iron.

2. Joints: ASTM D3139 compression gasket ring.

D. Steel Pipe: AWWA C200 Fabricated and Mill Pipe, minimum wall thickness **0.375 inches** for pipe diameters up to **8 inches**

1. Flanges: AWWA C207 **Class D** slip-on.

2. Field Welding Materials:

a. Pipe: AWWA C206.

b. Joints: AWWA C205.

3. Interior Cement Mortar Lining: AWWA C205.

E. Steel Fittings and Special Sections: AWWA C208.

F. Cement Mortar Lined and Coated Steel Pipe (CMLCS): AWWA C303

1. Mortar: AWWA C303. Bar-Wrapped, Steel Cylinder Type, shop applied, provided that cement for mortar lining shall be ASTM C150, Type II Low Alkali and mortar lining shall be ASTM C150.

2. Steel for Cylinder and Fittings: Pipe manufactured under AWWA C303 shall require minimum yield strength of 36,000 psi for the steel cylinder.

3. Exterior of Coating of Pipe: All pipe for buried service shall be coated with a minimum thickness of cement-mortar coating per AWWA C303.

G. Cement Mortar Lined Fittings: AWWA C208. AWWA M9 and M11.

H. Cement Mortar Lined Joint Design: The standard field joint shall be as shown on the drawings.

1. Ends of mechanically coupled field joints shall conform to Section 4.13.5 of AWWA C200.

2. End fitted with butt straps for field welded joints shall conform to Section 4.13.5 of AWWA C200.

3. Ends of the lap-welded slip type for field welded joints shall conform to Section 4.13.2 of AWWA Standard C200.

4. Plain end fitted with flanges shall conform to AWWA C200 Section 4.13.7 and AWWA C207

2.02 BALL VALVES

A. 2 inches and Smaller: Brass body, teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, IPS inlet end, IPS outlet.

2.03 SWING CHECK VALVES

A. 2 inches to 24 inches: AWWA C508, iron body, bronze trim, renewable disc and seat, flanged ends per California Waterworks Standards.

2.04 BACKFLOW PREVENTERS

A. Furnish materials in accordance with California Waterworks Standards.

B. Reduced Pressure Backflow Preventers:

1. Comply with ASSE 1013.

2. Bronze body, with bronze internal parts and stainless steel springs.

3. Two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve opening under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.05 UNDERGROUND PIPE MARKERS

A. Plastic Ribbon Tape: Bright colored, continuously printed, minimum 4 inches wide by 4 mil thick, manufactured for direct burial service.

B. Tracer Wire: Electronic detection materials for non-conductive piping products.

1. Unshielded 10 gage THWN insulated copper wire.

2. Conductive tape.

2.06 BEDDING AND COVER MATERIALS

A. Bedding: Fine Aggregate as specified in Section 31 05 16.

B. Soil Backfill from Above Pipe to Finish Grade: Soil Type Select Fill

2.07 ACCESSORIES

A. Concrete for Thrust Restraints: Concrete type specified in Section 03 30 00.

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Verify building service connection and municipal utility water main size, location, and invert are as indicated on Drawings.

3.02 PREPARATION

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

B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare pipe connections to equipment with flanges or unions.

3.03 BEDDING

A. Excavate pipe trench in accordance with Section 31 23 17 for Work of this Section.

B. Form and place concrete for pipe thrust restraints at change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide thrust restraint bearing on subsoil per drawings.

C. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches depth.

D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact to 95 percent.

E. Maintain optimum moisture content of fill material to attain required compaction density.

3.04 INSTALLATION – GENERAL PIPE

A. Group piping with other site piping work whenever practical.

B. Install pipe to indicated elevation to within tolerance of 5/8 inch.

C. Install ductile iron fittings to AWWA C600.

D. Route pipe in straight line.

E. Install pipe to allow for expansion and contraction without stressing pipe or joints.

F. Install access fittings to permit disinfection of water system.

G. Form and place concrete for thrust restraints at each elbow or change of direction of pipe main.

H. Establish elevations of buried piping with not less than 3 ft of cover.

I. Install plastic ribbon tape continuous buried 12 inches below finish grade, above pipeline.

J. Install trace wire continuous over top of pipe, above pipeline.

3.05 INSTALLATION SPECIFIC TO CEMENT MORTAR LINED PIPE JOINTS:

A. Field Welded Joints shall be in accordance with AWWA C206.

A. Where exterior welds are performed, adequate space shall be provided for welding and inspection of the joints. Butt straps shall be as required or as indicated.

B. Butt Strap Joint: The pipe ends shall be cut on joints where but straps are used for realignment, adjustment, or deflection and fillet welds shall be made as indicated.

C. Repair of Welds: All defective welds shall be repaired by the Contractor to meet the requirements of the applicable section of these specifications at no additional cost to the Owner. Defective welds shall be removed, and that section of the joint shall then be rewelded. Only sufficient removal of defective material that is necessary to correct the defect is required. After the repair is made, the joint shall be checked by repeating the original test procedure. Welds deficient in size shall be corrected by adding weld metal.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Flush and disinfect system in accordance with California Waterworks Standards.

3.07 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for inspecting, testing.

B. Perform pressure test on domestic site water distribution system in accordance with AWWA C600.

C. Compaction Testing for Bedding: In accordance with ASTM D698. ASTM D2922. ASTM D3017.

D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

E. Frequency of Compaction Tests: One test for each 12 inches of fill in each 100 feet of trench.

END OF SECTION

SECTION 33 13 00

DISINFECTING OF WATER UTILITY DISTRIBUTION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes disinfection of potable water distribution system; and testing and reporting results.

B. Related Sections:

1. Section 33 11 16 – Site Water Utility Distribution Piping

1.02 REFERENCES

A. American Water Works Association:

1. AWWA B300 - Hypochlorites.
2. AWWA B301 - Liquid Chlorine.
3. AWWA B302 - Ammonium Sulfate.
4. AWWA B303 - Sodium Chlorite.
5. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
6. AWWA C651 - Disinfecting Water Mains.

B. California Waterworks Standards

C. Water Pollution Control Federation and other applicable standard methods for the Examination of Water and Wastewater.

1.03 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures.

B. Name and experience of competent person(s) responsible for the disinfection process and performing the required bacteriological sampling. Engineer shall approve in advance.

C. Product Data: Submit procedures, proposed chemicals, and treatment levels for review.

D. Test Reports: Indicate results comparative to specified requirements.

E. Certified results for all bacterial sampling prior to restoring or placing the distribution system into service.

F. Contractor shall submit a Disinfection Plan and Schedule for approval by the Engineer a minimum of fourteen (14) calendar days in advance of the planned performance of the Work. Plan shall detail proposed disinfection procedures including injection and sampling points, proposed chemical and amounts, proposed hold time, proposed sectioning of the system, proposed water disposal and de-chlorination procedure.

1.04 CLOSEOUT SUBMITTALS

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

B. Disinfection Report:

1. Type and form of disinfectant used.
2. Date and time of disinfectant injection start and time of completion.

3. Test locations.
4. Name of person collecting samples.
5. Initial and 24 hour disinfectant residuals in treated water in ppm for each outlet tested.
6. Date and time of flushing start and completion.
7. Disinfectant residual after flushing in ppm for each outlet tested.

C. Bacteriological Report:

1. Date issued, project name, and testing laboratory name, address, and telephone number.
2. Time and date of water sample collection.
3. Name of person collecting samples.
4. Test locations.
5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
6. Coliform bacteria test results for each outlet tested.
7. Certify water conforms, or fails to conform, to bacterial standards of California Department of Public Health.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with AWWA C651.

1.06 QUALIFICATIONS

A. Testing Firm: Company specializing in testing potable water systems, certified by State of California.

B. The competent person(s) responsible for disinfection processes and bacteriological testing shall be familiar with AWWA C651.

C. The Engineer shall approve Disinfection Plan and Schedule prior to implementation.

D. Submit bacteriologist's signature and authority associated with testing.

E. The Engineer shall observe disinfection and bacteriological sampling procedures.

PART 2 PRODUCTS

2.01 DISINFECTION CHEMICALS

A. Chemicals: AWWA B300, Hypochlorite, AWWA B301, Liquid Chlorine, AWWA B302, Ammonium Sulfate, and AWWA B303, Sodium Chlorite.

B. Safety Data Sheets (SDS) of any chemicals used shall be available on site.

C. Competent person(s) responsible for the disinfection process shall be fully trained in the first aid requirements and procedures to address exposure to chemicals.

PART 3 EXECUTION

3.01 EXAMINATION

A. Section 01 30 00 - Administrative Requirements.

B. Verification of existing conditions before starting work.

C. Verify piping system has been cleaned, inspected, and pressure tested.

D. Perform scheduling and disinfecting activity with start-up, water pressure testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

3.02 DISINFECTION

A. Before being placed into service, all new water pipelines shall be chlorinated using the Continuous Feed Method specified in AWWA C651. The Engineer shall approve the procedure in advance.

1. The Contractor will determine the location of the chlorination and sampling points in the field. The Contractor shall install taps for chlorinating, sampling and expulsion of air and shall uncover, backfill and plug the taps as required.

2. Prior to disinfecting the water main, the main shall be completely filled to remove all air pockets and then flushed to remove particulate. The flushing velocity in the main shall not be less than 2.5 feet per second unless the Engineer and/or Owner determine that the conditions do not permit the required flow to be discharged to waste.

3. Required Flow to Flush Pipelines (40 PSI Residual Pressure in Water Main) shall be per AWWA C651, AWWA Standard for Disinfecting Water Mains

4. At a point not more than 10 feet downstream from the beginning of the new main, water entering a new main shall receive a dose of chlorine fed at a constant rate such that the water will not have less than 25 mg/L (PPM) free chlorine throughout the entire section of pipe to be chlorinated.

5. Chlorine Required to Produce 25-mg/L Concentration in 100 Feet of Pipe-by Diameter shall be per AWWA C651, AWWA Standard for Disinfecting Water Mains.

6. The chlorinated water is to remain in the new pipeline for at least 24-hours. After a contact time of 24-hours there should be a free chlorine concentration of not less than 10 mg/L (PPM). During this period, proper precautions are to be taken to prevent this chlorinated water from flowing back into the existing system.

7. All valves and hydrants within the treated section shall be operated to ensure disinfection of the appurtenances.

B. The Tablet Method consisting of placing calcium hypochlorite granules or tablets in the water main as it is being installed and then filling the main with potable water and allowing it to set for a contact period is not acceptable.

C. The interior of all pipe, fittings, and valves used in making a repair or tie-in shall be swabbed or sprayed with a one percent (1%) hypochlorite solution before they are installed.

3.03 FINAL FLUSHING

A. Following the chlorination period, all treated water shall be flushed from the lines at their extremities and replaced with water from the distribution system.

1. Flushing the main is to be accomplished at as high a velocity as possible consistent with the ability of the Contractor to collect the discharge water for proper disposal.

2. All treated water flushed from the lines shall be disposed of by discharging to the nearest sanitary sewer or by other approved means provide in AWWA C651.

3. Flushing shall be done in strict conformance with all applicable local, state, and federal regulations. No discharge to any storm sewer or natural watercourse will be allowed.

B. The discharge of chlorinated water will be harmful to vegetation and wildlife. Measures must be taken to impound the highly chlorinated water or to neutralize the chlorine prior to discharge of the water.

C. Federal, state and local environmental regulations may require special provisions or permits prior to the disposal of chlorinated water.

D. Coordinate disposal of chlorinated water with the Owner. Legally dispose of chlorinated water in accordance with regulatory agency requirements.

E. Neutralize the chlorine residual of the water being disposed with one of the chemicals listed below:

1. Sodium Thiosulfate
2. Sodium Bisulite
3. Sodium Metabisulfite
4. Sodium Sulfite

3.04 BACTERIOLOGICAL ANALYSES

A. After the 24-hour disinfection period and all chlorine solution has been thoroughly flushed, the bacteriological sampling and analysis of the replacement water may then be performed.

1. Bacteriological sampling shall be made by the Contractor's competent person(s) in full accordance with AWWA C651 – Section 7, Bacteriological Tests and under the supervision of the Engineer.
2. Analysis shall be performed by an independent commercial laboratory certified by the State Department of Environmental Protection and US Environmental Protection Agency for analyzing public drinking water supplies. All results shall be provided to the Engineer for review.
3. Two consecutive sets of acceptable samples, taken at least 24-hours apart are required prior to placing the main into service. Failure of any one of the bacteriological test samples shall require re-chlorination and retesting by the Contractor.
4. The line shall not be placed in service until the bacteriological requirements of AWWA C651 are met.

3.05 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

END OF SECTION

SECTION 33 14 19

VALVES FOR WATER UTILITY SERVICE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Valves.

1.02 SUBMITTALS

A. Product Data: Manufacturer information regarding component materials, fittings, assembly and parts diagram, and accessories.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

C. Manufacturer Instructions: Installation requirements, including storage and handling procedures.

1.03 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of valves.

1.04 QUALITY ASSURANCE

A. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.

B. Cast manufacturer's name, pressure rating, and year of fabrication into valve body.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store materials according to manufacturer instructions.

B. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas and according to manufacturer instructions.

PART 2 PRODUCTS

2.01 GATE VALVES

1. Coatings:

a. Comply with AWWA C550.

b. Application: Interior and exterior.

B. Double-Disc Gate Valves:

1. Description:

a. Comply with AWWA C500.

b. Materials:

1) Body: Iron.

2) Trim: Bronze.

c. Seat Type: Double disc; parallel.

d. Stem:

1) Type: Non Rising

2) Seals: O-ring.

e. Operation:

1) Square operating nut.

2) Opening Direction: Counterclockwise.

C. Resilient-Wedge Gate Valves:

1. Description:

a. Comply with AWWA C509.

b. Body: Ductile iron

c. Seats: Resilient.

d. Stem:

1) Type: Non-rising.

e. Operation:

1) Square operating nut.

2) Opening Direction: Counterclockwise.

2.02 BUTTERFLY VALVE

A. Manufacturer: Butterfly valves, butterfly valve operators, and component parts as manufactured by one of the following:

1. Henry Pratt, Model:

a. 2FII Groundhog Butterfly 3" – 20"

b. Triton – 24" and larger

2. Mueller Company

3. Millikan Valve

4. Engineer pre-approved equivalent

5. Substitutions: Section 01 60 00 - Product Requirements

B. Performance requirements:

1. Isolation valve, which shall provide drip-tight shutoff to the full valve rating on the dead end or isolation service without a downstream flange.

2. Maximum Velocity: 16 ft/s.

3. Duty: Open/Close

4. Permanently self-lubricating body bushings shall be provided and shall be sized to withstand bearing loads. Stuffing box of liberal dimensions shall be provided at the operator end of the vane shaft. Packing shall be of the self compensating-type. A sealing element utilizing O-rings shall also be acceptable. Packing shall be held in place by a bolted corrosion resistant retainer plate or gland; retainer clips are not acceptable. Replacement of seals shall not require removal of the valve from the line.

C. Valve: AWWA C504; fusion bonded epoxy coated cast iron.

D. Resilient seat: Buna-N; molded in-body with integral shaft seal.

E. Ends & Body: flanged; Class 150B per ANSI B16.1 and short bodied.

F. Valve Discs:

1. ASTM A48, Class 40C, cast iron.
2. Seating Edge: 316 stainless steel.
3. Configuration: Offset to provide uninterrupted 360-degree sealing surface.

G. Disc Seating Edge:

1. 316 Stainless Steel

H. Valve Shaft and Disc Shaft Fasteners:

1. Material: 316 stainless steel (one piece for 3" – 20").
2. Seal: V-type packing; carbon graphite/braided carbon with externally adjustable packing gland; minimum of 4 rings.

I. Rubber seats:

1. Installed in valve body only. No cartridge type or seats attached to disc allowed.
2. Buna-N.
3. No retainer bolts, clamps, or rings are allowed to retain the seats.

J. Valves shall be shop lined and coated with a High Solids Epoxy.

1. The Epoxy shall be NSF-61 Approved.
2. The Epoxy shall be a minimum of 8mils DFT per AWWA C550.

K. Butterfly Valves Operator

1. Operators and component parts: AWWA C504, unless otherwise specified in these Specifications.
2. Provide with counter-clockwise opening manual operators.
3. Compute operation torque of each valve and operator in accordance with Appendix of AWWA Standard C504 for velocity of 16 fps and applicable pressure drop across valve.
4. Operators: Sized for bi-directional flow and 450 ft-lb input torque.
5. Required input torque with maximum handwheel pull of:
   a. 80 lbs. for hand wheels and chain wheels, or
   b. 150 ft.-lbs. for operating nuts.
6. Hand wheels: 2-inch operating nut. Conform to detail drawings and provide adequate operating space.
7. Totally enclosed, permanently lubricated and sealed gear reducers.
8. Self-locking with open and close stops provided to limit valve disc travel.
9. Traveling nut type or worm gear.
10. Submit calculations for valve torque requirements to Engineer as part of Shop Drawing submittal package. Velocity for dynamic torque must be 16 fps.
11. Valve operators, as manufactured by:

a. Henry Pratt Company

b. Mueller Company

c. Substitutions: Section 01 60 00 – “Product Requirements”

12. Provide butterfly valves which are directly buried or submerged with 2-inch square operating nut and do not equip with position indicator unless otherwise specified.

PART 3 EXECUTION

3.01 EXAMINATION

A. Determine exact location and size of valves from Drawings and field conditions.

B. Identify required lines, levels, contours, and datum locations.

C. Verify that elevations of existing facilities prior to excavation and installation of valves.

3.02 PREPARATION

A. Locate, identify, and protect from damage utilities to remain.

B. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.

3.03 INSTALLATION

A. Perform trench excavation, backfilling, and compaction as specified in other sections.

B. Orientation:

1. Set valves plumb.

3.04 DISINFECTION AND TESTING

A. Disinfect and test valves with water mains.

END OF SECTION

SECTION 33 14 20

RUBBER EXPANSION JOINTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Rubber expansion joints.

1.02 SUBMITTALS

A. Product Data: Manufacturer information regarding component materials, fittings, assembly and parts diagram, and accessories.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

C. Manufacturer Instructions: Installation requirements, including storage and handling procedures.

1.03 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of valves and hydrants.

1.04 CODES AND STANDARDS

A. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings (Cl.125 Sizes 1”-24”)

B. ASME B16.5 - Steel Pipe Flanges and Flanged Fittings (Cl.150 Sizes 1”-24”)

C. ASME B16.47 A - Steel Pipe Flanges and Flanged Fittings (Cl.150 Sizes 26”-60”)

D. AWWA C207 - Steel Pipe Flanges for Waterworks Service (Sizes 66”-144”)

E. FSA - Fluid Sealing Association – Expansion Joint Piping Division
EJMA - Expansion Joint Manufacturers Association
ASME B31.1 - Code for Power Piping (where applicable to rubber expansion joints)

F. ASME B31.3 - Code for Process Piping (where applicable to rubber expansion joints)

G. ASTM F1123-87 - Standard Specifications for Non Metallic Expansion Joints

H. ISO 9001 - Quality Management Standard

I. ISO 14001 - Environmental Management Standard

J. ASTM D2000 - Standard Classification System for Rubber Products

K. ASTM D1418 - Standard Practice for Rubber and Rubber Latices-Nomenclature

L. ASTM D2240 - Standard Test Method for Rubber Property - Durometer Hardness

M. ASTM D412 - Standard Test Methods for Vulcanized Rubber - Tension
ASTM D297 - Standard Test Methods for Rubber Product - Chemical Analysis

N. ASTM D471 - Standard Test Method for Rubber Property - Effect of Liquids

O. ASTM D573 - Standard Test Method for Rubber - Deterioration in an Air Oven

P. ASTM D395 - Standard Test Method for Rubber Property - Compression Set

1.05 QUALITY ASSURANCE

A. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.

B. Perform Work according applicable codes and standards.

C. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' experience.

D. Installer: Company specializing in performing Work of this Section with minimum three years' experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store materials according to manufacturer instructions.

B. Protection:

1. Provide protection according to manufacturer instructions.

PART 2 PRODUCTS

2.01 RUBBER EXPANSION JOINTS

A. General:

1. The rubber expansion joint shall have a single or multiple arch. The inner tube shall be a seamless, leak-proof layer of nominal ¼" thickness that extends from the outside diameter of one flange to the outside diameter of the other flange. It shall be an elastomer compatible with the fluid media and service temperature. The reinforcement shall be multiple plies of textile and metal fibers with sufficient radial strength to support the loads. The exterior shall be covered in an elastomer compatible with the external environment. Rubber flanges shall be integral with the body and have a full flat face with the same outside diameter as the mating flange. Flanges shall be drilled to Class 150. Retaining rings shall be fabricated of minimum 3/8" thickness high grade carbon steel or ductile iron with hot dipped galvanized finish. Tie rods, if recommended by the manufacturer, shall allow for the ranges of motion specified in the table below. The gusset plates and rods shall be steel with hot dipped galvanized finish. Identification and markings shall be permanently attached to the expansion joint.

2. Range of Motion

Minimum Range of Motion of Rubber Expansion Joints

Type	Diameter (in)	Compression (in)	Extension (in)	Lateral (in)	Rotational (deg)
Single	6	1.4	0.7	0.6	12.8
Single	8	1.4	0.7	0.6	9.7
Single	16	1.6	0.8	0.8	5.7
Double	16	3.2	1.6	1.6	11.3
Single	30	2	1	1	3.8
Double	30	4	2	2	7.6
Single	36	2	1	1	3.2
Double	36	4	2	2	6.3
Single	42	2.4	1.2	1.1	3.1
Double	42	4.8	2.4	2.2	6.5

2.02

B. Manufacturer:

1. Rubber expansion joints shall be manufactured by Flexicraft, General Rubber, Metraflex, or equal.

C. Provide shrouds to protect expansion joints as shown on the Drawings and per manufacturer recommendations.

PART 3 EXECUTION

3.01 EXAMINATION

A. Determine exact location and size and application of rubber expansion joints from Drawings.

B. Field verify actual size and type of rubber expansion joints required and consult Owner regarding any discrepancies from the drawings prior to ordering.

3.02 PREPARATION

A. Locate, identify, and verify configuration of piping modifications to accommodate rubber expansion joints.

B. Coordinate shut downs and isolation of piping with owner.

C. Field locate all utilities and underground and above ground obstructions in the vicinity of the work.

D. Verify and properly abate any hazardous materials associated with existing piping to be affected.

3.03 INSTALLATION

A. Perform excavation, backfilling, and compaction per specifications.

B. Remove potions of existing piping, fittings, and other features as required to properly install rubber expansion joints and new piping.

C. Weld on new flanges as required.

D. Install rubber expansion joints, piping, fittings etc. as required to complete installations.

E. Disinfect and test new piping and rubber expansion joints.

F. Backfill and restore surfaces.

3.04 FIELD QUALITY CONTROL

A. Testing: Pressure test finished installation per specifications prior to backfilling.

END OF SECTION

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SECTION 33 16 13

STEEL TANK ROOF

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish all materials, equipment, tools, labor, and supervision required for the replacement of the roof on the District's 1-million-gallon industrial water tank at the Samoa site as shown on the Drawings and as described in these Specifications.

B. Related work specified elsewhere:

1. Tank Preparation and Coating Section 09 91 00

1.02 MEASUREMENT AND PAYMENT

A. Measurement and payment for this item shall be included in the Roof Tank Bid Item. No additional measurement or payment will be included for the requirements of this section.

1.03 QUALITY ASSURANCES

A. Qualifications of Fabricators:

1. The materials shall be furnished by one supplier who is regularly engaged in the manufacture of steel water storage tanks and has experienced, factory-qualified representatives that will be on site to supervise the field assembly.

a. Fabricator shall be registered and approved to perform work without special inspection for work performed at the shop. At completion of fabrication, the fabricator shall submit a certificate of compliance to the Owner stating that the work was performed in accordance with the approved construction documents per CBC Section 1704.2.5.2.

2. All materials shall be new and of current manufacture and shall be guaranteed against defects in workmanship.

B. Qualification of Installers:

1. For the erection and testing of the work in this Section, use only thoroughly trained and experienced personnel who are completely familiar with the requirements for this work and with the installation recommendations of the manufacturer and these Specifications.

2. All welders shall be certified for the particular type of welding required prior to starting welding on the site, including equipment to be used, positions, procedures, base metals and electrodes or base filler wires from the same specifications, classifications, or group number that will be used.

3. Welding certification testing shall be performed by an approved testing laboratory. Costs of such testing shall be borne by the Contractor. The Contractor shall maintain current records of all welding certifications. A copy of each welding certification shall be submitted to the Engineer for approval a minimum of 48 hours in advance of performing any welding.

4. Qualifications of welding procedures, welders and welding operators shall comply with Section 8 of AWWA D100-11.

C. Inspection and Testing of Welds

1. All inspection and testing of welds shall be completed before application of protective coatings.
2. On joints where radiography is required, the welding of each worker shall be radiographed on the worker's first joint, before work begins on subsequent joints.
3. The Engineer shall be furnished certified copies of all radiography reports. Welds shall be radiographed using the procedures described in Section 11.6 of AWWA D100-11.

D. Disinfection

1. Disinfection procedures shall be conducted in accordance with Section 33 13 13 – Water Reservoir Disinfection. The District will furnish enough water for one (1) filling of the tank for disinfection. The Contractor shall continuously monitor the filling operation to control the rate and level to avoid overflow.

1.04 SUBMITTALS

A. General:

1. Make all submittals and resubmittals in strict accordance with the provisions of Section 01 33 00.
2. Make all submittals listed in Part 1.04B, and any others required to fully describe what is to be furnished and/or installed under this Section.

B. Required Submittals:

1. Shop drawings: Within 45 days after award of contract and before any of the materials are delivered to the job site, submit complete Shop Drawings for the tank roof and appurtenances (including but not limited to ladder, platform, and landing) stamped and signed by a structural or professional engineer currently registered in the State of California. Owner reserves the right to review and comment and require changes to the roof design to facilitate future maintenance.
2. Structural calculations: Submit structural calculations of the roof and anchorage stamped and signed by a structural or professional engineer currently registered in the State of California.
3. Detailed drawings and structural analyses shall include:
    a. Plate thickness and width
    b. Number and size of structural members
    c. Construction and erection details of structural members and all other accessories and related work
    d. Structural details of connection points between new roof and existing tank members
    e. All other pertinent data concerning the construction of the roof
4. Materials list: Submit a complete list of all materials and equipment proposed to be furnished and installed under this portion of the work.
5. Manufacturer's recommendations: Submit two copies of the manufacturer's current recommended method of installation for the work in this section.
6. At the conclusion of the roof fabrication and installation work, the Contractor shall submit a written report containing the information outlined in AWWA D100-11, Section 11.2 – Inspection Report.

PART 2 PRODUCTS

2.01 DESIGN CRITERIA

A. General:

1. The steel roof shall meet the requirements of AWWA Specifications D100-11, including Section 13 for seismic design, and the 2019 California Building Code, and these shall be made a part of this Specification. Roof design calculations shall consider seismic sloshing wave
2. Design shall provide for easy painting of structural and appurtenant members after erection. Where design for ease of painting after erection is not feasible, steel shall be shop sand blasted and shall receive shop applied primer, intermediate, and finish coatings in accordance with Section 09 91 00 – Tank Preparation and Coating.

B. Roof Criteria:

1. The tank dimensions and capacity (in million U.S. gallons) are as follows:
   a. 1 MG Industrial (Samoa): 70 feet inside diameter, flat bottom, 1.0 million gallons nominal capacity.
2. Provide a 3/16-inch thick roof, minimum, with a slope of 1 inch in 12 inches.
3. The roof shall be cone type with a 3-foot radius knuckle between the roof and shell.
4. The details shall be designed to eliminate unwelded joints that will promote corrosion, pockets that will accumulate rain water, and attachments to the shell which result in excessive localized stresses due to welding or imposed loads. The roof rafters shall be fully seal welded to the roof plates or one-piece rafter and roof panel break shapes. Internal roof plate lap joints shall be fully seal welded.
5. All welds joining roof plates shall have complete joint penetration and fusion, and shall be double-welded from both sides. The use of low hydrogen electrodes is mandatory for the manual welding of plates.

C. Structural Design Criteria

1. Roof Live Load: 20 psf (no reduction allowed)
2. Wind Velocity: 115 miles per hour
3. Snow Load: none
4. Lowest One-day Mean Temperature: 32ºF

D. Seismic Design Criteria:

1. Site Coordinates:
   a. Samoa (1 MG): 40.805275, -124.199133
2. Site Class:
   a. Samoa (1 MG): F
3. Risk Category: IV (essential facilities)
4. Response Modification Coefficient, R: 3 (anchored tank)
5. Overstrength Factor, Ω_0: 2
6. Spectral Response Acceleration, S_{DS}:

a. Samoa (1 MG): 1.21g

7. Spectral Response Acceleration, S_{D1}:

a. Samoa (1 MG): 1.87g

8. Simultaneous combination of horizontal and vertical loads: Yes

9. Minimum Freeboard: 3.0 feet

10. Roof Live Load (for Earthquake Design): 20 psf

11. Seismic Design: Per AWWA D100-11, Section 13

E. Accessories: All accessories shall be in accordance with AWWA D100-11, Cal OSHA, and the Division of Industrial Safety, and as shown on the Drawings or described below:

1. General

a. Accessories shall have surface preparation and be coated in accordance with Section 09 91 00 – Tank Painting.

2. Ladders:

a. For the exterior, Contractor shall furnish and install a steel ladder as shown in the Drawings, with cage around the ladder, along with roof-top landing and adjacent platform.

b. Interior ladder and connections shall be coated steel with coated steel cage around the ladder, and a coated steel mid-level diving platform.

c. The ladders shall begin at the tank bottom and extend along the height of the tank to the roof top. Ladder rungs shall be one-inch diameter SLIPNOT skid resistant steel or approved equal. The bottom portion of the exterior ladder shall have a hinged access door with protected padlock on the exterior of the tank as shown on the Contract Drawings.

d. Cages shall not extend less than 27 nor more than 28 inches from the centerline of the rungs of the ladder. Cage shall not be less than 27 inches in width. Vertical bars shall be located at a maximum spacing of 40 degrees around the circumference of the cage; this will give a maximum spacing of approximately 9.5 inches, center to center.

e. All ladders shall be equipped with fall prevention device per the latest OSHA requirements.

f. The minimum ladder design loading shall be 100 psf and 300 pounds concentrated load.

3. Roof Hatch:

a. Contractor shall furnish and install weather-tight roof hatches as shown on the Contract Drawings.

b. The cover shall have automatic hold-open lockable arm, with compression spring operator for easy opening and closing, with inside and outside handles and locking hasp on the top side, and ladder rungs on inside face for use as access to the interior tank ladder.

c. The hatch shall be coated after fabrication.

d. Rubber gasket sealant shall be installed on roof hatches. The seal material should be safe to use in drinking water tanks and must be NSF 61 approved.

e. Roof hatches shall be manufactured by the Bilco Company, New Haven Connecticut, model E-20 Roof Hatch or approved equal.

f. Roof hatches shall be welded to tank and completely sealed against any water penetration.

4. Vents:

a. Mushroom type vents shall be constructed and installed as shown on the Drawings and fitted with replaceable 2 x 2 (2 openings per linear inch) stainless steel backer mesh and #3 stainless steel insect mesh. The vent assembly shall be coated after fabrication.

b. Type 316 stainless steel nuts and bolts with dielectric isolation shall be used to install roof vents and screens.

5. Tie- off points:

a. Contractor shall install OSHA compliant tie-off points on the tank roof as shown in the Contract Drawings. Shop drawings and structural calculations are required for the tie-off points and shall be part of the shop drawing submittals per requirements of Section 1.04 of this document.

6. Manways

a. Manways shall be 30-inch diameter clear opening and shall be located as shown on the Contract Drawings.

b. Manway shall be inward opening with davit arm and include a cover plate and easy lock system.

c. Manway shall be installed and furnished per OSHA standards for drinking water storage tanks.

d. Nuts and bolts shall be Type 316 stainless steel with dielectric isolation.

e. Provide and install gasket suitable for potable water service.

7. Roof Platform

a. A roof platform shall be provided extending from the external ladder past the hinged roof hatch as shown on the Drawings. The platform shall be constructed from structural steel shapes with a steel grate deck, and shall be coated after fabrication. The minimum platform loading shall be 100 psf.

8. Handrail

a. Handrail shall be installed on tank roof as shown on Contract Drawings. Handrail assembly shall meet all OSHA, Federal and State regulations. Handrail shall be coated per Section 09 91 00, Tank Painting.

9. Cathodic Protection

a. Hand holes and appurtenances for cathodic protection system anodes shall be cut into the roof as shown on the Drawings.

b. Hand holes shall be sealed with Divecorr grommets and covers.

2.02 DIELECTRIC BARRIERS:

A. There shall be a dielectric barrier wherever stainless steel and carbon steel are in contact.

B. No welding of stainless steel to carbon steel will be permitted below the water level.

PART 3 EXECUTION

3.01 INSTALLATION:

A. Inspection and Testing shall conform to Section 11 or Section 14 of AWWA D100-11. Testing equipment and cost thereof shall be furnished by the Contractor.

1. Roof:

a. Welds in the tank shall be tested by the Contractor by means of spot radiographic inspection where required by AWWA D100-11 and as directed by the Engineer or Inspector.

b. All radiographs shall be performed by an independent testing laboratory approved by the Engineer. The radiographs shall become the property of the Owner, and the Engineer shall have the right to review all information obtained.

c. The first 10 feet of each welder's work shall be checked, and then up to 5 percent of all the welding shall be radiographed as directed by the Engineer or Inspector.

d. The Contractor shall provide logs of each welder's work through the project.

3.02 PAINTING:

A. Painting and exterior color shall be in accordance with Section 09 91 00 – Tank Painting.

END OF SECTION

PART 5
DRAWINGS

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PART 6
APPENDICES

APPENDIX A – GEOTECHNICAL REPORT

APPENDIX B – LIMITED HAZARDOUS MATERIALS SURVEY REPORT

APPENDIX C – FEMA ESA REVIEW FORM FOR USFWS ARCATA-YREKA, JULY 2020

APPENDIX D – FEMA PROGRAMMATIC BIOLOGICAL ASSESSMENT, SEPTEMBER 7, 2018

APPENDIX E – NOT USED

APPENDIX F – EONCOAT SURFACE PREPARATION & APPLICATION GUIDE

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APPENDIX A – GEOTECHNICAL REPORT

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GEOTECHNICAL INVESTIGATION REPORT

HBMWD Reservoirs Seismic Retrofit Project
Three Water Tanks
Korblex and Samoa, California

Prepared by:

Crawford & Associates, Inc.
1100 Corporate Way, Suite 230
Sacramento, CA 95831

July 23, 2021

Prepared for:

GHD Inc
718 Third Street
Eureka, CA 95501

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July 23, 2021
Crawford File No. 20-651.1

Mr. Steve McHaney, PE
718 Third Street
Eureka, CA 95501

Subject: **GEOTECHNICAL INVESTIGATION REPORT**
HBMWD Reservoirs Seismic Retrofit Project
Korblex and Samoa, California

Dear Mr. McHaney,

Crawford & Associates, Inc (Crawford) presents this Geotechnical Investigation Report for the Humboldt Bay Municipal Water District's (HBMWD) Reservoirs Seismic Retrofit Project. The project includes two tanks in Korblex, California and one tank in Samoa, California. Crawford prepared this report in accordance with our September 30, 2020 agreement.

This report defines the geotechnical conditions as evaluated from field and laboratory test data and used in the development of the geotechnical design. The purpose of this report provides recommendations for use in project design, specifications, and construction. We will issue a final report based on your comments and as the project is further developed

Thank you for the opportunity to be part of your design team. Please contact us if you have questions or require additional information.

Sincerely,

Crawford & Associates, Inc.,

Yosief Ghebremicael, EIT
Staff Engineer

Reviewed by

Chris Trumbull, PE, GE, D.GE
Senior Project Manager

Taber
Since 1954

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1 INTRODUCTION

1.1 PURPOSE

Crawford & Associates, Inc (Crawford) prepared this Geotechnical Investigation Report for the Humboldt Bay Municipal Water District (District) Reservoirs Seismic Retrofit Project in Samoa and Korblex, California. We provide this report for GHD, Inc (GHD), the design team, and the District to use during seismic retrofit design and construction. This report contains our findings and geotechnical recommendations for this project.

The purpose of this report is to identify subsurface geotechnical and material conditions, provide a design site-specific response spectrum per the 2019 CBC and ASCE 7-16 guidelines, evaluate liquefaction potential, and provide shallow foundation bearing capacity and lateral resistance for the foundations of the existing water tanks.

1.2 SCOPE OF SERVICES

To prepare this report, Crawford:

- Discussed the project with the design team;
- Reviewed geologic, soils, and seismic maps pertaining to the site;
- Reviewed a geotechnical investigation by Taber Consultants dated December 26, 1995;
- Drilled, logged and sampled two borings: one at each site to a depth of 51.5 feet (ft) below ground surface (bgs) on November 30 and December 1, 2020;
- Performed laboratory tests on representative soil samples from the borings; and
- Performed geotechnical engineering calculations and analysis to develop our recommendations.

2 PROJECT AND SITE DESCRIPTION

Based on our conversation with Mr. Steve McHaney of GHD, we understand the design team is evaluating the existing three water tanks for updated seismic design requirements.

2.1 KORBLEX HILL TANKS

The existing plant facilities include a 1 Million Gallon (MG) capacity 70 ft diameter storage welded steel tank constructed in 1967, clarifier, filters, control building and a 2MG welded steel 130 ft diameter storge tank constructed in 1996, which is used for disinfection contact time in the treatment process along with storage. We assume the tanks have a perimeter ring foundation system.

The site is located approximately 700 ft south of the intersection of Pipeline Road and West End Road. The coordinates of the midpoint between the two tanks are approximately latitude 40.8052°N and longitude -124.1990°W. The access road to the tank is paved and the surrounding areas covered with some trees and vegetation.

2.2 SAMOA PENINSULA TANK

On Samoa Peninsula, there is one domestic water reservoir, a 1 Million Gallon (MG) capacity, welded steel tank constructed in 1967 which is used for storage at the end of the industrial water system. We assume the tank has a perimeter ring foundation system.

The site is located on the Samoa Peninsula, approximately 2,800 ft northeast of the intersection of New Navy Base Road and Bay Street, approximately 500 ft east of the Pacific Ocean. The tank coordinates are approximately latitude 40.9075°N and longitude -124.0641°W. The access road to the tank is paved and the surrounding areas covered with some trees and vegetation.

Figure 1 of Appendix I shows the site Vicinity Map.

2.3 PROJECT DATUM

Crawford elevations referenced within this report are based on the North American Vertical Datum of 1988 (NAVD 88), unless otherwise noted.

3 REGIONAL AND SITE GEOLOGY

3.1 REGIONAL GEOLOGY

The project is located within the Coast Ranges geomorphic province of California. This geomorphic province is characterized by a series of discontinuous northwest-trending mountain ranges extending from the Klamath Mountains on the north coast of California to the Transverse Ranges to the south. The Coast Ranges are composed of thick Mesozoic and Cenozoic sedimentary strata that have a complex structure due to intense folding and faulting.

3.2 SITE GEOLOGY

Published geologic mapping[1] shows surface materials at the Samoa site as undeformed marine shoreline and aeolian (wind-blown) deposits (Qm) consisting of sand. The Korblex site[2] is underlain by Pleistocene fluvial and shallow-water marine sediments of the Falor and Broken formations (cm2), generally described as pebbly conglomerate, claystone, and silt.

We provide a geologic map on Figure 3 of Appendix I.

[1] McLaughlin, R.J, S.D. Ellen, M.C. Blake, Jr., A.S. Jayko, W.P. Irwin, K.R. Aalto, G.A. Carver, and S.H Clarke, Jr., 2000, Geology of the Cape Mendocino, Eureka, Garberville, and southwest parts of Hayfork 30 x 60 Minute Quadrangles and adjacent offshore area, northern California: USGS Miscellaneous Field Studies MF-2336, Sheet, scale 1:100,000.

[2] Wagner, D.L., Jennings, C.W., Bedrossian, T.L., and Bortugno, E.J. Geologic map of the Sacramento quadrangle. Scale: 1:250,000. California Division of Mines and Geology, 1981.

3.3 FAULTS AND GEOLOGIC HAZARDS

Both sites are located in the Cascadia Subduction Zone, which is an area of high seismic activity. Based on mapping by the California Geological Survey[3], the nearest Quaternary age faults include unnamed segments of the Mad River fault zone, approximately 250 to 500 ft from Korblex tanks and the Little Salmon Fault is approximately 1.6 miles from the Samoa tank. No active fault traces are shown on the cited published mapping and the site in not within an Alquist-Priolo Earthquake Fault Zone[4] for fault rupture hazard. The CGS considers a fault to be active if it has shown evidence of ground displacement during the Holocene period, defined as the last 11,700 years.

The Fault Activity Map for this site is shown on Figure 4 of Appendix I.

4 SUBSURFACE EXPLORATION

The current subsurface exploration for the project consisted of two borings performed by Crawford in 2020. A summary of explorations by Crawford and Taber are provided below in Table 1. See the attached Figures 2A and 2B, Field Exploration Map, in Appendix I for the exploration locations.

Table 1: Summary of Subsurface Exploration

I.D.	Site	Completion Date	Boring Depth (ft)	Drill Rig	Hammer Type	Hammer Efficiency Ratio (%)	Drilling Equipment
R-20-001	Samoa	11/30/2020	51.5	CME 55	Auto	78.4	4” Auger, Mud rotary
A-20-002	Korblex (1MG)	12/1/2020	51.5	CME 55	Auto	78.4	4’ Auger
B-1	Korblex (2MG)	10/10/1995	52	N/A	Auto	80*	4’ Auger
B-2	Korblex (2MG)	10/10/1995	42	N/A	Auto	80*	4’ Auger

* Estimated

4.1 CRAWFORD BORINGS (2020)

Crawford retained Taber Drilling to drill and sample two borings (R-20-001 and A-20-002) on November 30 and December 1, 2020 at the Samoa and Korblex (1MG) tank sites, respectively. Taber used a CME 55 truck-mounted drill rig to complete the boring to a depth of 51.5 ft bgs using solid-stem auger and mud rotary drilling techniques.

The boring was typically sampled continuously in the upper 5 to 8 ft and at approximately 2.5- to 5-ft intervals thereafter. Soil samples were recovered by means of 2.0-inch O.D. “Standard Penetration Test” split-spoon sampler (ASTM D1586) with 1.4-inch I.D. liners and a 3.0-inch O.D. “Modified California” split-spoon sampler (ASTM D3550) with 2.4-inch I.D. liners. Samplers were advanced with standard 350 ft-lb striking force using a 140-lb automatic hammer and a drop height of 30 inches. A hammer energy calibration test was not performed specifically for this project;

[3] https://maps.conservation.ca.gov/cgs/fam/
[4] http://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps

however, previous hammer energy test results provided by the driller show the hammer to have an energy efficiency of 78.4 %.

At each test interval, the sampler was driven 18 inches (or until sampler refusal criterion was met), and the blows required to advance the sampler each 6-inches of penetration were recorded. The sampler refusal criterion is defined as 50 or more blows with less than 6-inches of sampler advancement. The field blow counts were recorded as the number of hammer blows required to drive the sampler the final 12-inches of the 18-inch sample interval, unless refusal was met. The recorded sampler penetration resistance provides a field measure of relative densities and can be correlated to soil strength and bearing characteristics. The field-recorded (uncorrected) blow counts are shown on the boring logs provided in Appendix II.

Crawford logged the exploratory borings consistent with the Unified Soil Classification System (USCS) and the Caltrans 2010 Logging Manual. Selected portions of recovered soil drive samples were retained in sealed containers for laboratory testing and reference. Groundwater observations were recorded during drilling operations when/if encountered and when drilling method allowed. The borings were backfilled with cement grout in compliance with the Yolo County boring permit requirements.

4.2 TABER BORINGS (1995)

Taber Consultants drilled two test borings (B-1 and B-2 pertinent to the Korblex 2 MG tank) with auger drilling methods in October 1995. The maximum depth of exploration was 52± ft bgs (lowest elev.186±ft). Logs of the previous borings by Taber are provided in Appendix II.

5 LABORATORY TESTS

The following laboratory tests were completed on representative soil samples obtained from the exploratory borings:

- Grain Size Analysis (ASTM D6913)
- Moisture Content-Dry Density (ASTM D2216/D2937)
- No. 200 Wash (ASTM D1140)
- Plasticity Index (ASTM D4318)
- Unconfined Compressive Strength (ASTM D2166)

We present the laboratory results in Appendix III.

6 SUBSURFACE CONDITIONS

Based on the material encountered in the exploratory borings, the subsurface conditions for each segment are described below. Refer to the log of borings in Appendix II for more specific soil descriptions and boring details.

6.1 KORBLEX HILL TANKS

Unit 1 materials were encountered to depths of 15.5±ft in A-20-002, 45.5±ft (elevation 201.9±ft) in B-1, and 29.5±ft (elevation 198.5±ft) in B-2. Below a 2-ft thick layer of lean clay/elastic sit fill, materials in this unit generally consists of soft to very stiff silty clay, clayey silt, and lean clay.

Unit 2 materials were encountered below Unit 1 soils to the maximum depth explored in A-20-002, B-1 and B-2. Materials of this unit generally consists of medium dense to dense silty / clayey sand.

6.2 SAMOA PENINSULA TANK

Beneath the surface materials, we encountered loose to very dense poorly graded sand and medium dense clayey sand to the maximum depth explored in A-20-001(51.5 ft).

6.3 GROUNDWATER

At the time of our November and December 2020 exploration, groundwater was encountered in borings R-20-001 and A-20-002. Groundwater was also reported in two previous borings drilled in 1995. Groundwater levels encountered in the borings are summarized in Table 2.

Table 2: Groundwater Data

Boring Location	Site	Date	Ground Surface Elevation (ft)	Groundwater Depth/ Elevation (ft)
R-20-001	Samoa	11/30/2020	22*	17.5/5
A-20-002	Korblex (1MG)	12/1/2020	218*	25.7/192.3
B-1	Korblex (2MG)	10/11/1995	247	39/208
B-2	Korblex (2MG)	10/11/1995	228	25/203

* Estimated from topography provided by GHD

At the Samoa site, the groundwater level should be considered to be generally consistent with Mean Sea Level.

7 SITE SEISMICITY

7.1 SHEAR WAVE VELOCITY AND CLASSIFICATION OF SOILS

The shear wave velocity in the upper 30 meters (V_{S30}) was determined for each site based on the soil data obtained from our 2020 test boring data and correlations with SPT N-values (or equivalent SPT N-values) corrected for hammer efficiency using the equations outlined by Caltrans[5]. The design V_{S30} (m/s) values for the two sites are presented in Table 3 below.

[5] *Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations*, Appendix A, November 2012

Table 3: Shear Wave Velocity Data

Site	V_{S30} (m/s)	V_{S30} (f/s)
Samoa	279	915
Korblex	273	896

7.2 SEISMIC DESIGN PARAMETERS

7.2.1 KORBLEX SITE

Based on our interpretation of ASCE 7-16 Chapter 11, section 4.8 and ASCE 7-16 Supplement 1, this structure meets "Exception 2," and the design team should confirm this. If the design team determines that this structure does not meet Exception 2 and a site-specific analysis is warranted for the project, then the values provided below will need to be updated. The base acceleration parameters, S_s *and* S_1 were obtained from the SEAOC/OSHPD website[6] and the procedures in Chapter 11 of ASCE 7-16 were followed to determine the design acceleration values.

Table 4: Seismic Design Parameters - Korblex

Site Class	**D**
Risk Category	III
S_s – Acceleration Parameter	2.610 g
S_1 – Acceleration Parameter	1.072 g
F_a – Site Coefficient	1.2
F_v – Site Coefficient	1.7
S_{MS} – Adjusted MCE[1] Spectral Response Acceleration Parameter	3.132 g
S_{M1} – Adjusted MCE[1] Spectral Response Acceleration Parameter	1.822 g
S_{DS} – Design Spectral Acceleration Parameter	2.088 g
S_{D1} – Design Spectral Acceleration Parameter	1.215 g
T_L – Long-Period Transition Period[2]	8
PGA_M - Site modified peak ground acceleration	1.29 g

[1]Risk Targeted Maximum Considered Earthquake
[2]Figure 22-14, ASCE 7-16

7.2.2 SAMOA SITE

Since the Samoa site is classified as a Site Class F in ASCE 7-16 Section 20.3.1, Crawford completed a site-specific hazard analysis according to ASCE 7-16 Section 11.4.8. We recommending using the following site-specific hazard values for the Samoa site, as provided in Table 5.

[6] https://seismicmaps.org

Table 5: Seismic Design Parameters - Samoa

Design Parameter	Value (g)
Design Spectral Acceleration for Short Period (S_{DS})	1.21
Design Spectral Acceleration for 1 sec Period (S_{D1})	1.87
MCE Spectral Response Acceleration for short Period (S_{MS})	1.81
MCE Spectral Response Acceleration Parameter for 1 sec Period (S_{M1})	2.80

See Appendix IV for the detailed site-specific hazard analysis.

7.3 LIQUEFACTION POTENTIAL AND SEISMICALLY-INDUCED SETTLEMENT

Liquefaction can occur when saturated, loose to medium dense granular soils (generally within 50 ft of the surface), or specifically defined cohesive soils, are subjected to ground shaking. A liquefaction analysis was performed for each site.

7.3.1 KORBLEX SITE

Based on our 2020 boring at the 1 MG Korblex tank, the site is underlain by medium stiff clay and medium dense to dense clayey sand below the groundwater table. Previous borings indicate the 2 MG Korblex tank is underlain by stiff to very stiff silt, very stiff sandy clayey silt, and dense clayey silty sand below the groundwater. A liquefaction analysis was performed on the materials encountered in the 2020 boring, which resulted in a moderate potential for liquefaction. Additionally, liquefaction-induced settlement at the ground surface on the order of 1 to 3 inches. Differential liquefaction-induced settlement is estimated to be less than 1 inch across a horizontal distance of 40 feet.

7.3.2 SAMOA SITE

Based on the boring at the Samoa site, the site is underlain by medium dense to very dense poorly-graded sand and medium dense clayey sand below the groundwater. A liquefaction analysis was performed on the materials encountered in the 2020 boring, which resulted in a high potential for liquefaction. Liquefaction-induced settlement at the ground surface is estimated to be on the order 2 to 6 inches. Differential liquefaction-induced settlement is estimated to be about half of the value above across a horizontal distance of 40 feet.

8 CONCLUSIONS

The foundation recommendations below and seismic design parameters above may be used for the seismic evaluation of these two sites. In addition, the potential liquefaction-induced settlement mentioned above at the Samoa site should be considered.

9 FOUNDATION RECOMMENDATIONS

The details of the tank foundations are not known. However, for the purposes of our analyses, we have assumed that all three tanks have a perimeter ring foundation with a width and depth of 2 ft.

9.1.1 BEARING CAPACITY

An allowable bearing capacity (dead plus live load) value 3,000 pounds per square foot, may be used for both sites. These values may be increased by one-third if wind and/or seismic loads are included.

9.1.2 LATERAL RESISTANCE

Based on the age and lack of construction history (no as-built information) we have assumed the footings were cut into the existing native soil (not formed in place) and that backfill was not properly compacted around the footing and therefore passive pressure should not be relied upon for lateral resistance. Resistance to lateral loads (including those due to wind or seismic forces) may be determined using a coefficient of friction of 0.30 between the bottom of assumed cast-in-place concrete foundations and the underlying soils.

9.1.3 SETTLEMENT

Due to the age of the tanks, total and differential settlement should be complete and future static settlement is not anticipated.

10 RISK MANAGEMENT

Our experience, and that of our profession, clearly indicates the risks of costly design, construction, and maintenance problems can be significantly lowered by retaining the Geotechnical Engineer of Record to provide additional services during design and construction. For this project, Crawford should be retained as the Geotechnical Engineer of Record to:

- If applicable, review and provide comments on the civil plans and specifications prior to 90% plan set submittal.
- Update this report if design changes occur, 2 years or more lapse between this report and construction, and/or site conditions have changed.

If we are not retained to perform the above applicable services, we are not responsible for any other party's interpretation of our report, and subsequent addendums, letters, and discussions.

11 LIMITATIONS

Crawford performed services in accordance with generally accepted geotechnical engineering principles and practices currently used in this area. Do not use this report for different locations and/or projects without the written consent of Crawford. Where referenced, we used ASTM standards as a general (not strict) guideline only. We do not warranty our services.

Crawford based this report on the current site conditions. We assumed the soil and groundwater conditions are representative of the subsurface conditions on the site. Actual conditions will vary along the project alignment. Our scope did not include evaluation of flooding potential and aerial photograph review. Please contact Crawford if you would like an evaluation of one or more of these potentially damaging issues.

Logs of our explorations are presented in Appendix II. The lines designating the interface between soil types are approximate. The transition between soil types may be abrupt or gradual. Our

recommendations are based on the final logs, which represent our interpretation of the field logs and general knowledge of the site and geological conditions. Modern design and construction are complex, with many regulatory sources/restrictions, involved parties, and construction alternatives. It is common to experience changes and delays. The owner should set aside a reasonable contingency fund based on complexities and cost estimates to cover changes and delays.

APPENDIX I

Figure 1: Vicinity Map
Figure 2: Field Exploration Maps
Figure 3: Geologic Map
Figure 4: Fault Activity Map

North

Source:
USGS 7.5' Topographic Maps, Tyee City, Humboldt County, California, 2018, Scale: 1:24,000

USGS 7.5' Topographic Maps, Eureka, Humboldt County, California, 2018, Scale: 1:24,000

USGS 7.5' Topographic Maps, Arcata South, Humboldt County, California, 2018, Scale: 1:24,000

USGS 7.5' Topographic Maps, Arcata North, Humboldt County, California, 2018, Scale: 1:24,000

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HBMWD Reservoirs Seismic Retrofit

Eureka, CA

Figure 1
Vicinity Map

Proj. No:	20-651.1
Scale:	1"=7,000'
Date:	12/16/20

North

Source:
Topographic data provided by GHD via electronic transfer on 12/24/20

Design file provided by GHD via electronic transfer on 12/15/2020

Basemap: AutoCAD Civil3D Geolocation Tool, using Bing Maps

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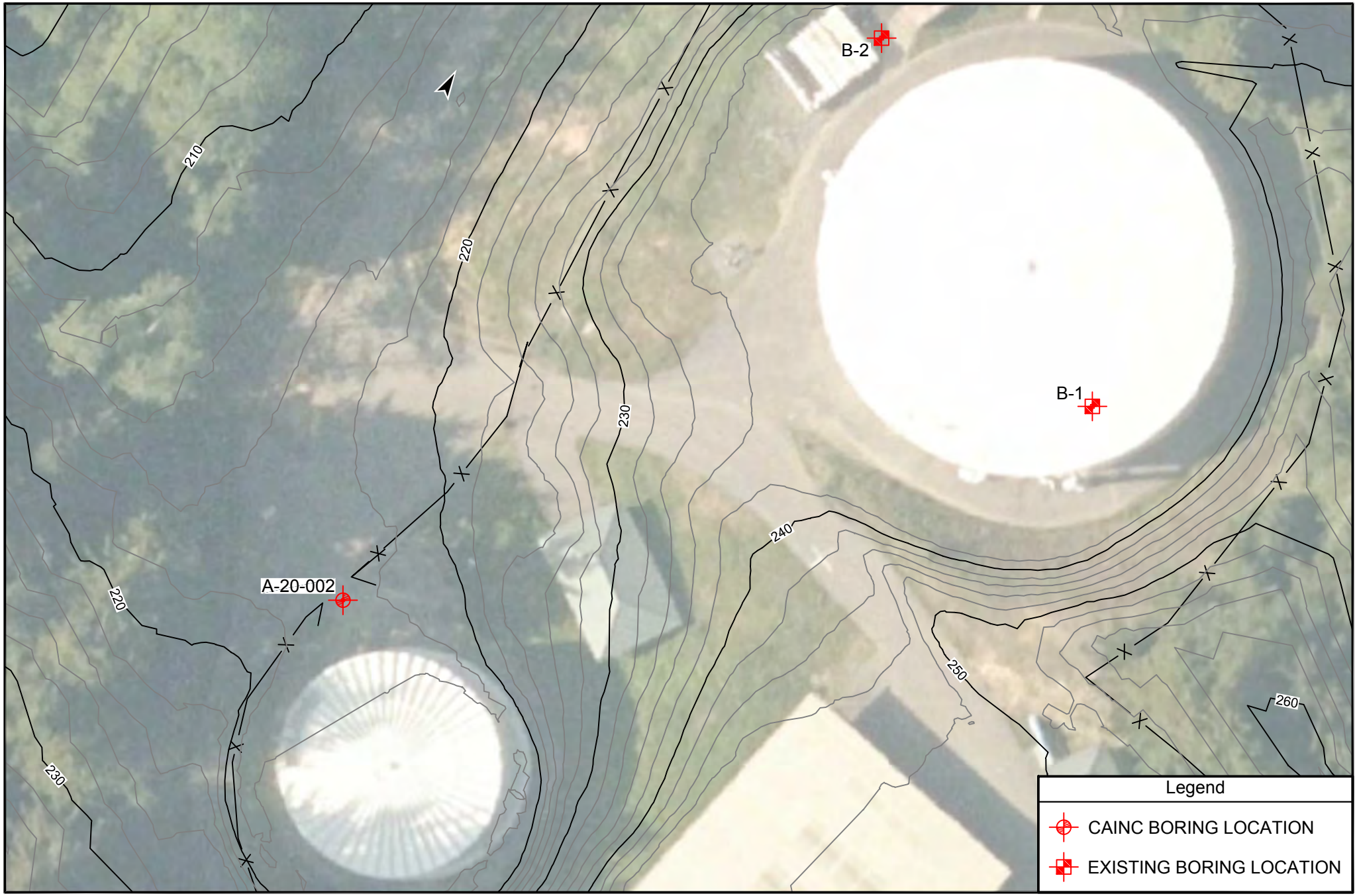
Figure 2A
Samoa Tank
Field Exploration
Map

Proj. No:	20-651.1
Scale:	1"=40'
Date:	12/23/20



North

Source:
Topographic data provided by GHD via electronic transfer on 12/24/20

Design file provided by GHD via electronic transfer on 12/15/2020

Basemap: AutoCAD Civil3D Geolocation Tool, using Bing Maps

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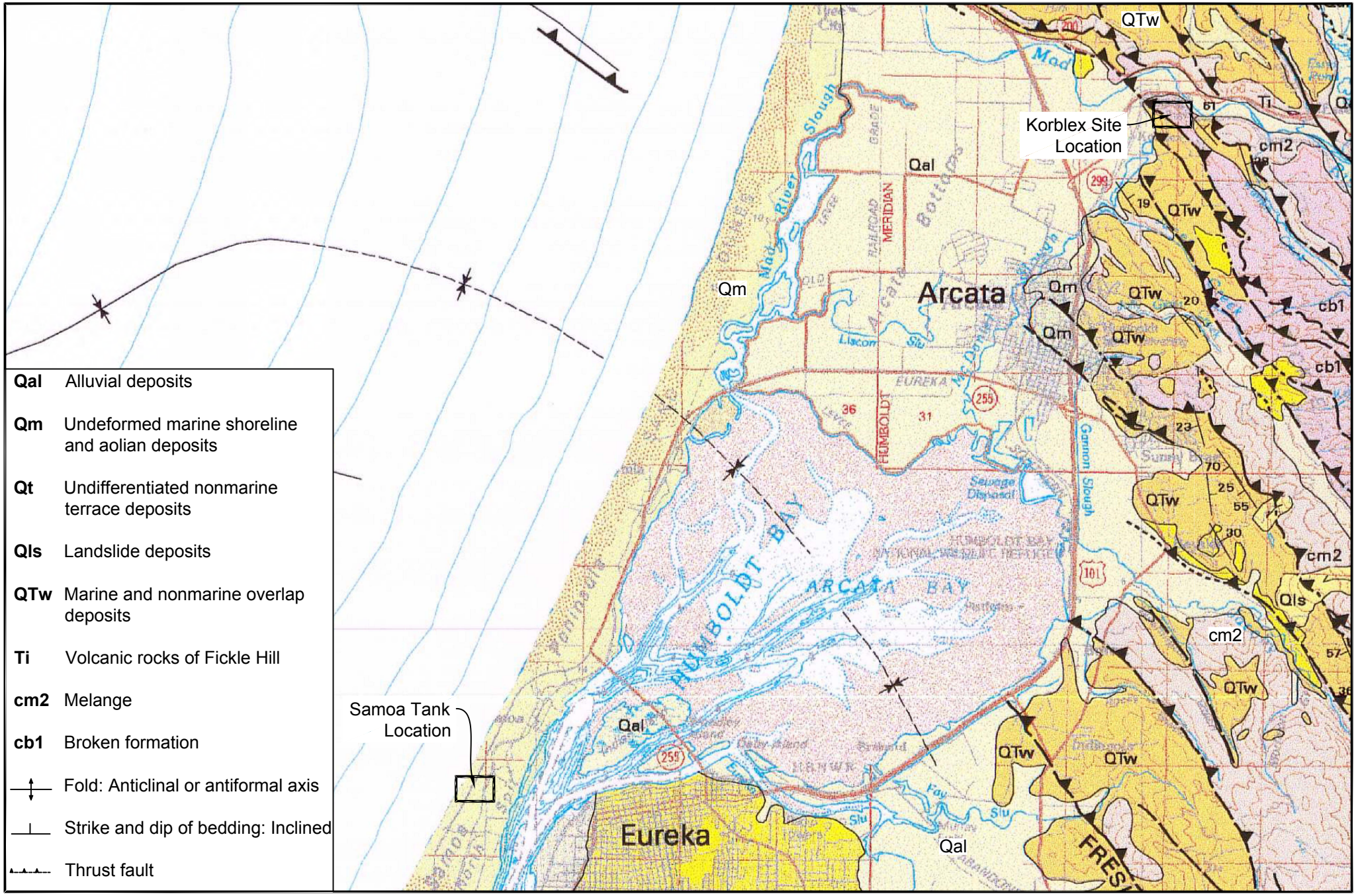
Figure 2B
Korblex Tanks
Field Exploration
Map

Proj. No:	20-651.1
Scale:	1"=40'
Date:	12/23/20



North

Source: McLaughlin, R.J., Ellen, S.D., Blake, M.C., Jayko, A.S., Irwin, W.P., Aalto, K.R., Carver, G.A., Clarke, S.H., Barnes, J.B., Cecil, J.D., and Cyr, K.A.; Geology of the Cape Mendocino, Eureka, Garberville, and southwestern part of the Hayfork 30 X 60 minute quadrangles and adjacent offshore area, northern California, with digital database; Scale: 1:100,000; U.S. Geological Survey: 2000.

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HBMWD Reservoirs Seismic Retrofit

Eureka, CA

Figure 3
Geologic Map

Proj. No:	20-651.1
Scale:	1"=7,000'
Date:	12/22/20

LEGEND

Quaternary Fault (Age)	Quaternary Fault (Age)	Location
<150 years	<750,000 years	Well Constrained
<15,000 years	<1.6 million years	Moderately Constrained
<130,000 years		Inferred

North

Source:
Basemap: AutoCAD Civil3D Geolocation Tool, using Bing Maps

Fault Data: USGS GIS Data

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HBMWD Reservoirs Seismic Retrofit

Eureka, CA

Figure 4
Fault Activity Map

Proj. No:	20-651.1
Scale:	1"=40,000'
Date:	12/22/20

APPENDIX II

Boring Log Legend
Boring Logs
Previous Boring Logs (1995)

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTS

!	Consolidation (ASTM D 2435)
!"	Collapse Potential (ASTM D 4546)
!#	Compaction Curve (CTM 216)
!$	Corrosion, Sulfates, Chlorides (CTM 643, CTM 417, CTM 422)
!%	Consolidated Undrained Triaxial (ASTM D 4767)
&$	Drained Residual Shear Strength (ASTM D 6467)
&'	Direct Shear (ASTM D 3080)
()	Expansion Index (ASTM D 4829)
*	Moisture Content (ASTM D 2216)
+!	Organic Content (ASTM D 2974)
#	Permeability (CTM 220)
#,	Particle Size Analysis (ASTM D 422)
#)	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89, AASHTO T 90)
#"	Point Load Index (ASTM D 5731)
#*	Pressure Meter
$	R-Value (CTM 301)
'(	Sand Equivalent (CTM 217)
'-	Specific Gravity (AASHTO T 100)
'.	Swell Potential (ASTM D 4546)
%!	Unconfined Compression - Soil (ASTM D 2166) Unconfined Compression - Rock (ASTM D 7012-C)
%%	Unconsolidated Undrained Triaxial (ASTM D 2850)
%.	Unit Weight (ASTM D 7263)

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT)
- Standard California Sampler (ID 2.0 in.)
- Modified California Sampler (ID 2.5 in.)
- Shelby Tube
- Piston Sampler
- NX Rock Core
- HQ Rock Core
- Bulk Sample
- Other (see remarks)

DRILLING METHOD SYMBOLS

- Auger Drilling
- Rotary Drilling
- Dynamic Cone or Hand Driven
- Diamond Core

WATER LEVEL SYMBOLS

- First Water Level Reading (during drilling)
- Static Water Level Reading (short-term)
- Static Water Level Reading (long-term)

$(/($(0!(1 Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010) with Errata Sheet (2015).

CONSISTENCY OF COHESIVE SOILS

Descriptor	Unconfined Compressive Strength (tsf)	Pocket Penetrometer (tsf)	Torvane (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 - 0.50	0.25 - 0.50	0.12 - 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 - 1.0	0.50 - 1.0	0.25 - 0.50	Can be penetrated several inches by thumb with moderate effort
Stiff	1.0 - 2.0	1.0 - 2.0	0.50 - 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2.0 - 4.0	2.0 - 4.0	1.0 - 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

APPARENT DENSITY OF COHESIONLESS SOILS

Descriptor	SPT N_{60} !"#$%&'(')*'+;-./&0
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

MOISTURE

Descriptor	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS

Descriptor	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

SOIL PARTICLE SIZE

Descriptor		Size
Boulder		> 12 inches
Cobble		3 to 12 inches
Gravel	Coarse	3/4 inch to 3 inches
	Fine	No. 4 Sieve to 3/4 inch
Sand	Coarse	No. 10 Sieve to No. 4 Sieve
	Medium	No. 40 Sieve to No. 10 Sieve
	Fine	No. 200 Sieve to No. 40 Sieve
Silt and Clay		Passing No. 200 Sieve

PLASTICITY OF FINE-GRAINED SOILS

Descriptor	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to reach the plastic limit; it cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

CEMENTATION

Descriptor	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

1232124526 Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

ROCK GRAPHIC SYMBOLS


IGNEOUS ROCK


SEDIMENTARY ROCK


METAMORPHIC ROCK

BEDDING SPACING

Descriptor	Thickness or Spacing
Massive	> 10 ft
Very thickly bedded	3 ft - 10 ft
Thickly bedded	1 ft - 3 ft
Moderately bedded	4 in - 1 ft
Thinly bedded	1 in - 4 in
Very thinly bedded	1/4 in - 1 in
Laminated	< 1/4 in

WEATHERING DESCRIPTORS FOR INTACT ROCK

	Diagnostic Features					
	Chemical Weathering-Discoloration-Oxidation		Mechanical Weathering and Grain Boundary Conditions	Texture and Solutioning		
Descriptor	Body of Rock	Fracture Surfaces		Texture	Solutioning	General Characteristics
Fresh	No discoloration, not oxidized	No discoloration or oxidation	No separation, intact (tight)	No change	No solutioning	Hammer rings when crystalline rocks are struck.
Slightly Weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull	Minor to complete discoloration or oxidation of most surfaces	No visible separation, intact (tight)	Preserved	Minor leaching of some soluble minerals may be noted	Hammer rings when crystalline rocks are struck. Body of rock not weakened.
Moderately Weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty"; feldspar crystals are "cloudy"	All fracture surfaces are discolored or oxidized	Partial separation of boundaries visible	Generally preserved	Soluble minerals may be mostly leached	Hammer does not ring when rock is struck. Body of rock is slightly weakened.
Intensely Weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in situ disaggregation (refer to grain boundary conditions)	All fracture surfaces are discolored or oxidized; surfaces are friable	Partial separation, rock is friable; in semi-arid conditions, granitics are disaggregated	Altered by chemical disintegration such as via hydration or argillation	Leaching of soluble minerals may be complete	Dull sound when struck with hammer; usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures or veinlets. Rock is significantly weakened.
Decomposed	Discolored of oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay		Complete separation of grain boundaries (disaggregated)	Resembles a soil; partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete		Can be granulated by hand. Resistant minerals such as quartz may be present as "stringers" or "dikes".

Note: Combination descriptors (such as "slightly weathered to fresh") are used where equal distribution of both weathering characteristics is present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, combination descriptors should not be used where significant identifiable zones can be delineated. Only two adjacent descriptors shall be combined. "Very intensely weathered" is the combination descriptor for "decomposed to intensely weathered".

!"#$"%&'$(#"'#"$()"#*'+#"$,

$$\frac{\Sigma \text{ Length of the recovered core pieces (in.)}}{\text{Total length of core run (in.)}} \times 100$$

#($-'./012&*'3"425%0&2(%'+#.3,

$$\frac{\Sigma \text{ Length of intact core pieces > 4 in.}}{\text{Total length of core run (in.)}} \times 100$$

%6789RQD* indicates soundness criteria not met

ROCK HARDNESS

Descriptor	Criteria
Extremely Hard	Specimen cannot be scratched with pocket knife or sharp pick; can only be chipped with repeated heavy hammer blows
Very hard	Specimen cannot be scratched with pocket knife or sharp pick; breaks with repeated heavy hammer blows
Hard	Specimen can be scratched with pocket knife or sharp pick with heavy pressure; heavy hammer blows required to break specimen
Moderately Hard	Specimen can be scratched with pocket knife or sharp pick with light or moderate pressure; breaks with moderate hammer blows
Moderately Soft	Specimen can be grooved 1/16 in. with pocket knife or sharp pick with moderate or heavy pressure; breaks with light hammer blow or heavy hand pressure
Soft	Specimen can be grooved or gouged with pocket knife or sharp pick with light pressure; breaks with light to moderate hand pressure
Very Soft	Specimen can be readily indented, grooved, or gouged with fingernail, or carved with pocket knife; breaks with light manual pressure.

FRACTURE DENSITY

Descriptor	Criteria
Unfractured	No fractures
Very Slightly Fractured	Core lengths greater than 3 ft.
Slightly Fractured	Core lengths mostly from 1 ft. to 3 ft.
Moderately Fractured	Core lengths mostly from 4 in. to 1 ft.
Intensely Fractured	Core lengths mostly from 1 in. to 4 in.
Very Intensely Fractured	Mostly chips and fragments.

#":"#"%$"9 Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

LOG OF BORING R-20-001

PROJECT NO: 20-651.1
PROJECT: HBMWD Reservoirs Seismic Retrofit
LOCATION: Samoa, CA
COUNTY: Humboldt
CLIENT: HBMWD
LOGGED BY: YYG
DEPTH OF BORING: 51.5 (ft)

BEGIN DATE: 11/30/2020
COMPLETION DATE: 11/30/2020
SURFACE ELEVATION: 22 (ft)
SURFACE CONDITION: Asphalt
WATER DEPTH: 17.5 ft
READING TAKEN: 11/30/20
HAMMER EFFICIENCY: 78.4 (%)

DRILLING CONTRACTOR: Taber Drilling
DRILLING METHOD: Soild-Stem Auger, Mud Rotary
DRILL RIG: CME 55 truck
HAMMER TYPE: Automatic; 140 lbs; 30 in drop
SAMPLER TYPE & SIZE: SPT (1.4" ID)
BOREHOLE DIAMETER: 4.0 in.
BACKFILL METHOD: Neat Cement Grout

FIELD									LABORATORY								
ELEVATION (ft)	DEPTH (ft)	SAMPLE	SAMPLE NO	BLOWS PER 6 IN.	BLOWS PER FOOT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	RECOVERY(%)	RQD (%)	PLASTIC LIMIT	LIQUID LIMIT	MOISTURE (%)	D. DENSITY (PCF)	% PASSING 200 SIEVE	DRILL METHOD / CASING DEPTH	REMARKS
21	1		1	6 7	13			ASPHALT CONCRETE(2") Poorly-graded SAND (SP); medium dense; light gray; moist; mostly fine SAND; trace fines.	78								
20	2		2	5 6	11				89								
19	3																
18	4		3	2 3	5			loose	94								
17	5		4	7 8	15			medium dense	89				5		3		
16	6																
15	7		5	6 9	15				100								
14	8																
13	9																
12	10		6	9 7 7	14				100								
11	11																
10	12																
9	13							Clayey Sand (SC); medium dense; light gray; dry to moist; mostly coarse to fine SAND; few fine GRAVEL;; little fines.								
8	14																
7	15		7	8 7 11	18				83								
6	16														25		
5	17	▽															
4	18							Poorly-graded SAND (SP); dense; light gray; wet; mostly fine SAND; trace fines.									
3	19																
2	20		8	6 11 12	23				100								hole caving switch to mud rotary; 94 mm bit; 6 inches diameter,15 ft casing 13.5 ft in the ground.
1	21														2		
0	22																
-1	23							Poorly-graded SAND with GRAVEL (SP); very dense; light gray; wet; mostly coarse to fine SAND; little fine GRAVEL;; trace fines.									
-2	24																
-3	25		9	26 40 47	87				89								
-4	26												22		3		
-5	27																
-6	28							Poorly-graded SAND (SP); very dense; light gray; wet; mostly fine SAND; trace fines.									
-7	29																
-8	30		10	18 24 23	47				100								
-9	31																
-10	32																

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FIELD									LABORATORY								
ELEVATION (ft)	DEPTH (ft)	SAMPLE	SAMPLE NO	BLOWS PER 6 IN.	BLOWS PER FOOT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	RECOVERY(%)	RQD (%)	PLASTIC LIMIT	LIQUID LIMIT	MOISTURE (%)	D. DENSITY (PCF)	% PASSING 200 SIEVE	DRILL METHOD	CASING DEPTH	REMARKS
-12	34																	
-13	35		11	15 16 20	36			dense	100									
-14	36																	
-15	37																	
-16	38																	
-17	39																	
-18	40		12	19 28 29	57			very dense	89									
-19	41																	
-20	42																	
-21	43																	
-22	44																	
-23	45		13	15 24 44	68			medium-fine SAND;	100									
-24	46																	
-25	47																	
-26	48																	
-27	49																	
-28	50		14	17 42 50/5.5					100									
-29	51																	
-30	52							Bottom of borehole at 51.5 ft bgs										
-31	53																	
-32	54																	
-33	55																	
-34	56																	
-35	57																	
-36	58																	
-37	59																	
-38	60																	
-39	61																	
-40	62																	
-41	63																	
-42	64																	
-43	65																	
-44	66																	
-45	67																	
-46	68																	
-47	69																	
-48	70																	
-49	71																	
-50	72																	

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Crawford & Associates, Inc.
1100 Corporate Way, Suite 230
Sacramento, CA 95831
(916) 455-4225

PROJECT NUMBER: 20-651.1
PROJECT: HBMWD Reservoirs Seismic Retrofit
BORING: R-20-001
ENTRY BY: YYG
CHECKED BY: HFW

LOG OF BORING A-20-002

PROJECT NO: 20-651.1
PROJECT: HBMWD Reservoirs Seismic Retrofit
LOCATION: Korblex, CA
COUNTY: Humboldt
CLIENT: HBMWD
LOGGED BY: YYG
DEPTH OF BORING: 51.5 (ft)

BEGIN DATE: 12/01/2020
COMPLETION DATE: 12/01/2020
SURFACE ELEVATION: 218 (ft)
SURFACE CONDITION: Asphalt
WATER DEPTH: 25.7 ft
READING TAKEN: 12/01/20
HAMMER EFFICIENCY: 78.4 (%)

DRILLING CONTRACTOR: Taber Drilling
DRILLING METHOD: Solid-Stem Auger
DRILL RIG: CME 55 truck
HAMMER TYPE: Automatic; 140 lbs; 30 in drop
SAMPLER TYPE & SIZE: SPT (1.4" ID), MCAL (2.4" ID)
BOREHOLE DIAMETER: 4.0 in.
BACKFILL METHOD: Neat Cement Grout

FIELD									LABORATORY								
ELEVATION (ft)	DEPTH (ft)	SAMPLE	SAMPLE NO	BLOWS PER 6 IN.	BLOWS PER FOOT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	RECOVERY(%)	RQD (%)	PLASTIC LIMIT	LIQUID LIMIT	MOISTURE (%)	D. DENSITY (PCF)	% PASSING 200 SIEVE	DRILL METHOD	CASING DEPTH	REMARKS
218	0							ASPHALT CONCRETE(3")										
217	1							AGGREGATE BASE(7")										
216	2		1	5 4	9			Lean CLAY/Elastic SILT (CL/MH); brown; moist; few SAND; mostly medium plasticity fines [FILL]	89		29	51	34					
215	3		2	6 6	12	1.50		Lean CLAY(CL); stiff; brown; moist; few SAND; mostly medium plasticity fines.	83									
214	4		3	1 3	4	0.75		medium stiff	89									
213	5																	
212	6																	
211	7																	
210	8		4	3 9 15	24	+4.5		very stiff; mottled brown	83									
209	9												23	103				Unconfined Compressive Strength 4,219 psf Shear Strength 2,110 psf
208	10		5	4 9 11	20	+4.5			83									
207	11																	
206	12																	
205	13							CLAYEY SAND/SANDY CLAY (SC/CL); medium dense; bluish gray; moist; mostly coarse to fine SAND few subangular GRAVEL; some low plasticity fines.										
204	14																	
203	15		6	7 6 9	15				83									
202	16												24	104	49			
201	17																	
200	18																	
199	19																	
198	20		7	3 9 11	20				94									
197	21																	
196	22																	
195	23																	
194	24																	
193	25		8	3 3 4	7	2.50		Lean CLAY (CL); medium stiff; bluish gray; wet; few fine SAND; mostly low plasticity fines.	100		18	29	24					
192	26																	
191	27																	
190	28							CLAYEY SAND (SC); dense; bluish gray; wet; mostly coarse to fine SAND;fine GRAVEL; few; little low plasticity fines.										
189	29																	
188	30		9	9 17 26	43				100									
187	31												18	118	25			
186	32																	

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ELEVATION (ft)	DEPTH (ft)	SAMPLE	SAMPLE NO	BLOWS PER 6 IN.	BLOWS PER FOOT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	RECOVERY(%)	RQD (%)	LABORATORY: PLASTIC LIMIT	LABORATORY: LIQUID LIMIT	LABORATORY: MOISTURE (%)	LABORATORY: D. DENSITY (PCF)	LABORATORY: % PASSING 200 SIEVE	DRILL METHOD	CASING DEPTH	REMARKS
184	34																	
183	35		10	10 15 20	35				28									
182	36																	
181	37																	
180	38																	
179	39																	
178	40		11	6 12 14	26				83									
177	41																	
176	42																	
175	43																	
174	44																	
173	45		12	8 5 13	18			medium dense;some low plastic fines	28				16	118	34			
172	46																	
171	47																	
170	48																	
169	49																	
168	50		13	9 11 13	24			dense	67									
167	51																	
166	52							Bottom of borehole at 51.5 ft bgs										
165	53																	
164	54																	
163	55																	
162	56																	
161	57																	
160	58																	
159	59																	
158	60																	
157	61																	
156	62																	
155	63																	
154	64																	
153	65																	
152	66																	
151	67																	
150	68																	
149	69																	
148	70																	
147	71																	
146	72																	

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Crawford & Associates, Inc.
1100 Corporate Way, Suite 230
Sacramento, CA 95831
(916) 455-4225

PROJECT NUMBER: 20-651.1
PROJECT: HBMWD Reservoirs Seismic Retrofit
BORING: A-20-002
ENTRY BY: YYG
CHECKED BY: HFW

Taber Consultants
Engineers and Geologists
536 Galveston Street
West Sacramento, CA 95691
(916) 371-1690 F (916) 371-7265
Since 1954

TEST BORING LOG

1P2/392/127-2

TYPE 4-Inch Auger

ELEVATION 247.4

BORING No 1

UNCONFINED COMPRESSIVE STRENGTH (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu ft)	Moisture (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS	
		89	20	29	14	1				Very stiff orange brown SILTY CLAY to slightly CLAYEY SILT with black ORGANIC stringers and cemented fragments
6 9		102	24	30	14	2	5		CL / ML	
31		78	44	21	14	3				
	E G,A S				Bag	A	10			Soft-very soft (locally stiff) orange brown and light gray/buff CLAYEY SILT with ROCK fragments and rounded PEBBLES
				16	25	4	15			
10		61	65	4	14	5				
					Bag	B			ML / CL	
	S	74	45	15	25	6	20			
13		81	41	9	14	7				
08		81	41	8	14	8	25			
08		86	34	13	14	9	30			Stiff-very stiff orange brown CLAYEY SILT with ROCK fragments and rounded PEBBLES
10		94	28	17	14	10	35		ML / GM	
							40			10/11/95

--CONTINUED--

THE BORING LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES

LOGGED BY T A K | DATE 10-10-95

10/95 1392127X.DWG 1 1 232

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West Sacramento CA 95691
(916) 371-1690 F (916) 371-7265
Since 1954

TEST BORING LOG

1P2/392/127-2

TYPE 4-Inch Auger

ELEVATION 247.4

BORING No 1 (cont)

UNCONFINED COMPRESSIVE STRENGTH (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu ft)	Moisture (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS	
1 7		117	16	31	1 4	11			ML / GM	Stiff-very stiff orange brown CLAYEY SILT with ROCK fragments and rounded PEBBLES
										▼ 10/10/95
							45			
1 4		114	16	37	1 4	12			GC / ML	Dense orange brown and brown CLAYEY SILTY SAND with rounded GRAVEL and sedimentary ROCK fragments
		120	15	39	1 4	13	50			
										Groundwater measured at 44 3ft depth 10-10-95 and 39 2ft depth 10-11-95 2-inch PVC (lower 20ft slotted) installed to depth 48 5ft
							55			
							60			
							65			
							70			
							75			
							80			

THE BORING LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES

LOGGED BY T A K | DATE 10-10-95

10/95 1392127B.DWG 1=1 232

Taber Consultants
Engineers and Geologists
536 Galveston Street
West Sacramento, CA 95691
(916) 371-1690 Fax (916) 371-7265
Since 1954

TEST BORING LOG

1P2/392/127-2

TYPE 4-Inch Auger ELEVATION 228.0 BORING No 2

UNCONFINED COMPRESSIVE STRENGTH (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu ft)	Moisture (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS	
	S	83	22	23	2 5	1				Very stiff and stiff orange brown SILTY CLAY and CLAYEY SILT with black ORGANIC stringers
8 8		105	21	23	1 4	2				
		81	23	24	2 5	3	5			
		85	27	37	2 0	4				
					Bag	C			CL / ML	
3 4		93	29	20	1 4	5	10			
				18	2 5	6				
		79	42	18	2 0	7				
1 4		66	61	15	1 4	8	15			
				21	2 5	9				
		92	31	17	2 0	10				
1 0		95	31	12	1 4	11	20			
				12	2 5	12				Stiff orange brown and light gray CLAYEY SILT with rounded PEBBLES and sedimentary ROCK fragments
		79	37	14	2 0	13			ML / GM	
0 6		98	27	12	1 4	14	25			
				26	2 5	15			10/11 /95	
		96	30	26	2 0	16			GM	Very stiff brown SANDY CLAYEY SILT with PEBBLES to SANDY fine-coarse GRAVEL (PEBBLES and sedimentary ROCK fragments) within CLAYEY SILT matrix
		106	19	21	1 4	17	30			
0 7		108	20	21	1 4	18				Compact-dense brown very fine-fine SANDY and CLAYEY SILT with cemented fragments and rounded PEBBLES
1 7		111	22	21	1 4	19	35		GM / ML	
2 0		120	17	37	1 4	20	40			No free groundwater encountered during drilling Groundwater measured at 25 5ft depth 10-11-95

THE BORING LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES

LOGGED BY T A K | DATE 10-10-95

10/95 1392127.CDWG 1 1 2.52

APPENDIX III

Laboratory Test Results

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: HBMWD Reservoir Seismic Retrofit
CAInc File No: 20-651.1
Date: 12/22/20
Technician: YYG

MOISTURE-DENSITY TESTS - D2216/D7263

	1	2	3	4	5
Sample No.	R-20-001-4A	R-20-001-9A	A-20-002-1A	A-20-002-4A	A-20-002-6A
USCS Symbol	SP	SP	MH	CL	SC
Depth (ft.)	6	26	2	8.5	16
Sample Length (in.)	-	-	-	5.850	5.428
Diameter (in.)	-	-	-	2.383	2.374
Sample Volume (ft^3)	-	-	-	0.01509	0.01390
Total Mass Soil+Tube (g)	-	-	-	865.8	1090.0
Mass of Tube (g)	-	-	-	0.0	274.3
Tare No.	2010	2035	D7	151	G24
Tare (g)	126.3	127.8	13.7	14.3	13.7
Wet Soil + Tare (g)	336.3	449.4	65.5	62.3	75.7
Dry Soil + Tare (g)	326.7	392.1	52.3	53.4	63.5
Dry Soil (g)	200.4	264.3	38.6	39.1	49.9
Water (g)	9.6	57.3	13.3	8.9	12.2
Moisture (%)	**4.8**	**21.7**	**34.4**	**22.8**	**24.4**
Dry Density (pcf)	**-**	**-**	**-**	**103.0**	**104.0**

Notes:

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: HBMWD Reservoir Seismic Retrofit
CAInc File No: 20-651.1
Date: 12/22/20
Technician: YYG

MOISTURE-DENSITY TESTS - D2216/D7263

	1	2	3	4	5
Sample No.	A-20-002-8A	A-20-002-9A	A-20-002-12A		
USCS Symbol	CL	SP-SC	SC		
Depth (ft.)	26	31	46		
Sample Length (in.)	-	4.236	4.761		
Diameter (in.)	-	2.359	1.402		
Sample Volume (ft^3)	-	0.01071	0.00425		
Total Mass Soil+Tube (g)	-	948.3	383.0		
Mass of Tube (g)	-	275.2	117.9		
Tare No.	139	D20	159		
Tare (g)	14.0	13.9	14.0		
Wet Soil + Tare (g)	61.3	76.4	66.8		
Dry Soil + Tare (g)	52.1	67.0	59.4		
Dry Soil (g)	38.1	53.2	45.3		
Water (g)	9.2	9.4	7.4		
Moisture (%)	**24.2**	**17.6**	**16.4**		
Dry Density (pcf)	**-**	**117.7**	**118.0**		

Notes:

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: HBMWD Reservoir Sesimic Retrofit
CAInc File No: 20-651.1
Date: 12/15/20
Technician: YYG

200 Wash - ASTM D1140
Method A

Max Particle Size (100% Passing)	Standard Sieve Size	Recommended Min Mass of Test Specimens
2 mm or less	No. 10	20 g
4.75 mm	No. 4	100 g
9.5 mm	3/8 "	500 g
19.0 mm	3/4 "	2.5 kg
37.5 mm	1 1/2 "	10 kg
75.0 mm	3 "	50 kg

Table from 6.2 of ASTM D1140

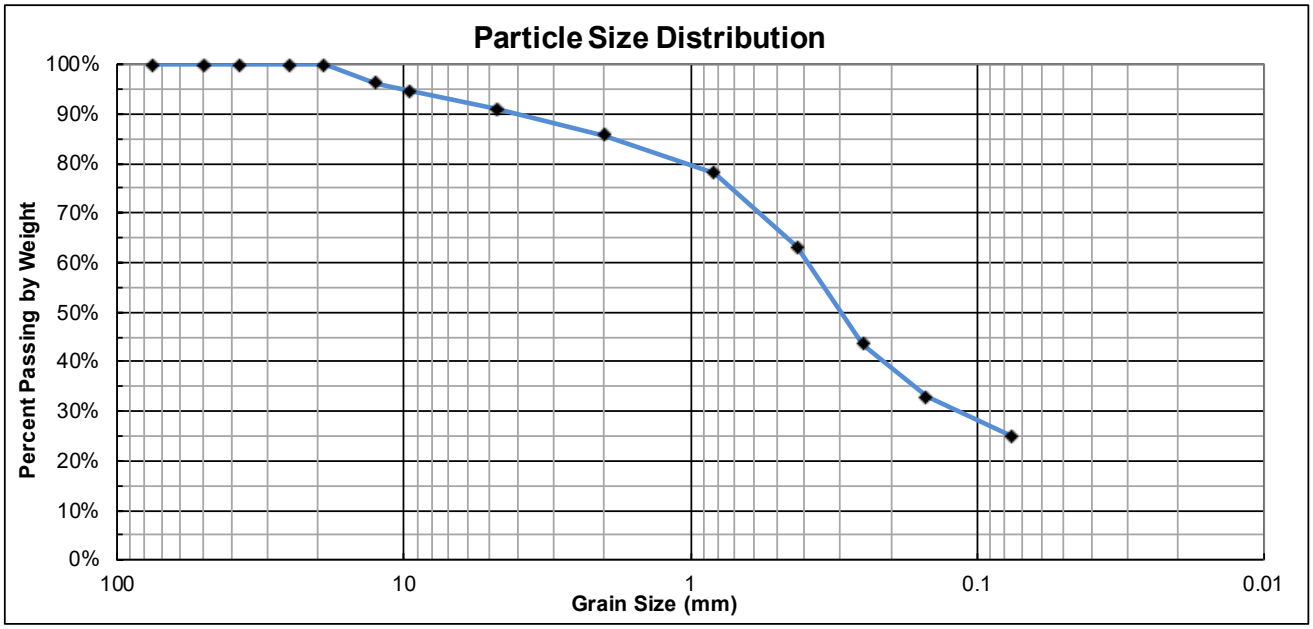
Sample No.	R-20-001-4A	R-20-001-8A	A-20-002-12A		
USCS Symbol	SP	SP	SC		
Depth (ft.)	6	21	46		
Tare No.	2010	2031	2030		
Tare (g)	126.3	128.8	128		
Dry Soil + Tare (g)	326.7	414.1	307.6		
Dry Mass before (g)	200.4	285.3	179.6		
Dry Mass after (g)	194.5	279.9	118.7		
Percent Fines (%)	3	2	34		

Notes:

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: HBMWD Reservoir Seismic Retrofit
CAInc File No: 20-651.1
Date: 12/22/20
Technician: LAD
Sample ID: R-20-001-7A
Depth (ft): 16
USCS Classification: Clayey Sand (SC)

ASTM 6913 - Method A



% Cobble	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt/Clay
	0	9	5	23	38	
0	**9**		**66**			**25**

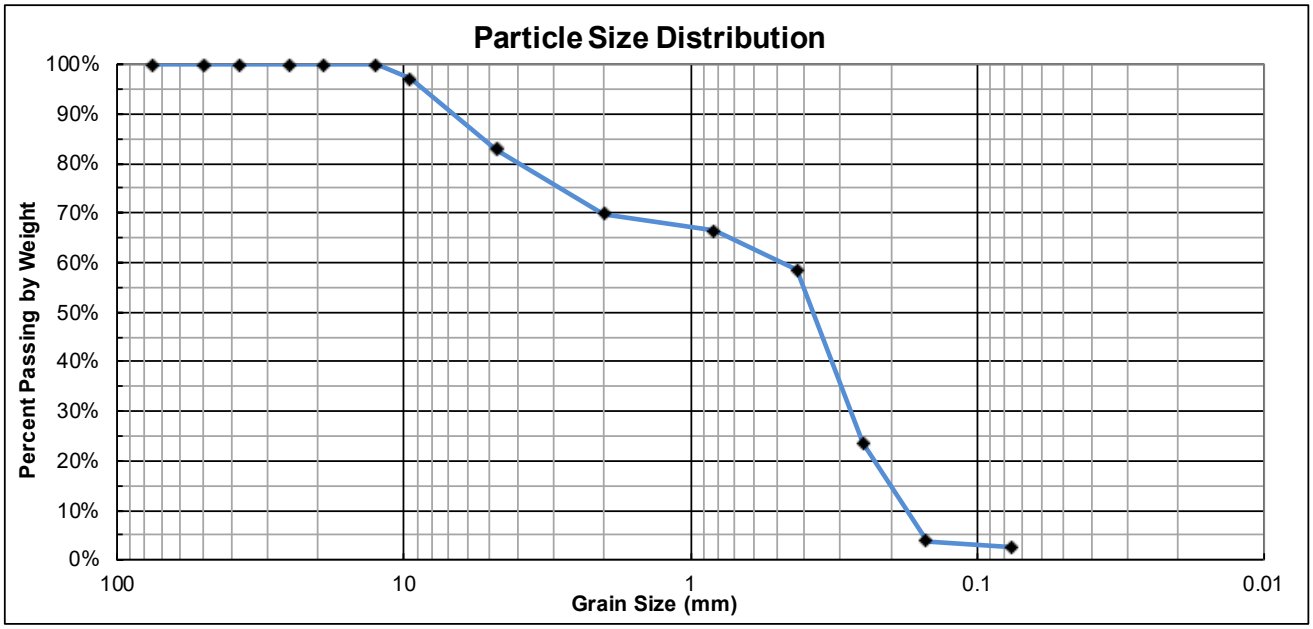
		Sieve #	Opening mm	Cummulative Mass Retained (g)	% Passing %
Cobbles		**3"**	75	0.0	100%
Gravel	Coarse	**2"**	50	0.0	100%
		1-1/2"	37.5	0.0	100%
		1"	25.0	0.0	100%
		3/4"	19.0	0.0	100%
	Fine	**1/2"**	12.5	11.8	96%
		3/8"	9.50	16.8	95%
		#4	4.75	28.1	91%
Sand	Coarse	**#10**	2.00	44.3	86%
	Medium	**#20**	0.825	67.6	78%
		#40	0.425	113.7	63%
	Fine	**#60**	0.250	174.0	43%
		#100	0.150	206.9	33%
		#200	0.075	231.3	25%

Coefficient of Uniformity	Coefficient of Curvature
Cu = NA	Cc = NA

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: HBMWD Reservoir Seismic Retrofit
CAInc File No: 20-651.1
Date: 12/22/20
Technician: LAD
Sample ID: R-20-001-9A
Depth (ft):26
USCS Classification: Poorly Graded Sand with Gravel (SP)

ASTM 6913 - Method A



% Cobble	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt/Clay
	0	17	13	11	56	
0	**17**		**80**			**3**

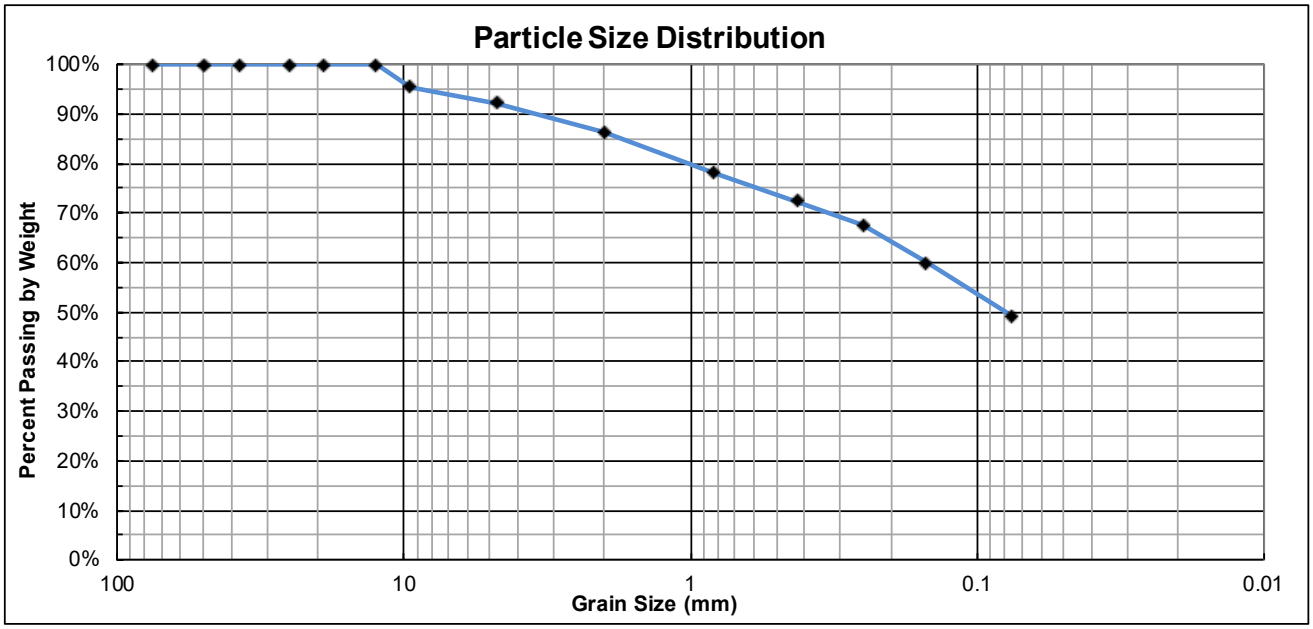
		Sieve #	Opening mm	Cummulative Mass Retained (g)	% Passing %
Cobbles		**3"**	75	0.0	100%
Gravel	Coarse	**2"**	50	0.0	100%
		1-1/2"	37.5	0.0	100%
		1"	25.0	0.0	100%
		3/4"	19.0	0.0	100%
	Fine	**1/2"**	12.5	0.0	100%
		3/8"	9.50	7.9	97%
		#4	4.75	45.4	83%
Sand	Coarse	**#10**	2.00	79.7	70%
	Medium	**#20**	0.825	88.9	66%
		#40	0.425	109.6	59%
	Fine	**#60**	0.250	202.4	23%
		#100	0.150	254.2	4%
		#200	0.075	257.5	3%

Coefficient of Uniformity	Coefficient of Curvature
Cu = 2.8	Cc = 0.9

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: HBMWD Reservoir Seismic Retrofit
CAInc File No: 20-651.1
Date: 12/22/20
Technician: LAD
Sample ID: A-20-002-6A
Depth (ft): 16
USCS Classification: Clayey Sand(SC)

ASTM 6913 - Method A



% Cobble	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt/Clay
	0	8	6	14	23	
0	**8**		**43**			**49**

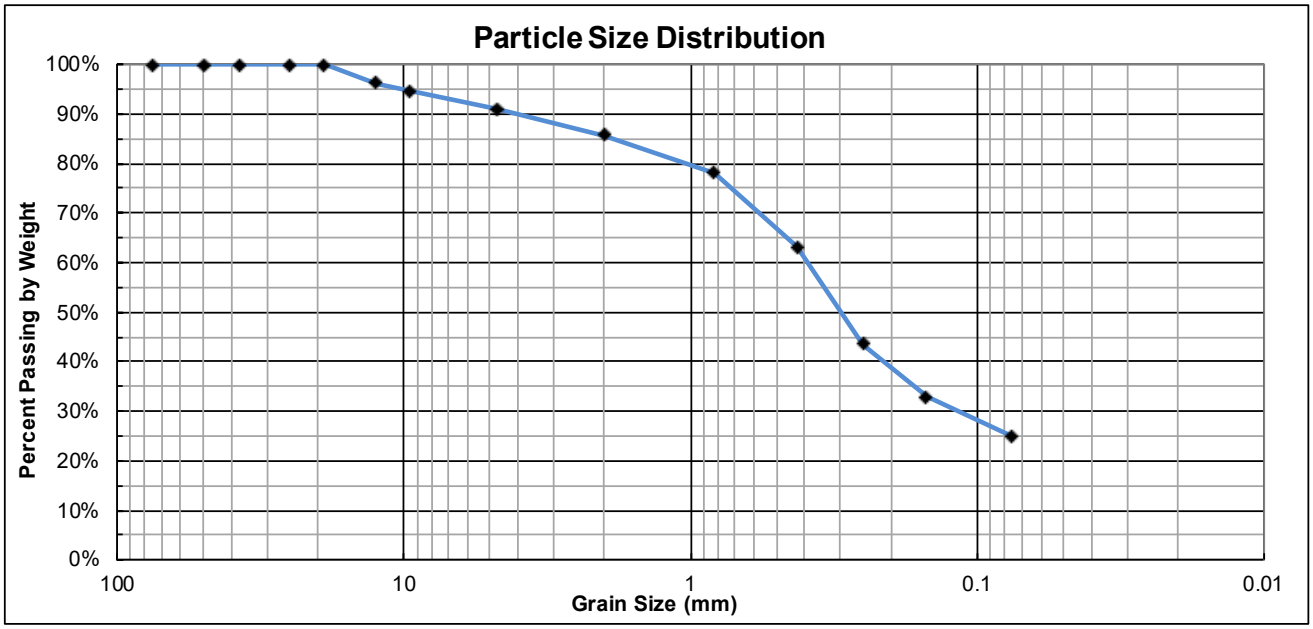
		Sieve #	Opening mm	Cummulative Mass Retained (g)	% Passing %
Cobbles		**3"**	75	0.0	100%
Gravel	Coarse	**2"**	50	0.0	100%
		1-1/2"	37.5	0.0	100%
		1"	25.0	0.0	100%
		3/4"	19.0	0.0	100%
	Fine	**1/2"**	12.5	0.0	100%
		3/8"	9.50	12.7	95%
		#4	4.75	21.9	92%
Sand	Coarse	**#10**	2.00	38.1	86%
	Medium	**#20**	0.825	60.6	78%
		#40	0.425	76.8	72%
	Fine	**#60**	0.250	90.4	67%
		#100	0.150	111.1	60%
		#200	0.075	141.1	49%

Coefficient of Uniformity	Coefficient of Curvature
Cu = NA	Cc = NA

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: HBMWD Reservoir Seismic Retrofit
CAInc File No: 20-651.1
Date: 12/22/20
Technician: OMR
Sample ID: A-20-002-9A
Depth (ft): 31
USCS Classification: Clayey Sand (SC)

ASTM 6913 - Method A



% Cobble	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt/Clay
	0	9	5	23	38	
0	**9**		**66**			**25**

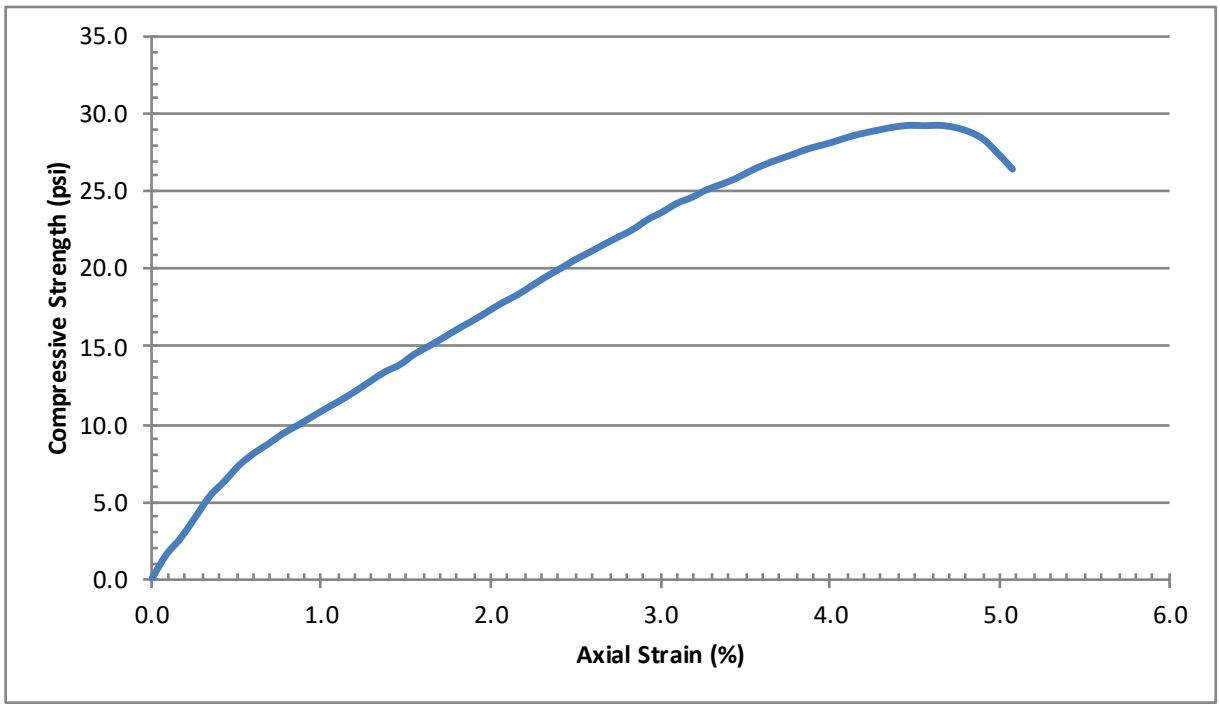
		Sieve #	Opening mm	Cummulative Mass Retained (g)	% Passing %
Cobbles		**3"**	75	0.0	100%
Gravel	Coarse	**2"**	50	0.0	100%
		1-1/2"	37.5	0.0	100%
		1"	25.0	0.0	100%
		3/4"	19.0	0.0	100%
	Fine	**1/2"**	12.5	11.8	96%
		3/8"	9.50	16.8	95%
		#4	4.75	28.1	91%
Sand	Coarse	**#10**	2.00	44.3	86%
	Medium	**#20**	0.825	67.6	78%
		#40	0.425	113.7	63%
	Fine	**#60**	0.250	174.0	43%
		#100	0.150	206.9	33%
		#200	0.075	231.3	25%

Coefficient of Uniformity	Coefficient of Curvature
Cu = NA	Cc = NA

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: HBMWD Reservoir Seismc Retrofit
CAInc File No: 20-651.1
Date: 12/16/20
Technician: YYG
Sample ID: A-20-002-4A Depth (ft): 8.5
USCS Classification: CL

UNCONFINED COMPRESSION TEST - D2166



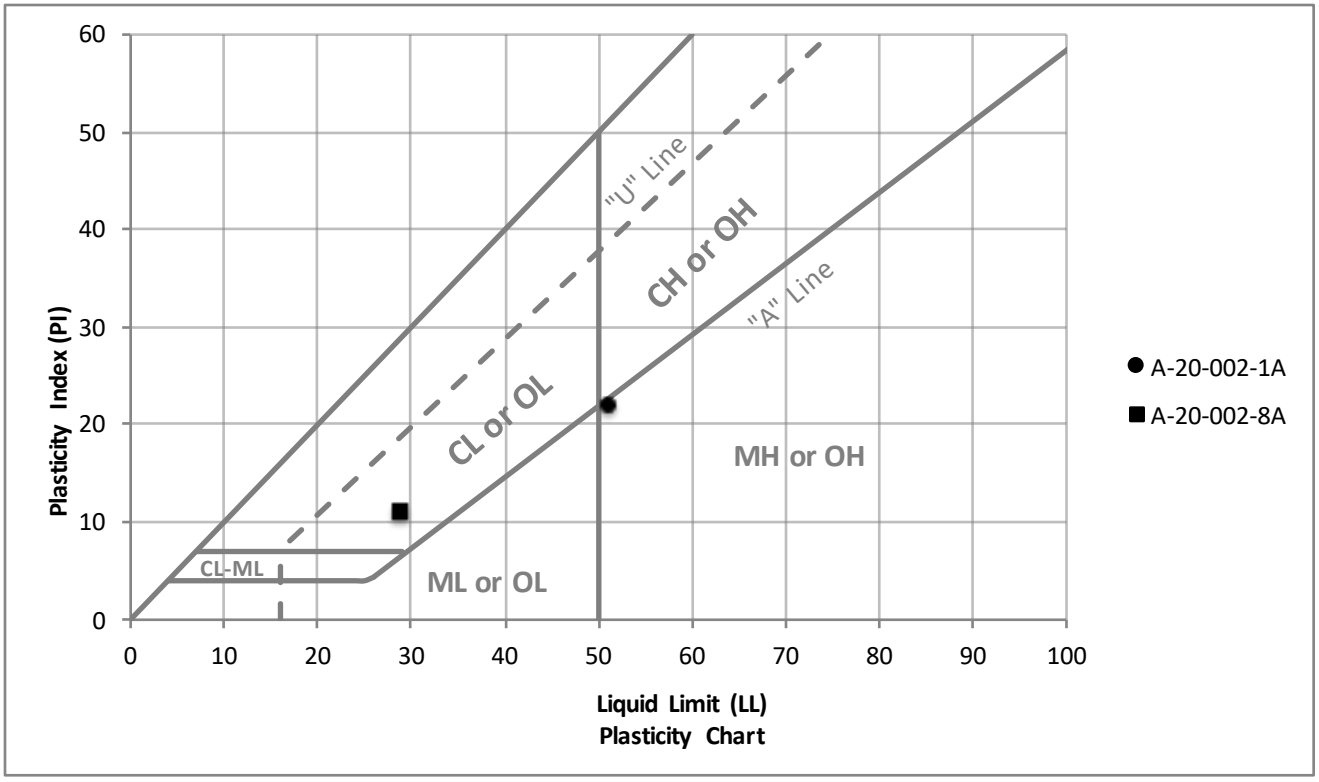
Dry Density (pcf)	**103.0**
Water Content (%)	**22.8**
Unconfined Compressive Strength (psi)	**29.3**
Unconfined Compressive Strength (psf)	**4219**
Shear Strength (psf)	**2110**
Average Height (in)	5.850
Average Diameter (in)	2.383
Rate of strain (%)	0.5
Strain at Failure (%)	4.5

Notes:

Project Name: HBMWD Reservoir Seismic Retrofit
CAInc File No: 20-651.1
Date: 12/22/21
Technician: LAD

Plastic Index - ASTM D4318

Sample ID	Depth (ft)	Liquid Limit	Plastic Limit	PI
A-20-002-1A	2	51	29	22
A-20-002-8A	26	29	18	11



APPENDIX IV

Site-Specific Hazard Analysis Memorandum

APPENDIX IV
SITE-SPECIFIC HAZARD MEMORANDUM
HBMWD RESERVOIR SEISMIC RETROFIT
SAMOA, CALIFORNIA

1 INTRODUCTION

Crawford drilled one boring in 2020 adjacent the existing tank and completed a site-specific hazard analysis for compliancy with ASCE 7-16 and 2019 CBC.

2 SITE SPECIFIC ANALYSIS

The following sections describe the site-specific ground motion analysis performed in accordance with ASCE 7-16 (with Supplement 1) and 2019 CBC.

2.1 INITIAL SEISMIC HAZARD ANALYSIS

2.1.1 SEISMIC DESIGN CRITERIA

Seismic design criteria are included in Section 11 of ASCE 7-16 (Sections referenced hereafter refer to ASCE 7-16), including mapped acceleration parameters. These mapped parameters are available online through the SEAOC/OSHPD[1] Seismic Design website, which interpolates values form the ASCE 7-16 maps using the site location.

2.1.2 SITE CLASS AND RISK CATEGORY

The site was classified as Site Class F according to Section 20.3.1 due to the potentially liquefiable soils. The shear wave velocity of 279 meters per second (m/s) in the upper 30 meters or 100 feet (V_{S30}) used for the site was developed from boring R-20-001. Crawford used correlations with SPT blow count N-values corrected for hammer efficiency. The Risk Category for the structure is III for the improvements.

2.1.3 MAPPED ACCELERATION PARAMETERS

Crawford ran the SEAOC/OSHPD Seismic Design Map website considering the site location latitude 40.8051°N and longitude 124.1990°W, Site Class E, and Risk Category III to determine the Mapped Maximum Considered Earthquake (MCE) Spectral Response Short Period (S_S), Mapped MCE Spectral Response at 1 second period (S_1), Long Period (T_L), and mapped risked coefficients (C_{RS} and C_{R1}). The S_S, S_1, T_L, C_{RS}, and C_{R1} are coordinate specific and are taken from ASCE 7-16 figures independently of site class. The mapped acceleration parameters are based on an MCE which is roughly equivalent to an earthquake with a 2% chance of exceedance in 50 years (2,475-year return period). Due to the site class F designation and a S_1, > 0.2, a site-specific analysis is required according to Section 11.4.8 for the acceleration parameters. Table 1 summarizes the mapped acceleration parameters.

[1] https://seismicmaps.org

Table 1: Mapped Acceleration Parameters

Mapped Acceleration Parameter	Value	Source
Mapped MCE_R Spectral Response Short Period (S_S)	2.832	Figure 21-1
Mapped MCE_R Spectral Response at 1 Second Period (S_1)	1.094	Figure 21-2
Long Period (T_L)	8	Figure 21-14
Mapped Risk Coefficient at Short Period (C_{RS})	0.878	Figure 22-17
Mapped Risk Coefficient at 1 Second Period (C_{R1})	0.869	Figure 22-18

2.2 HORIZONTAL GROUND MOTION HAZARD ANALYSIS

A ground motion hazard analysis accounts for the regional tectonic setting, geology, and seismicity of a specific site as well as the expected recurrence of the maximum magnitudes of the earthquakes on known faults and source zones, considering ground motion attenuation and near source effects. The methodology included in ASCE 7-16 was used to determine the site-specific ground motions of the project site, generally consisting of the following steps:

- Determine the probabilistic MCE ground motions
- Determine the deterministic MCE ground motions
- Adjust probabilistic MCE ground motions to risk-targeted maximum considered earthquake ground motions (MCE_R)
- Compare and scale the site-specific deterministic MCE ground motion with minimum spectral responses to ASCE 7-16 Supplement 1 Section 21.2.2
- Compare the deterministic ground motion to the probabilistic ground motion to determine the site-specific MCE_R ground motion
- Calculate design spectral response ground motion (2/3 of MCE_R)
- Compare the Section 21.2 design spectral response ground motion to the Section 11.4.6 design spectral response ground motion (cannot be lower than 80% Section 11.4.6 design spectral response ground motion)
- Determine the design spectral response spectrum and design acceleration parameters
- Calculate peak ground acceleration (PGA_M)

2.2.1 GROUND MOTION HAZARD ANALYSIS

Due to the location site near a subduction fault zone and nearby strike-slip and reverse faults, Crawford ran two seismic hazard analyses and site response analyses using EZ-FRISK software Version 8.06. To analyze the potential ground motion due to subduction faults, Crawford used the following attenuation relationships all equally weighted:

- Atkinson-Boore (2003) Cascadia Subduction
- Atkinson-Boore (2003) Worldwide Subduction
- Youngs (1997) Subduction

Crawford also used the following next generation attenuation relationships (NGA) all equally weighted for the nearby strike-slip and reverse faults:

- Boore-et al (2014)
- Campbell and Bozorgnia (2014)
- Chiou and Youngs (2014)

The following parameters were common to all analyses for each of the attenuation relationships:

- The V_{S30} of the site of 279 m/s
- Depth to soil with a V_S of 1,000 m/s was calculated to be 330 meters based on the methodology proposed by Chiou and Youngs (2008)
- Depth to soil with a V_S of 2,500 m/s was calculated to be 1.7 kilometers based on the methodology proposed by Campbell and Bozorgnia (2008)

2.2.2 PROBABILISTIC MCER GROUND MOTION

Seismic sources within 200 kilometers were used to determine the site-specific ground motions. The subduction fault and NGA analyses considered the following faults in Table 2.

Table 2: Summary of Seismic Sources

Attenuation Relationship Type	Source	Distance (km)	Maximum Magnitude	Mechanism	Dip Angle (degree)	Dips Direction	Site Lies
NGA	California Gridded	0.0	7.0	SS|R	90	--	Above
	Nonextensional Gridded	0.0	10.0	SS|R	90	--	Above
	Shallow - Extensional Gridded	0.0	8.0	N|S	90	--	Above
	Shallow - Nonextensional Gridded	0.0	8.0	SS|R	90	--	Above
	Mendocino Gridded, Reverse	1.8	7.3	Reverse	90	--	N
	Mendocino Gridded, Strike Slip	1.8	7.3	Reverse	30	NE	N
	Little Salmon (Offshore)	2.8	7.3	Reverse	30	NE	NE
	Little Salmon (Onshore)	4.0	7.1	Reverse	30	NE	Above
	Little Salmon Connected	4.2	7.5	Reverse	45	NE	NE

Attenuation Relationship Type	Source	Distance (km)	Maximum Magnitude	Mechanism	Dip Angle (degree)	Dips Direction	Site Lies
NGA	Table Bluff	9.9	7.2	Reverse	35	NE	SW
	Fickle Hill	13.5	7.1	Reverse	35	NE	SW
	Mad River	15.1	7.2	Reverse	35	NE	SW
	McKinleyville	16.92	7.2	Reverse	35	NE	SW
	Trinidad	22.1	7.5	Reverse	35	NE	SW
	Big Lagoon-Bald Mtn	33.7	7.5	Reverse	35	NE	SW
	Maacama-Garberville	61.9	7.4	Strike Slip	90	--	N
	Northern San Andreas	64.7	8.1	Strike Slip	90	--	N
	Bartlett Springs	84.1	7.3	Strike Slip	90	--	NW
	Extensional Gridded	142.9	7.0	N|SS	90	--	W
	Whaleshead fault zone [897]	147.3	7.0	Strike Slip	90	--	S
	897 Whaleshead fault zone (dip 90)	147.3	7.0	Strike Slip	90	--	S
	Shear 2 Gridded	152.17	7.6	Strike Slip	90	--	SW
	Battle Creek	175.8	6.7	Normal	75	S	W
	Shear 1 Gridded	189.7	7.6	Strike Slip	90	--	W
	Battle Rock fault zone [896]	190.7	7.0	Normal	35-65	E	S
	896 Battle Rock fault zone (dip 50)	190.7	7.0	Normal	50	E	S
	Great Valley 1	197.1	6.8	Reverse	15	W	NW
	California Gridded Deep	0.00	7.2	Interslab	90	--	Above

Attenuation Relationship Type	Source	Distance (km)	Maximum Magnitude	Mechanism	Dip Angle (degree)	Dips Direction	Site Lies
Subduction	Deep - California Gridded	0.00	8.0	Interslab	90	--	Above
	Deep - Oregon Gridded	143.95	8.0	Interslab	90	--	S
	Deep - Pacific NW Gridded	151.34	8.0	Interslab	90	--	W
	Cascadia Interface Composite	14.13	9.0	Interslab	5-15	E, SE	Above
	Cascadia Interface Composite - Full Rupture	16.64	9.0	Interslab	7-13	E, SE	Above
	Cascadia Interface Composite - Partial Ruptur	16.65	9.0	Interslab	7-13	E, SE	Above

EZ-FRISK software was used to determine geometric mean spectral response acceleration predicted using NGA and maximum rotated using subduction from a 5% damped response spectrum with a 2% in 50-year exceedance probability. The predicted NGA scaled to the maximum rotated spectral using the scale factor, per section 21.1. The scaled NGA controlled probabilistic spectral response accelerations (MCE) was taken as the mean maximum rotated horizontal response acceleration represented by a 5% damped acceleration response spectrum with a 2% probability of exceedance within a 50-year period.

A. RISK COEFFICIENTS

Method 1 of Section 21.2 was used to determine the probabilistic MCE_R ground motion

Mapped risk coefficients (C_{RS} and C_{R1}) were used to adjust the response accelerations to a 1% chance of collapse in 50 years per Section 21.2.1.1. The risk coefficients are summarized in Table 1, along with the source figure from ASCE 7-16.

C_{RS} was applied to accelerations at spectral periods less than or equal to 0.2 seconds. C_{R1} was applied accelerations at spectral periods greater than or equal to 1 second. For spectral periods between 0.2 and 1 seconds, the C_R value was linearly interpolated.

B. PROBABILISTIC MCER GROUND MOTION

Figure 1 shows the geometric mean spectral response for the 2% in 50-year event developed using EZ-FRISK for each of the attenuation relationships described above. Also shown is the

risk-adjusted response spectrum adjusting the response to a 1% in 50-year probability of collapse, which is equivalent to the site-specific probabilistic ground motion MCE_R.

2.2.3 DETERMINISTIC MCER GROUND MOTION

The deterministic spectral response acceleration is defined as the 84th-percentile 5% damped spectral response in the direction of maximum horizontal response for the characteristic earthquake on all known active faults within the region. EZ-FRISK was used to calculate the deterministic ground motion per Section 21.2.2. The NGA controlled deterministic spectral response was taken as the largest amplitude of ground motion considering all sources using the weighted mean of NGA attenuation relationships stated in Section 2.2.1 of this memorandum. The controlling seismic source for the project site is the Little Salmon Connected fault. Figure 2 shows the 84th-percentile 5% damped spectral response for the NGA attenuation relationships.

DETERMINISTIC MCE_R GROUND MOTION SCALING

Per ASCE 7-16 Supplement 1 Section 21.2.2, the maximum deterministic spectral response was compared with the minimum peak acceleration of 1.5Fa with Fa = 1 for Site Class E. Our maximum spectral response was 3.29g, therefore, no scaling of the deterministic curve was required. Figure 3 shows our deterministic ground motions compared to the minimum peak spectral accelerations.

2.2.4 SITE-SPECIFIC SPECTRAL RESPONSE ACCELERATION MCER

The site-specific spectral response acceleration is defined as the lower of the probabilistic and deterministic ground motions in Section 21.2.3. For the project site, the probabilistic ground motion was lower for all periods (0 to 10 seconds). The site-specific spectral response acceleration (MCE_R) is shown on Figure 4.

2.2.5 DESIGN RESPONSE SPECTRUM

The design response spectrum is defined in Section 21.3 as the higher of two values:

- Two-thirds of the site-specific design spectral response acceleration per Section 21.2
- 80% of the design spectral response acceleration per Section 11.4.6 where F_a is calculated in Table 11.4-1 and $F_v = 4$ for $S_1 > 0.2$ for Site Class E

Crawford first calculated the design spectral response acceleration by taking 2/3 of the site-specific response acceleration MCE_R as shown in Figure 5.

Crawford then calculated the design response accelerations per Section 11.4.6 with $F_a = 1$ and $F_v = 4$ and reduced the spectral accelerations by 80% to adjust for the minimum design spectral accelerations for class E. We reduced the spectral accelerations by 80% again to adjust for the minimum design spectral accelerations for a Site Class F per Section 21.3. We then compared Section 11.4.6 design spectral accelerations for Site Class F with our site-specific design spectral response accelerations (Figure 6). The site-specific design spectral response accelerations controlled over all periods.

The design response spectrum is shown on Figure 6 and Table 3.

Table 3: Design Response Spectrum

Period, s	Sa, g
0.05	0.65
0.1	0.90
0.2	1.15
0.3	1.27
0.4	1.30
0.5	1.29
0.75	1.21
1.0	1.21
2.0	0.93
3.0	0.62
4.0	0.47
10	0.19

2.2.6 DESIGN ACCELERATION PARAMETERS

Design acceleration parameters were calculated in accordance with Section 21.4. The S_{DS} value was taken as 90% the peak spectral acceleration value from periods 0.2 to 5 seconds. The S_{D1} value was taken as the maximum product of $T*S_a$ (period * spectral acceleration) from periods 1 to 5 seconds. Per Section 21.4, the S_{DS} and S_{D1} values cannot be less than 80% of the S_{DS} and S_{D1} calculated from Section 11.4.5. The S_{DS} and S_{D1} values in Section 11.4.5 was calculated from using $F_a = 1$ and $F_v = 4$ for a Site Class E as given in Section 21.3. The Section 11.4.5 S_{DS} and S_{D1} values were reduced by 80% again to convert to Site Class F values for comparison per Section 21.3.

S_{MS} and S_{M1} were calculated as 1.5 times S_{DS} and S_{D1}, respectively. Per Section 21.4, the S_{MS} and S_{M1} values cannot be less than 80% of the S_{MS} and S_{M1} calculated from Section 11.4.3. The S_{MS} and S_{M1} values in Section 11.4.3 was calculated from using $F_a = 1.0$ (mapped parameter) and $F_v = 4$ for a Site Class E as given in Section 21.3. The Section 11.4.3 S_{MS} and S_{M1} were reduced by 80% again to convert to Site Class F values per Section 21.3.

The design acceleration parameters are summarized in Table 4.

Table 4: Preliminary Horizontal Site-Specific Spectral Accelerations

Design Acceleration Parameter	Value (g)
Design Spectral Acceleration for Short Period (S_{DS})	1.21
Design Spectral Acceleration for 1 Second Period (S_{D1})	1.87
MCE Spectral Response Acceleration for Short Period (S_{MS})	1.81
MCE Spectral Response Acceleration for 1 Second Period (S_{M1})	2.80

2.2.7 MAXIMUM CONSIDERED EARTHQUAKE MCEG PEAK GROUND ACCELERATION (PGA)

A. PROBABILISTIC MCEG PGA

Per Section 21.5.1 the probabilistic geometric mean PGA shall be taken as geometric mean peak ground acceleration with a 2% probability of exceedance within a 50-year period. The probabilistic MCE_G PGA is 0.967 g.

B. DETERMINISTIC MCEG PGA

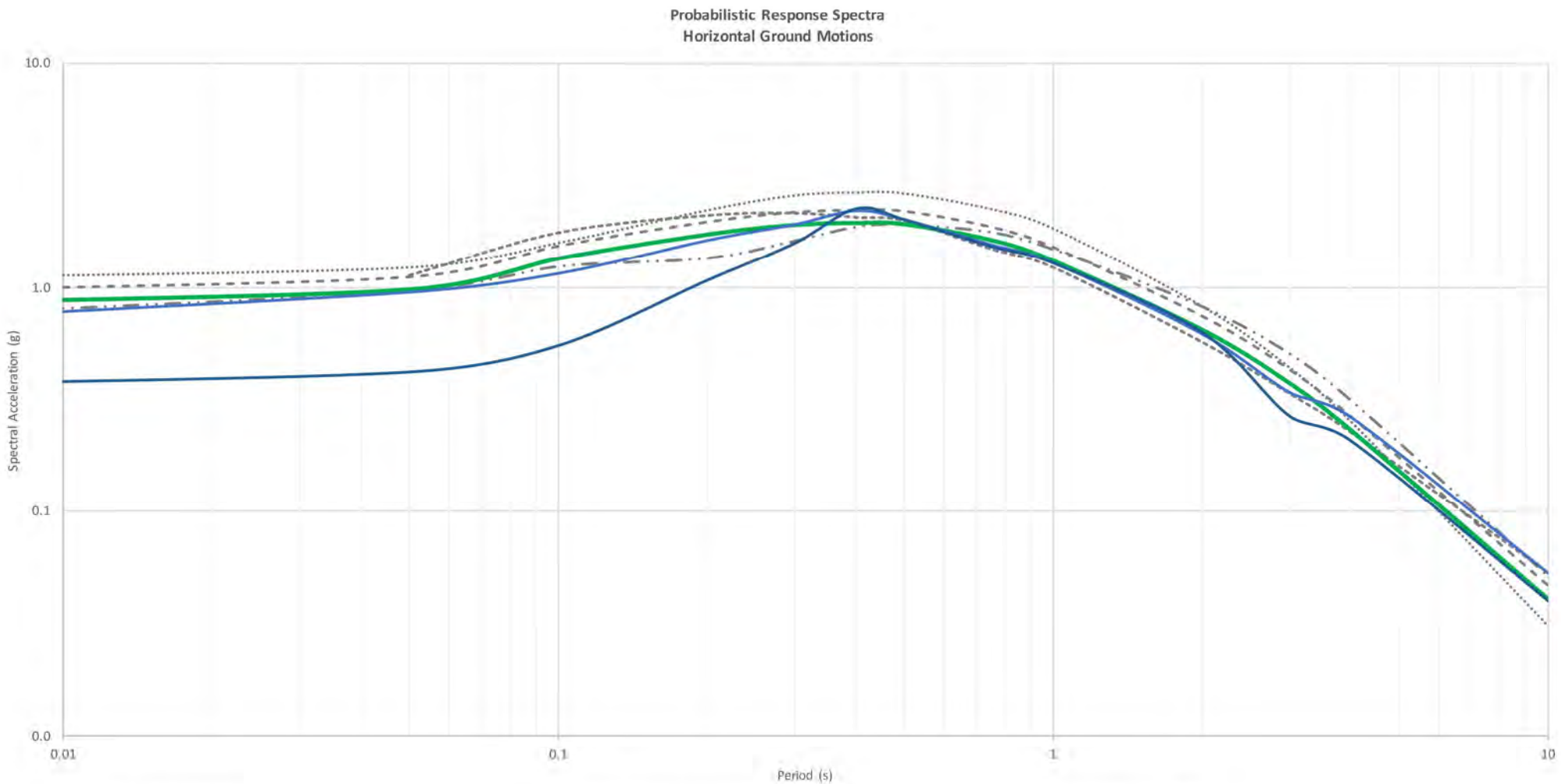
Per Section 21.5.2 the deterministic geometric mean PGA shall be taken as the largest 84th-percentile geometric mean peak PGA but not lower than $0.5*F_{PGA}$ where F_{PGA} is determined using ASCE 7-16 Table 11.8-1 and PGA is taken as 0.5g. The 84th-percentile geometric mean PGA is 1.184g and the minimum calculated PGA ($0.5*F_{PGA}$) was 0.55g, therefore, the deterministic MCE_G PGA was taken as 1.184g.

C. SITE-SPECIFIC MCEG PGA

The site-specific MCE_G PGA (PGA_M) taken as the lesser of the probabilistic MCE_G PGA and deterministic MCE_G PGA but not less than 80% of the PGA_M determined from Equation 11.8-1 in ASCE 7-16. 80% of the PGA_M determined from Equation 11.8-1 was calculated as 1.02g, therefore, the site-specific PGA_M was taken as 1.02g.

ATTACHMENTS

Figure 1: Probabilistic Response Spectra
Figure 2: Deterministic Response Spectra
Figure 3: Probabilistic Risk Targeted Maximum Considered Earthquake (MCE_R) vs 1.2Fa
Figure 4: Site-Specific Risk Targeted Maximum Considered Earthquake (MCE_R) vs Site Specific Design Response
Figure 5: Section 11.4.6 Design Spectral Response
Figure 6: Design Response Spectrum



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Geotechnical Engineering, Design and Construction Services
Taber Since 1954
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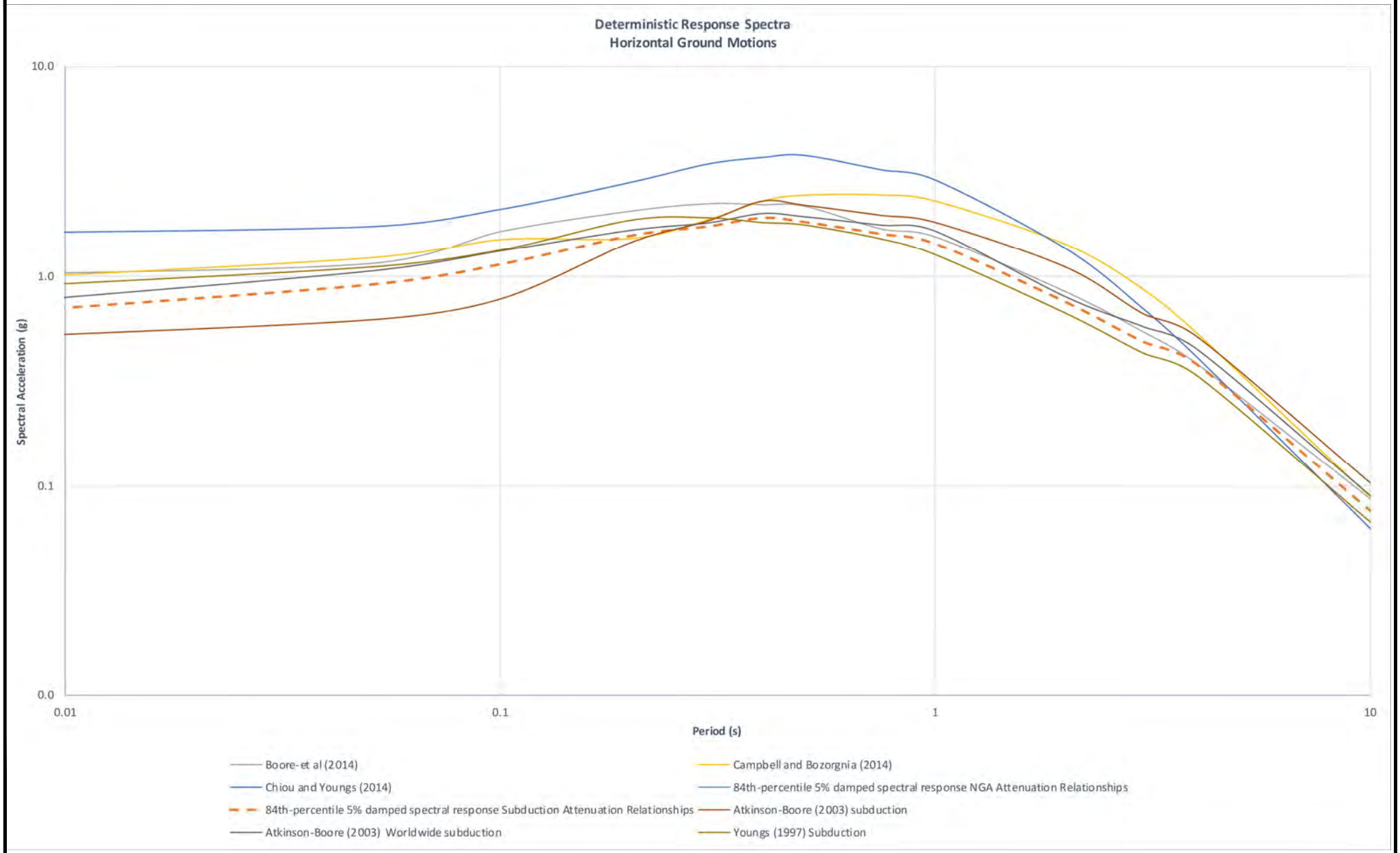
Suite 230
Sacramento, CA 95831
(916) 455-4225

HBMWD Reservoirs Seismic Retrofit

Eureka, CA

Figure 1
Probabilistic Response Spectra

Proj. No:	20-651.1
Scale:	N/A
Date:	1/8/2021



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Eureka, CA

Figure 2
Deterministic Response Spectra

Proj. No:	20-651.1
Scale:	N/A
Date:	1/8/21

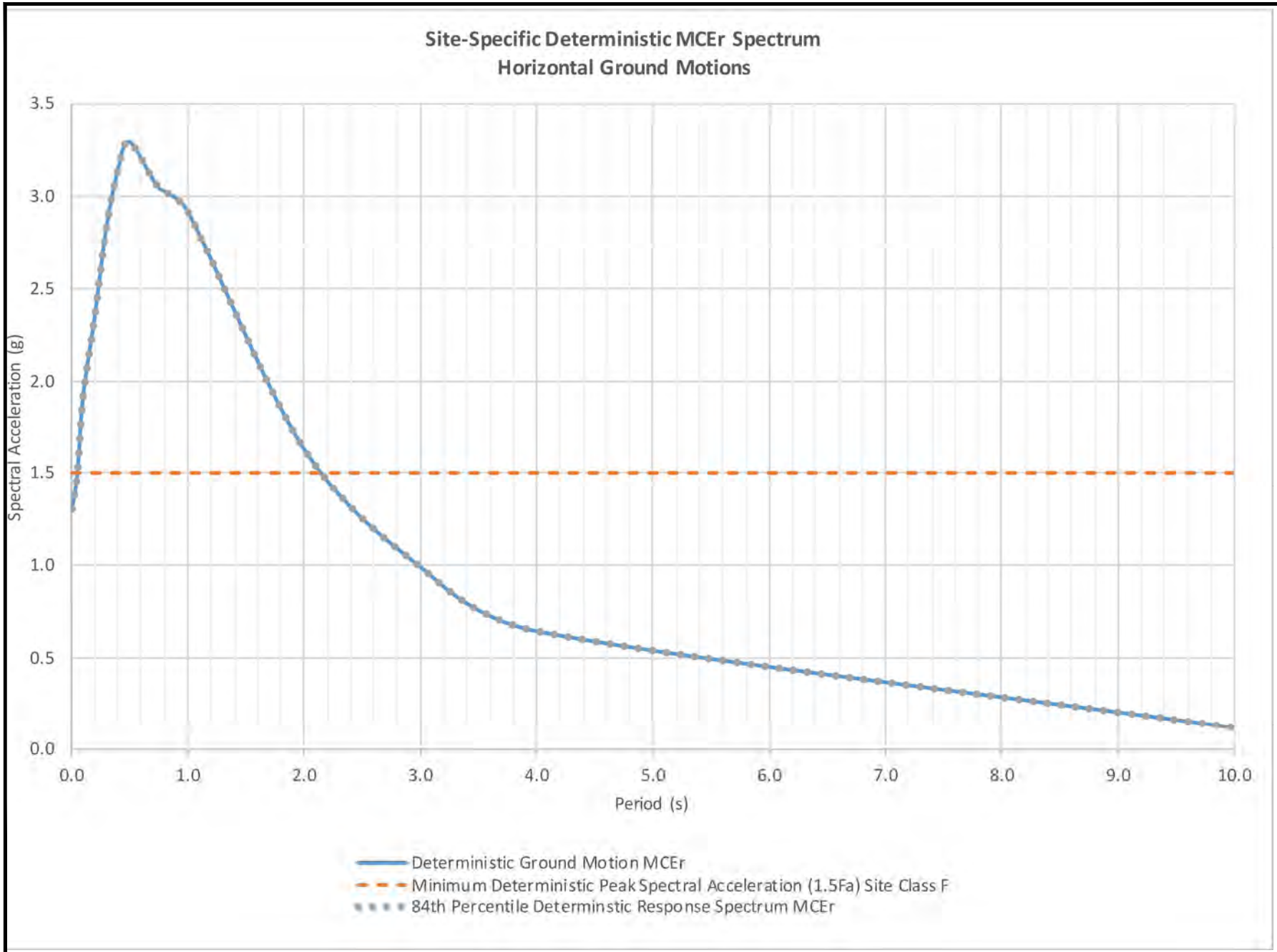

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Figure 3
Site Specific Deterministic MCEr Spectrum

Proj. No:	20-651.1
Scale:	N/A
Date:	1/8/21

Risk Targeted Maximum Considered Earthquake (MCEr)
Horizontal Ground Motions

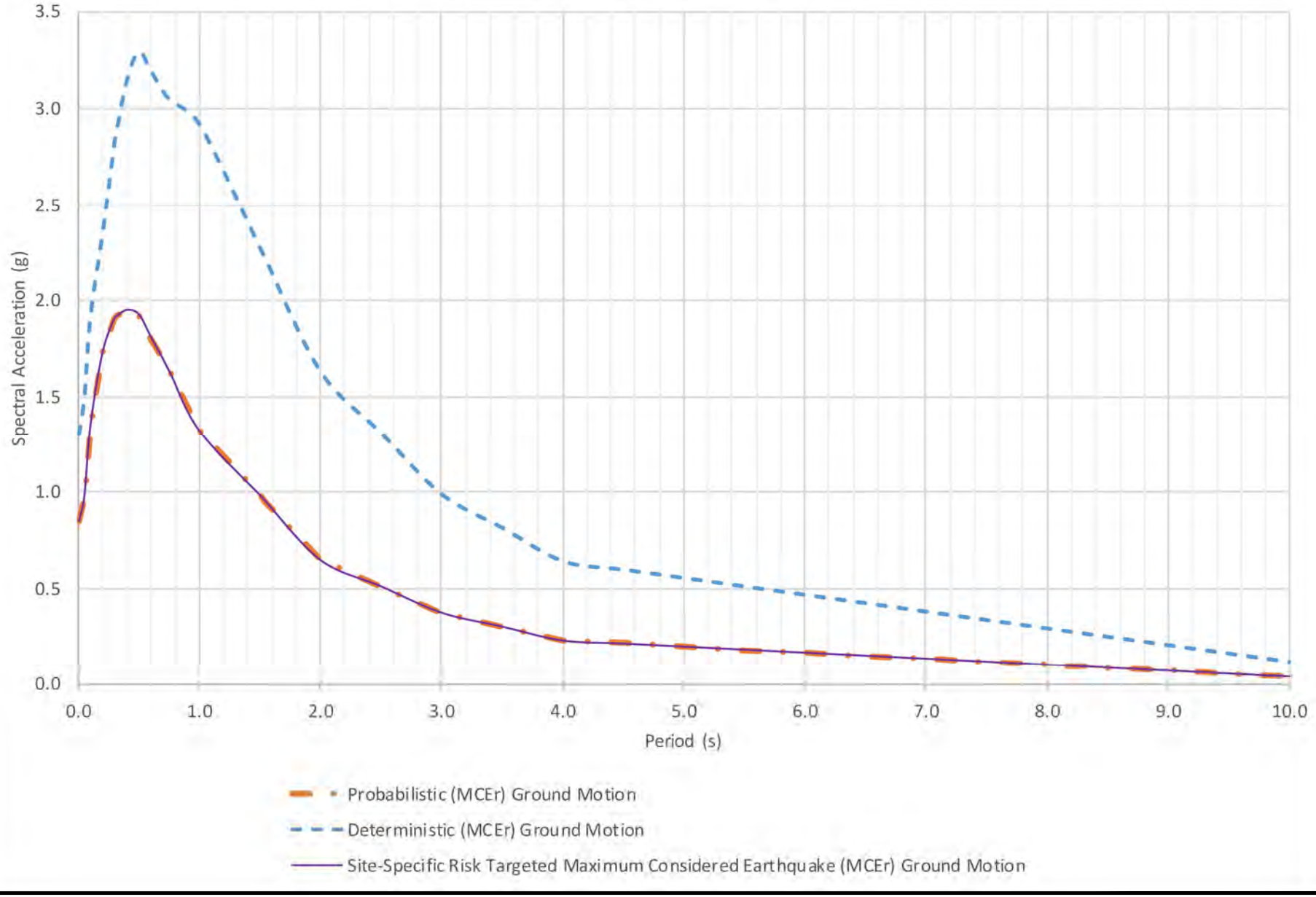

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Figure 4
Risk Targeted MCEr

Proj. No:	20-651.1
Scale:	N/A
Date:	1/8/21

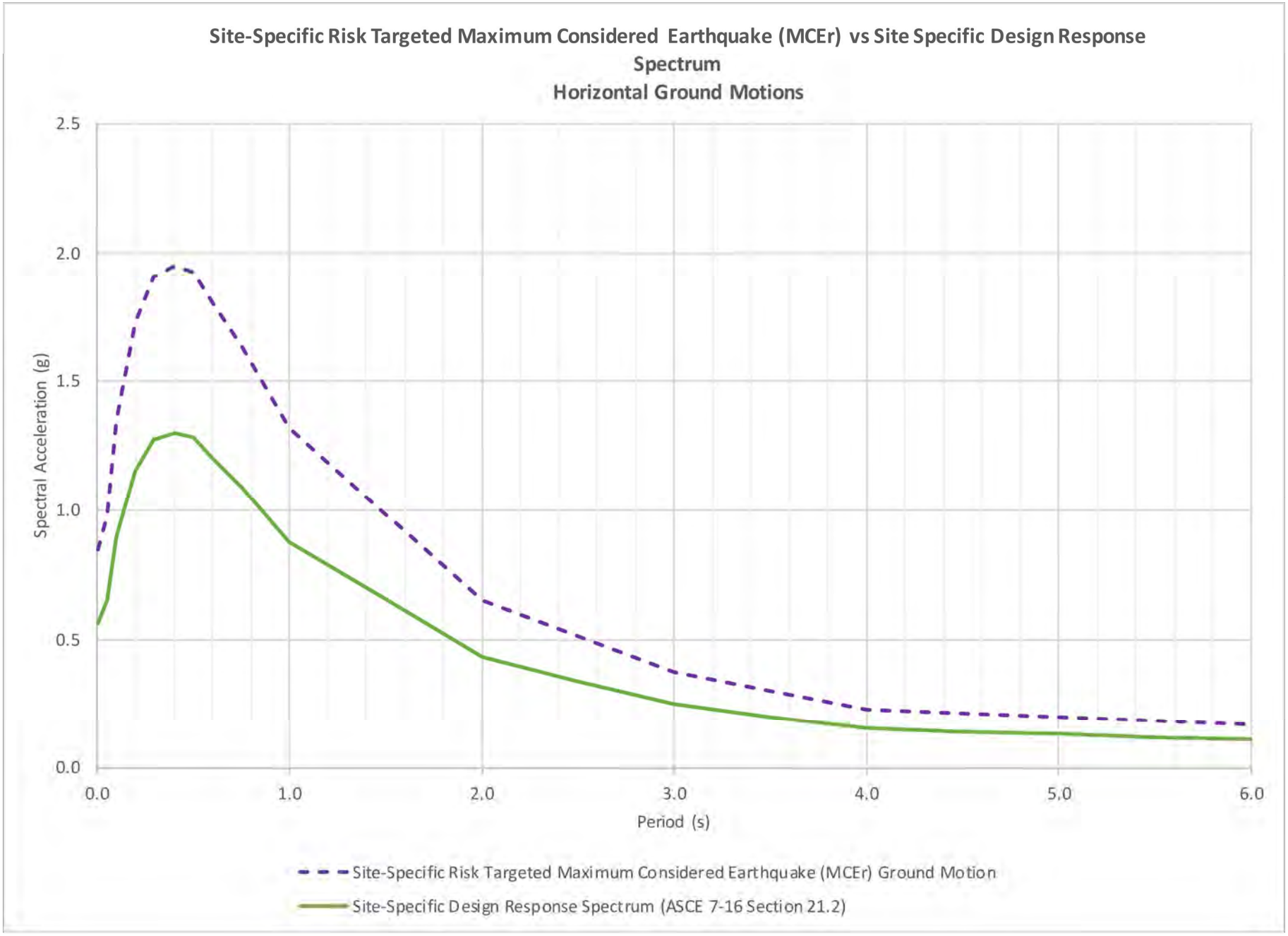

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Figure 5
MCEr vs Design Response Spectrum

Proj. No:	20-651.1
Scale:	N/A
Date:	1/8/21

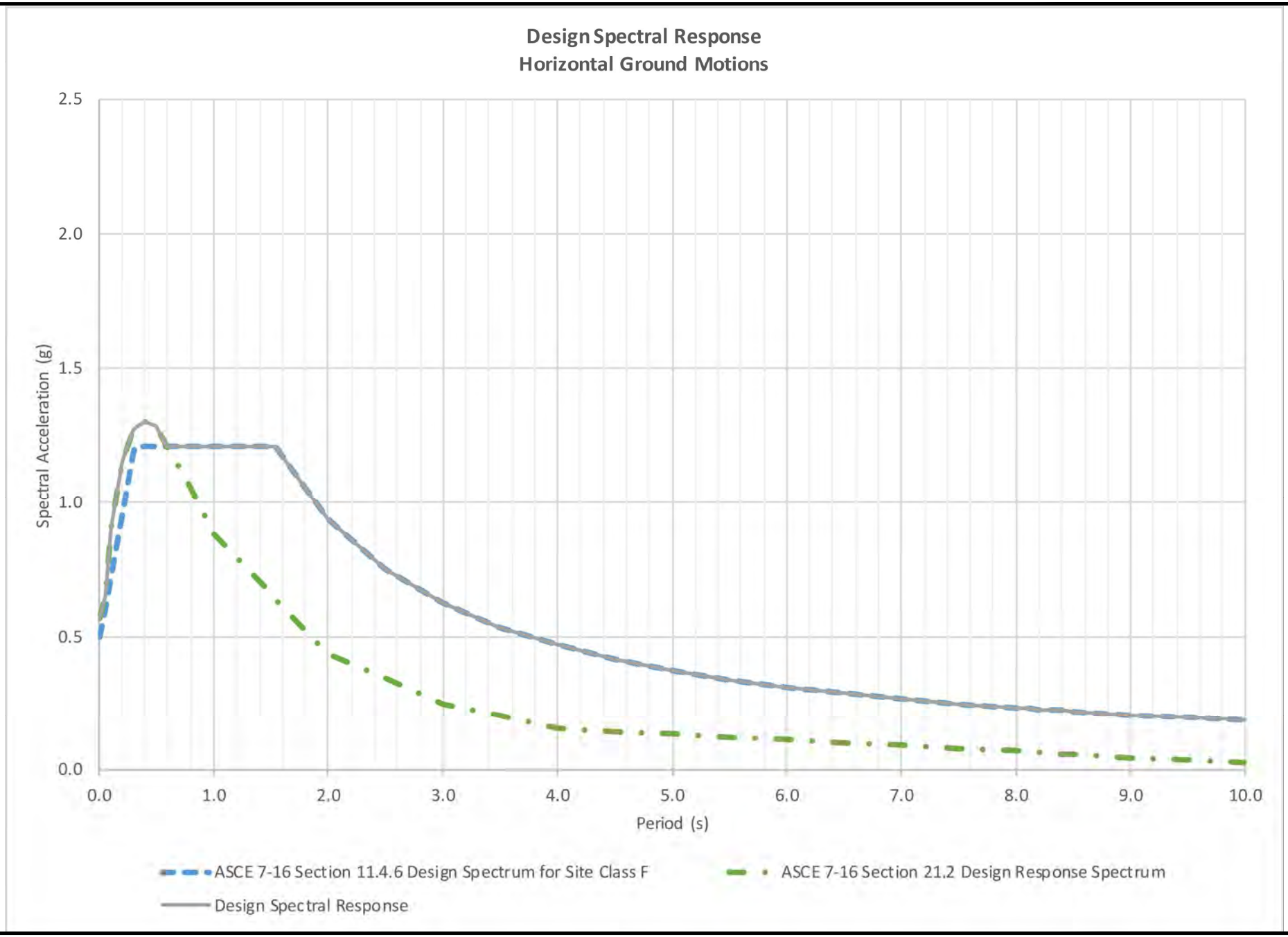

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Figure 6
Design Spectral Response

Proj. No:	20-651.1
Scale:	N/A
Date:	1/8/21

APPENDIX B – LIMITED HAZARDOUS MATERIALS SURVEY REPORT

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Limited Hazardous Materials Survey Report

Korblex and Samoa Reservoir Seismic Retrofit Project

Humboldt Bay Municipal Water District

30 July 2021

Executive summary

From June 8 through June 9, 2021, GHD Inc. (GHD) conducted a limited asbestos and lead assessment survey at the Humboldt Bay Municipal Water District (HBMWD) professional building complex known as HBMWD Korblex and Samoa Reservoirs (project site(s)) located in Arcata and Samoa, California. The project site includes three currently operational water reservoirs:

1. Korblex Site
   7270 West End Road, Arcata, California 95521
      Quantity 1 - 2 Million Gallon (MG) Water Tank
      Quantity 1 - 1 MG Water Tank
2. Samoa Site
   Latitude: 40.8052, Longitude: 124.1991, New Navy Base Road, Samoa, California 95564
      Quantity 1 - 1 MG Water Tank

The limited hazardous materials assessment included two components, collectively defined as “the survey”:

1. Bulk sampling of suspect asbestos containing materials (ACM)
2. Bulk sampling of suspect Lead Based Paint (LBP) representative of coatings common throughout the project site

The survey was conducted in association with the HBMWD Reservoir Seismic Retrofit Project (the project) under contract with HBMWD. The survey included assessment of select ACM and LBP located at the project site, specifically including suspect ACM and suspect LBP representative of the materials within the requested scope of the survey as defined by HBMWD. The survey was not conducted in association with any known renovation or demolition work to be conducted by HBMWD. The survey was conducted to generally characterize select building materials associated with exterior roof, exterior walls, exterior pipe assembly, reservoir concrete pad, and exterior asphalt for asbestos and lead content.

As described on Table 4.1, located in Section 4, none (0) of the bulk materials sampled for this survey were reported to contain asbestos and three (3) unsampled homogenous building materials, flange gaskets associated with 12-inch and 24-inch piping located at the tank’s exterior, were presumed to be asbestos containing. Samples reported or presumed to contain detectable levels of asbestos, are listed in Table 4.1. Suspect ACM samples were analyzed for asbestos via the polarized light microscopy (PLM) analytical method. A tabulated summary of all PLM laboratory data associated with the survey is located in Table C1.1 (Appendix C). The laboratory analytical reports associated with this survey are located in Appendix D (Asbestos Analytical Data). A summary of governmental regulations applicable to ACM is provided in Appendix F.

Per Table 5.1 located in Section 5, six (6) of the 17 sampled surface coatings were reported to contain lead via Atomic Absorption Spectrometry (AAS) laboratory analysis. Given the age of the project site structures, unsampled surface coatings at the project site shall be presumed to contain lead. While not applicable to the nondetect sampled coatings, other materials reported or presumed to contain lead are subject to applicable governmental regulations as summarized in Appendix G.

The project site and location of bulk samples collected for the survey are depicted on Figures 1 through 3 – Project Site Sample Location Map (Figures 1 - 3) located in Appendix A. Photographs of the project site, as well as select hazardous materials identified therein, are located in Appendix B. A tabulated summary of all PLM data collected for the asbestos survey is provided in Appendix C. The laboratory analytical reports resultant from the survey are located in Appendix D (Asbestos Analytical Data) and Appendix E (Lead Analytical Data). This report is subject to, and must be read in conjunction with the limitations, assumptions, and qualifications contained throughout the report.

Contents

Table index

Appendices

1. Introduction

GHD Inc. (GHD) is pleased to provide Humboldt Bay Municipal Water District (HBMWD) with the following Hazardous Materials Assessment Report (herein “the report”) detailing the findings of the limited asbestos and lead assessment survey conducted from June 8 to June 9, 2021 (herein “the survey”) at HBMWD Korblex and Samoa Reservoirs (herein “project site(s)”) located in Arcata and Samoa, California. The survey was completed as a component of the HBMWD Reservoir Seismic Retrofit Project (herein “the project”).

The survey described by this report was performed at the request of, and on behalf of HBMWD. GHD performed the survey to evaluate specific areas and building materials within the project site for the presence of asbestos and lead. The purpose of the report is to transmit to HBMWD the findings and conclusions resultant from the survey.

The services undertaken by GHD in connection with preparing the report were limited as defined herein and are subject to the assumptions set out in the report and associated contracting documents. The following subsections provide pertinent contextual information regarding the survey, the project, and the project site.

1.1 Client

The survey was conducted by GHD under contract with HBMWD, the facility(ies) owner. HBMWD shall herein be defined as the client for this report. The project-specific client information is as follows:

Humboldt Bay Municipal Water District
7270 West End Road
Arcata, California 95521
Client Representative: Dale Davidsen

1.2 Project Site

The project site(s) includes three currently operational above ground water reservoirs (tanks) located at the following street addresses:

1. Korblex Site
   7270 West End Road, Arcata, California 95521
      Quantity 1 - 2 Million Gallon (MG) Water Tank
      Quantity 1 - 1 MG Water Tank
2. Samoa Site
   Latitude: 40.8052, Longitude: 124.1991, New Navy Base Road, Samoa, California 95564
      Quantity 1 - 1 MG Water Tank

2. Survey Description

The survey was conducted at the project site by GHD on June 8 and June 9, 2021. The following key tasks collectively define the survey scope of work:

1. Bulk sampling of suspect Asbestos Containing Material (ACM) within the project site
2. Limited bulk sampling of representative surface coatings common throughout the site

The survey was conducted to support HBMWD in their compliance with United States Environmental Protection Agency (USEPA) and California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA) regulations governing asbestos and lead paint, as applicable to the project and project site. The lead portion of the survey was limited and conducted for the purpose of generally characterizing the project site with respect to the presence of lead-containing paint. A general summary of the regulatory context governing the survey is provided in Section 2.3.

For this survey, the following number of bulk samples were collected from the project site and submitted under chain of custody to EMSL Analytical Inc. (EMSL) for analysis via the referenced methodology:

1. A total of 58 bulk material samples were analyzed for asbestos content via polarized light microscopy (PLM) methodology following USEPA method 600/R-93-116.
2. A total of 17 bulk paint samples were analyzed for lead content via flame atomic absorption spectrometry (AAS) methodology following USEPA method 3050B/7420.

See Figures 1 through 3 located in Appendix A for the approximate sample locations. Photographs of the project site generally depicting the homogeneous areas of asbestos material identified during this survey are located in Appendix B. A tabulated summary of all PLM analytical data is provided in Appendix C (Asbestos Data Summary Table). The survey laboratory analytical reports and chain of custody documentation describe all of the materials sampled at the project site and are located in Appendix D (Asbestos Analytical Data) and Appendix E (Lead Analytical Data).

2.1 Survey Scope and Limitations

The survey scope of work associated with this report was limited to the project site areas shown on Figures 1 through 3 and the suspect hazardous materials described herein. The survey was limited to the safely accessible areas of the project site listed in Section 1.2 and shown on Figures 1 through 3 (Appendix A).

Some areas and components associated with the project site were not sampled for the survey, as such areas/materials are not to be impacted by the project scope, safe access was not available at the time of the survey, or sampling would have significantly damaged the building component. Areas not surveyed by GHD (areas not in scope and/or not specifically defined in this report) are excluded from the definition of the project site.

The areas and materials excluded from the scope of this limited survey included the following (areas and/or components not surveyed):

1. Interior of Water Tanks located at the Korblex and Samoa Site(s).
2. Suspect materials that could not be sampled without significantly damaging the functional integrity of the building element, including the structure piping gaskets and couplers (materials presumed to contain asbestos) and materials encased in concrete (destructive sampling required).
3. Pressurized and/or energized systems, including: plumbing, wiring, interior of mechanical units and machinery (energized, in-use components, destructive sampling required).
4. Materials not to be disturbed during the project, located outside the project scope, or associated with components to be removed intact (such as stored piping and equipment) (outside of survey scope).
5. Suspect materials located within permit-required confined spaces, or otherwise inaccessible including material buried underground (outside of survey scope).
6. Exterior areas including: staging areas, porticos, soil and/or naturally-occurring aggregate.
7. Any other areas and/or components not specifically defined herein or listed on the laboratory analytical reports.

2.2 Survey and Reporting Assumptions

The content of the report is based on assumptions made by GHD as described in this report and associated contracting documents. This report is an instrument of service of GHD. It is GHD's understanding that the report is solely to be used by HBMWD specifically in connection with the project and project site, and this stated purpose was a

significant factor in determining the survey scope and level of service provided for in the contracting documents. Should the project or the report purpose change, this report immediately ceases to be valid and use of it by HBMWD, or any other party without GHD's prior review and written authorization, shall be at the user's sole risk.

GHD has endeavored to conduct the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project. No other representation, express or implied, is included or intended in this document. The scope of service GHD implemented was based, in part, on rules and regulations that GHD understood to be current or expected at the time GHD developed its proposal. Changes in regulations, interpretations, and/or enforcement policies may occur at any time and such changes could affect the extent of remediation required.

The report's findings are based on conditions that existed on the date(s) of GHD's site visit(s) and should not be relied upon to precisely represent conditions at any other time. Conclusions about site conditions under no circumstances comprise a warranty that conditions in all areas within the site are of the same quality as those sampled. Recognize, too, that hazardous materials and/or contamination might exist in forms not indicated by the limited assessment described herein.

Samples of soil or naturally occurring rock were not collected for this survey. Based on California Department of Conservation Division of Mines and Geology data[1], rock and/or soils associated with Naturally Occurring Asbestos (NOA) are known to be present in proximity to the project site. Regulations governing NOA, including those enforced by the California Air Resources Board (CARB), may apply to the project subject to the site-specific occurrence and/or disturbance of NOA. The existence of NOA can only be defined by a Professional Geologist via CARB 435 methodology.

2.3 Survey Regulatory Setting

This section provides a regulatory context for the survey and generally summarizes the hazardous materials regulatory setting applicable to the project site. Further information is provided in Appendix F(Asbestos Regulatory Summary) and Appendix G (Lead Regulatory Summary).

The USEPA enforces asbestos regulations authorized under the Clean Air Act and specify work practices to be followed at facilities to mitigate asbestos air pollution. To mitigate airborne asbestos fiber release, a survey must be conducted at facilities prior to renovation and/or demolition work to identify and sample suspect asbestos materials[2] in compliance with the USEPA National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations, per Title 40 Code of Federal Regulations (CFR) Section 61, Subparts A and M. The project-specific NESHAP requirements are outlined in Section 4. Materials reported to contain greater than one percent (1%) asbestos by weight are regulated by the USEPA as either Asbestos Containing Material (ACM) or Regulated Asbestos Containing Material (RACM) based each material’s distinctive physical characteristics. Materials containing less than 1% asbestos are not subject to USEPA asbestos regulations.

Asbestos is a known human carcinogen, thus worker exposure to asbestos is regulated by Cal/OSHA. Employee protection protocols per Title 8 California Code of Regulations (CCR) Sections 1529 (8CCR1529) apply to disturbance of material containing asbestos in any detectable concentration. Per Cal/OSHA, material containing greater than 1% asbestos is defined as Asbestos Containing Material (ACM), while Asbestos Containing Construction Material (ACCM) refers to material containing greater than 0.1% asbestos. Cal/OSHA requires that specific types of suspect asbestos materials located in buildings constructed no later than 1980 must be presumed to contain asbestos, unless sampled

[1] State of California Department of Conservation Division of Mines and Geology, *A General Location guide for Ultramafic Rocks in California – Areas More Likely to Contain Naturally Occurring Asbestos* (August 2000), accessed on July 27, 2021 via: https://ww3.arb.ca.gov/toxics/asbestos/ofr_2000-019.pdf

[2] Suspect asbestos material includes, but is not limited to, the following materials: mastics, caulking, base cove, Thermal System Insulation applied to pipes, boilers, or other components to prevent heat loss or gain; Surfacing Materials, including spray or trowelled-on surface coatings and acoustic/decorative textures; cementitious products, including cement panelling/piping; roofing products, including associated mastics, felts, or coatings; resilient flooring; gaskets and lagging; drywall; joint compound; plasters; vibration cloths, or expansion joints.

and proven to be otherwise. Presumed Asbestos Containing Material (PACM) includes thermal system insulation[3] (TSI) and surfacing materials[4]. Work conducted by an employee impacting ACM or ACCM is regulated by Cal/OSHA according to the specific material(s) to be disturbed and the size of the job. Materials reported to be nondetect via laboratory analysis are not subject to regulation by Cal/OSHA as ACM or ACCM.

The USEPA and Cal/OSHA regulate exposure to materials containing lead. Paint, glazing and other coating materials containing lead in a concentration above 90 parts per million (ppm) are defined by the United States Consumer Product Safety Commission (CPSC) as Lead Containing Paint (LCP). Coatings reported to contain lead above 5,000 ppm, or 1.0 milligram per square centimeter (mg/cm^2), are defined as Lead Based Paint (LBP). Work impacting LCP, LBP and/or presumed lead material triggers compliance with applicable regulations, including 8CCR1532.1. Additionally, work at the project site impacting LBP must comply with USEPA and California Department of Public Health (CDPH) lead regulations and the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. Section 6901 et seq.), 40 CFR Part 745, Subpart E; and 17 CCR Division 1, Chapter 8.

3. Survey Methodology

The following protocol generally describes the sampling methodology for the survey. Copies of the professional certifications for key GHD personnel, including survey field staff, are included in Appendix H. The following list summarizes the sampling procedures utilized:

1. Suspect asbestos and lead materials were visually identified at the project site.
    a. Suspect ACM was categorized into homogeneous materials/areas. Note: for the purpose of this report, “homogeneous” defines visually similar materials that are uniform in texture, color, and date of installation/application.
2. A sampling scheme was developed based on the location and quantity of surface coatings and identified homogeneous materials/areas.
    a. Representative suspect ACM was identified and selected for sampling in general accordance with NESHAP sampling guidelines.
    b. Suspect lead coatings were sampled based on the magnitude of occurrence and location of the material. This survey is not intended to comply with United States Housing and Urban Development sampling guidelines. Only the most common surface coatings observed to be generally representative of the project site were sampled and analyzed for this survey.
3. Bulk samples were collected using appropriate sampling tools. Samples were placed in leak-tight containers and labeled with a unique numerical identifier (sample number).
4. Decontamination of sampling tools was employed to prevent the spread of secondary contamination to subsequent bulk samples.
5. Friability, defined as the susceptibility of a dry material to be crumbled, pulverized or reduced to a powder using hand pressure, was determined for each sampled suspect ACM. Multiple samples were taken of some homogeneous suspect ACM distributed throughout the project site, in general accordance with regulatory and industry standards.
6. The general location of each bulk sample was noted on a project site plan-view diagram. The sample number, collection location and a description of the physical attributes of each bulk sample were recorded on a chain of custody form. The custody forms accompanied the sample set(s) to the analyzing laboratory.

[3] Thermal system insulation (TSI) is defined by 8 CCR 1529 as ACM applied to pipes, fittings, boilers, breeching, tanks, ducts or other structural components to prevent heat loss or gain.
[4] Surfacing material is defined by 8 CCR 1529 as material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes).

7. Bulk samples were submitted under chain of custody via overnight shipment to EMSL Analytical, Inc. (EMSL), an accredited laboratory located in San Leandro, California; Phoenix, Arizona; and Las Vegas, Nevada for analysis as follows:
    a. Asbestos content via PLM analysis following USEPA method 600/R-93-116
    b. Lead content via Atomic Absorption Spectrometry (AAS) via USEPA Method 3050B/7000B
8. Copies of the professional certifications for key GHD personnel, including survey field staff, are included in Appendix H.
9. Copies of the EMSL accreditations and certifications are located in Appendix I.

4. Findings for Asbestos

Of the suspect ACMs collected during this survey for PLM analysis, none of the materials sampled were reported by the analyzing laboratory to contain asbestos fibers. In addition, three suspect ACMs were identified, but not sampled throughout the project site. Suspect materials presumed to contain asbestos not sampled as sampling of materials would result in material damage and potential negative impact to infrastructure integrity. Materials presumed to contain asbestos are associated with in situ reservoir features (flanges, gaskets, etc.) that HBMWD required to remain intact. The asbestos materials identified during the survey are described in Table 4.1 (Asbestos Laboratory Data and Quantification Summary) which begins on page 6. Table 4.1 lists the physical description, approximate location, and reported asbestos content for the identified asbestos material. In addition, the applicable Cal/OSHA asbestos work class, the Cal/OSHA or USEPA asbestos material category, and the anticipated waste designation for each material type are listed in Table 4.1.

Materials that are homogeneous to (i.e., alike and may be represented by) those listed in Table 4.1 shall be presumed to contain asbestos. As applicable, suspect ACM not sampled is classified in Table 4.1 as Presumed Asbestos Containing Material (PACM) in accordance with Cal/OSHA protocols. Materials that do not contain asbestos fibers above the laboratory detection limit are noted on the laboratory analytical reports as nondetect (ND), or no asbestos detected (NAD). Materials reported to be ND or NAD are not listed in Table 4.1.

Quantity estimates for the asbestos material identified at the Project Site are provided in Table 4.1. The quantities include the total observed distribution of the material, cumulatively estimated for the project site, and do not define any partial quantities potentially disturbed during project work impacting only discrete location(s) or limited amount(s) of material. The actual quantity of asbestos to be impacted in association with the Project is undefined, as the amount of asbestos disturbance is dependent on developing Project needs, abatement scoping, and contractor means/methods. Quantities shall be confirmed with bidding contractor(s) prior to bid submittal.

A summary table, Table C1.1, listing all asbestos bulk sampling PLM data collected by GHD for the survey, including the ND/NAD data, is provided in Appendix C. The PLM analytical data associated with the asbestos survey is located in Appendix D.

Table 4.1 Asbestos Laboratory Data and Quantification Summary

HBMWD Korblex and Samoa Reservoirs, Arcata and Samoa, California

Sample Number(s)	Material Description	Material Location	Asbestos %/Type	Estimated Quantity	Asbestos Material Category[1]	Cal/OSHA Work Class[2]	Projected Waste Designation[3]
Not Sampled	24" O.D. Flange Gasket (black)	Korblex – 2 MG water tank – Roof at pipe intersection	2% CH (presumed)	10 SF	Category II Nonfriable ACM	Class II	Non-hazardous Asbestos Waste
Not Sampled	12" O.D. Flange Gasket (black, grey)	Korblex – 1 MG water tank – Exterior at pipe intersection with tank	2% CH (presumed)	10 SF	Category II Nonfriable ACM	Class II	Non-hazardous Asbestos Waste
Not Sampled	12" O.D. Gasket (black)	Samoa – 1 MG water tank – Exterior at pipe intersection with tank	2% CH (presumed)	15 SF	Category II Nonfriable ACM	Class II	Non-hazardous Asbestos Waste

Acronyms:

- ACM = Asbestos Containing Material (>1% asbestos)
- ACCM = Asbestos Containing Construction Material (>0.1% asbestos)
- Cal/OSHA = California Department of Industrial Relations, Division of Occupational Safety and Health
- CH = Chrysotile (serpentine form of asbestos)
- NA = Not applicable
- ND = Nondetect, or No Asbestos Detected
- PACM = Presumed Asbestos Containing Material
- RACM = Regulated Asbestos Containing Material
- RCRA = Resource Conservation and Recovery Act
- SF = Square feet
- TSI = Thermal System Insulation
- USEPA = United States Environmental Protection Agency
- VFT = Vinyl Floor Tile
- < = Symbol meaning "less than"
- > = Symbol meaning "greater than"

Annotations:

- [1] = USEPA regulates material containing >1% asbestos, classified into two broad categories: friable (RACM and Category I and II that may become friable) and nonfriable (Category I and II ACM).
- [2] = Cal/OSHA regulates material containing ANY quantity of asbestos. Cal/OSHA regulates material containing >0.1% asbestos as ACCM and >1% asbestos as ACM. Cal/OSHA differentiates asbestos removal operations into five classes (Class I to IV, plus unclassified work). Class I through IV operations include tasks impacting material containing >1% asbestos (ACM). Unclassified work includes tasks impacting material containing <1% asbestos. Work impacting asbestos in any quantity is subject to Cal/OSHA requirements.
  - It is recommended that unclassified work be conducted per Class II work protocols.
  - It is recommended that interior work, regardless of work classification, be conducted within sealed negative pressure containments.
- [3] = RACM is a California hazardous waste (non-RCRA hazardous waste). USEPA Category I and II nonfriable ACM that remains nonfriable during removal is characterized as non-hazardous asbestos-containing waste. The non-hazardous waste designation presumes that nonfriable material will not become friable due to contractor removal practices. If nonfriable ACM is rendered friable (e.g., via the use of mechanical removal means, fire damage, etc.), then such material shall be reclassified as RACM and disposed of as a California hazardous waste.

Notes:

- Work impacting material homogeneous (alike) to that noted in this table shall be understood to impact asbestos, regardless of location.
- See Appendix F for further information on the asbestos regulatory environment, including USEPA material categories and Cal/OSHA work classes.

5. Findings for Lead

Of the 17 suspect lead containing surface coatings collected for this survey, eight (8) were reported to contain lead above the laboratory detection limit. The samples analyzed for lead are described in Table 5.1 Lead Laboratory Data located on page 8. Table 5.1 provides the physical description, the approximate location, material substrate, reported lead content (if any), and regulatory definition (if applicable) for each of the sampled coatings.

None of the sampled surface coatings meet the Lead Based Paint (LBP) regulatory threshold, however six (6) of the samples meet the definition of Lead Containing Paint (LCP). For the purpose of the project, all unsampled paint shall be classified as LBP unless appropriately sampled, analyzed, and determined not to contain lead. The lead regulations governing the project, including specific work practices and administrative requirements, are summarized in Appendix G.

Table 5.1 Lead Laboratory Data

HBMWD Korblex and Samoa Reservoirs, Arcata and Samoa, California

Sample Number	Sample Description	Substrate	Color	Sample Location	Lead Content	Triggers Cal/OSHA Compliance (1532.1)	Lead Classification
11218859-Pb-1	Paint	Metal	White, Tan	Korblex - 2 Million Gallon (2 MG) Water Tank (Tank) - Roof - South at Ladder Railing	<0.0080 % wt	NA	Not LBP or LCP
11218859-Pb-2	Paint	Metal	White, Tan	Korblex - 2 MG Tank - Roof - Center West	<0.0080 % wt	NA	Not LBP or LCP
11218859-Pb-3	Paint, Putty	Metal	White	Korblex - 2 MG Tank - Roof - Center East	<0.0080 % wt	NA	Not LBP or LCP
11218859-Pb-4	Paint	Metal	White, Tan, Grey	Korblex - 2 MG Tank - Roof - Center West at 6" O.D. Penetration Cap	<0.0080 % wt	NA	Not LBP or LCP
11218859-Pb-5	Paint	Metal	Red	Korblex - 2 MG Tank - Roof at South Storage Box	<0.0098 % wt	1532.1 Applies	LCP
11218859-Pb-6	Paint	Metal	White, Tan	Korblex - 2 MG Tank - East Wall at NE Corner	<0.019 % wt	1532.1 Applies	LCP
11218859-Pb-7	Paint	Metal	White, Tan	Korblex - 2 MG Tank - East Wall at Base	<0.0086 % wt	NA	Not LBP or LCP
11218859-Pb-8	Paint	Metal	White	Korblex - 2 MG Tank - West Wall at 2' O.D. Flange	0.017 % wt	1532.1 Applies	LCP
11218859-Pb-9	Paint	Metal	White, Tan, Grey	Korblex - 1 MG Tank - Roof at Center South	<0.0081 % wt	NA	Not LBP or LCP
11218859-Pb-10	Paint	Metal	White, Tan, Grey	Korblex - 1 MG Tank - Roof at NW Corner	<0.0080 % wt	NA	Not LBP or LCP
11218859-Pb-11	Paint	Metal	White, Tan	Korblex - 1 MG Tank - Exterior - Center East at Tank/Pad Intersection	0.057 % wt	1532.1 Applies	LCP

Table 5.1 Lead Laboratory Data

HBMWD Korblex and Samoa Reservoirs, Arcata and Samoa, California

Sample Number	Sample Description	Substrate	Color	Sample Location	Lead Content	Triggers Cal/OSHA Compliance (1532.1)	Lead Classification
11218859-Pb-12	Paint	Metal	White, Tan, Beige	Samoa - 1 MG Tank - Roof at Center South	<0.0080 % wt	NA	Not LBP or LCP
11218859-Pb-13	Paint	Metal	White, Tan, Beige	Samoa - 1 MG Tank - Roof at Center Vent at Cap	<0.0080 % wt	NA	Not LBP or LCP
11218859-Pb-14	Paint	Metal	White, Tan, Beige	Samoa - 1 MG Tank - Roof at Center North	<0.0080 % wt	NA	Not LBP or LCP
11218859-Pb-15	Paint	Metal	White, Tan, Beige	Samoa - 1 MG Tank - Roof at East Hand Rail	0.0094 % wt	1532.1 Applies	LCP
11218859-Pb-16	Paint	Metal	White, Beige	Samoa - 1 MG Tank - Exterior East Wall at 2' O.D. Valve	<0.0080 % wt	NA	Not LBP or LCP
11218859-Pb-17	Paint	Metal	White	Samoa - 1 MG Tank - Exterior West Wall at Patch	<0.016 % wt	1532.1 Applies	LCP

Acronyms:

- Cal/OSHA = California Department of Industrial Relations, Division of Occupational Safety and Health
- CDPH = California Department of Public Health
- LBP = Lead Based Paint = Paint containing lead in a concentration of greater than or equal to 5,000 ppm, 1.0 mg/cm^2, or 0.5 percent by weight
- LCP = Lead Containing Paint = Paint containing lead in a concentration of greater than 90 ppm, or 0.009% by weight
- mg/cm^2 = milligrams per square centimeter (laboratory units of measurement reporting weight of lead per area)
- ppm = Parts per million (laboratory units of measurement reporting lead concentration)
- USEPA = United States Environmental Protection Agency
- wt% = Percent by weight

Notes:

- Lead content is reported in parts per million (laboratory units of measurement reporting lead concentration).
- Notation “1532.1 Applies” signifies that the amount of lead in the sample triggers compliance with applicable regulations, including 8CCR1532.1.
- Notation “Not LBP” signifies that lead was not reported in a concentration above 5,000 ppm, or 0.5 percent by weight.
- Notation “Not LCP” signifies that lead was not reported in a concentration above 90 ppm, or 0.009 percent by weight.
- Parts per million (ppm) is equivalent to milligrams per kilogram (mg/kg).
- One (1) ppm is equivalent to 0.0001% by weight)
- See Appendix G for further information on the lead regulatory environment.

6. Regulatory Jurisdiction and Notification

The survey was conducted by GHD to assist HBMWD with compliance with the USEPA National Emission Standards for Hazardous Air Pollutants (NESHAP) asbestos requirements in association with the project. The USEPA local authority with responsibility for implementing the NESHAP regulations throughout the project site region is the North Coast Unified Air Quality Management District (NCUAQMD). Contact information for the NCUAQMD is provided below:

North Coast Unified Air Quality Management District

707 L Street

Eureka, California 95501

Phone: (866) 287-6329

Website: ncuaqmd.org

Work at a facility meeting the NCUAQMD definition of a demolition and/or work impacting RACM in quantities above specific size thresholds necessitates the submittal of a NESHAP pre-work notification form and associated fee to the NCUAQMD (address above). The RACM quantity thresholds necessitating pre-work notification to the NCUAQMD are greater than, or equal to the following:

1. 100 square feet, or 35 cubic feet (for debris or waste)

The NCUAQMD regulations stipulate that the Project owner shall notify the NCUAQMD at least 10 business days prior to the commencement of a demolition project, or commencement of work that impacts RACM in excess of the above-noted quantities. A pre-work notification is required by the NCUAQMD if the Project includes one or more of the following element(s):

1. The impaction of RACM in excess of the NCUAQMD NESHAP notification thresholds

Work that meets the NESHAP definition of a “demolition,” which is defined as the unweighting or removal of any structural member(s)

a) Note: a NESHAP notification is required for all demolition projects regardless of the presence or absence of asbestos (ACM or RACM)

In addition to the NESHAP regulations enforced by the NCUAQMD, work at the Project Site shall be conducted in accordance with applicable employee protection regulations enforced by Cal/OSHA, including 8CCR1529, 5203 341.6-341.14 and the California Health and Safety Code.

As required by 8CCR1529(r) and 5203, written notification must be made to the nearest Cal/OSHA District Enforcement Office with jurisdiction over the Project Site for Asbestos-Related Work. For planned work exposing employees to lead, a Lead-Work Pre-Job Notification is required per 8CCR1532.1(p). Cal/OSHA notification shall be made at least 24 hours prior to the start of hazardous material-related work and is required if the planned project scope includes the one or both of the following elements:

1. The impaction of ACM, ACCM and/or LBP in excess of 100 square feet

The following table, Table 6.1 Pre-Work Regulatory Notifications (Table 6.1), summarizes the Cal/OSHA and NESHAP notifications anticipated in association with the project.

Table 6.1 Pre-Work Regulatory Notifications

Agency	Notification Type	Anticipated Notification Requirement		Submittal Timeline
NCUAQMD	NESHAP Notification	Notification:	☐ Required[1]	>10 Business Days Prior to Work Start
			☒ Not anticipated	
Cal/OSHA	Temporary Worksite Notification	Notification:	☒ Required [2]	≥24 Hours Prior to Work Start
			☐ Not anticipated	

Notes:

- Cal/OSHA = California Department of Industrial Relations, Division of Occupational Safety and Health
- NESHAP = National Emissions Standards for Hazardous Air Pollutants
- NCUAQMD = USEPA-delegated authority with jurisdiction over the project site
- USEPA = United States Environmental Protection Agency
- [1] = Assumption: Removal/unweighting of structural members (demolition work) and/or disturbance of RACM in excess of NCUAQMD notification thresholds is not expected to occur
- [2] = Assumption: asbestos and/or lead-related work in excess of 100 square feet is not expected to occur
- ≥ = Signifying “greater than, or equal to”

Further discussion of USEPA and Cal/OSHA regulations is provided in Appendix F (Asbestos Regulatory Summary) and Appendix G (Lead Regulatory Summary).

7. Key Project Personnel

The survey was completed by Matt Tolley, a Cal/OSHA Certified Site Surveillance Technician (CSST) (#17-6073) and CDPH Lead Sampling Technician (#1047) a working under the direction of Scott Harris, a Cal/OSHA Certified Asbestos Consultant (CAC) (#11-4713) and CDPH Lead Inspector/Assessor (#21408). This report was produced for HBMWD by GHD and was authored by Mr. Tolley and reviewed by Mr. Harris. Copies of the certifications for key GHD staff performing survey and reporting work are included in Appendix H.

8. Conclusion

The findings in this report are based on information obtained from the specific sample points noted on Figures 1 through 3 (Appendix A) and described by the laboratory analytical reports. Site conditions at other parts of the project site may be different from the conditions found at the specific sample points. This report should not be used to evaluate the potential disturbance of suspect hazardous materials in association with area(s), site feature(s), and/or projects beyond the scope of the survey.

GHD recommends that asbestos materials be appropriately removed by a licensed abatement contractor prior to the commencement of work at the project site that may impact the hazardous materials described herein. While removal

of all lead surface coatings is not required prior to work, impaction of material containing lead shall be conducted by appropriately licensed and trained personnel, as outlined herein.

It is recommended that this report be provided to contractors and/or personnel who conduct work at the project site. It is recommended that HBMWD maintain copies of this report for as long as the known hazardous materials remain at the project site, plus an additional period of 30 years.

8.1 Conclusions and Recommendations for Asbestos

As described in Section 4, none of the materials sampled for this survey were reported by the analyzing laboratory to contain asbestos. As three (3) unsampled homogenous materials (flange gaskets) were presumed to contain asbestos, all appropriate USEPA and Cal/OSHA asbestos regulations apply to the identified ACMs. A tabulated summary of all bulk samples analyzed via PLM for this project is provided in Appendix C. As applicable to the project scope of work, agency notifications, as summarized in Table 6.1 in Section 6, must be submitted by the contractor or the site owner prior to the commencement of work at the project site.

The findings in this report are based on information obtained from the specific sample points noted on Figures 1 through 3 (Appendix A) and described by the laboratory analytical reports (Appendix D). This report should not be used to evaluate the potential disturbance of suspect hazardous materials in association with area(s), site feature(s), and/or projects beyond the scope of the survey.

If additional suspect ACM is discovered at the project site, beyond those materials listed in Table C1.1 (Appendix C), then such suspect material shall be presumed to contain greater than 1% asbestos, unless appropriately sampled, analyzed, and determined not to contain asbestos. If supplemental suspect asbestos material is exposed during site work, then work in that area shall stop, the material wetted, and access to the area restricted until an appropriate asbestos characterization can be made

8.2 Conclusions and Recommendations for Lead

As noted in Table 5.1 located in Section 5, six (6) of the 17 sampled surface coatings were reported to contain lead. Project work is understood to meet the Cal/OSHA definition of construction work (8CCR1532.1 [a]) and includes impaction of known and presumed lead material, thus project demolition and construction work is subject to 8CCR1532.1. Suspect lead material (e.g., paint, ceramic glazing, metal flashing, metal vents and piping, coatings, varnishes, etc.) not identified in this report should be presumed to contain lead, unless appropriately sampled, analyzed and determined not to contain lead. Material reported or presumed to contain lead is subject to governmental regulations, including those summarized in Appendix G.

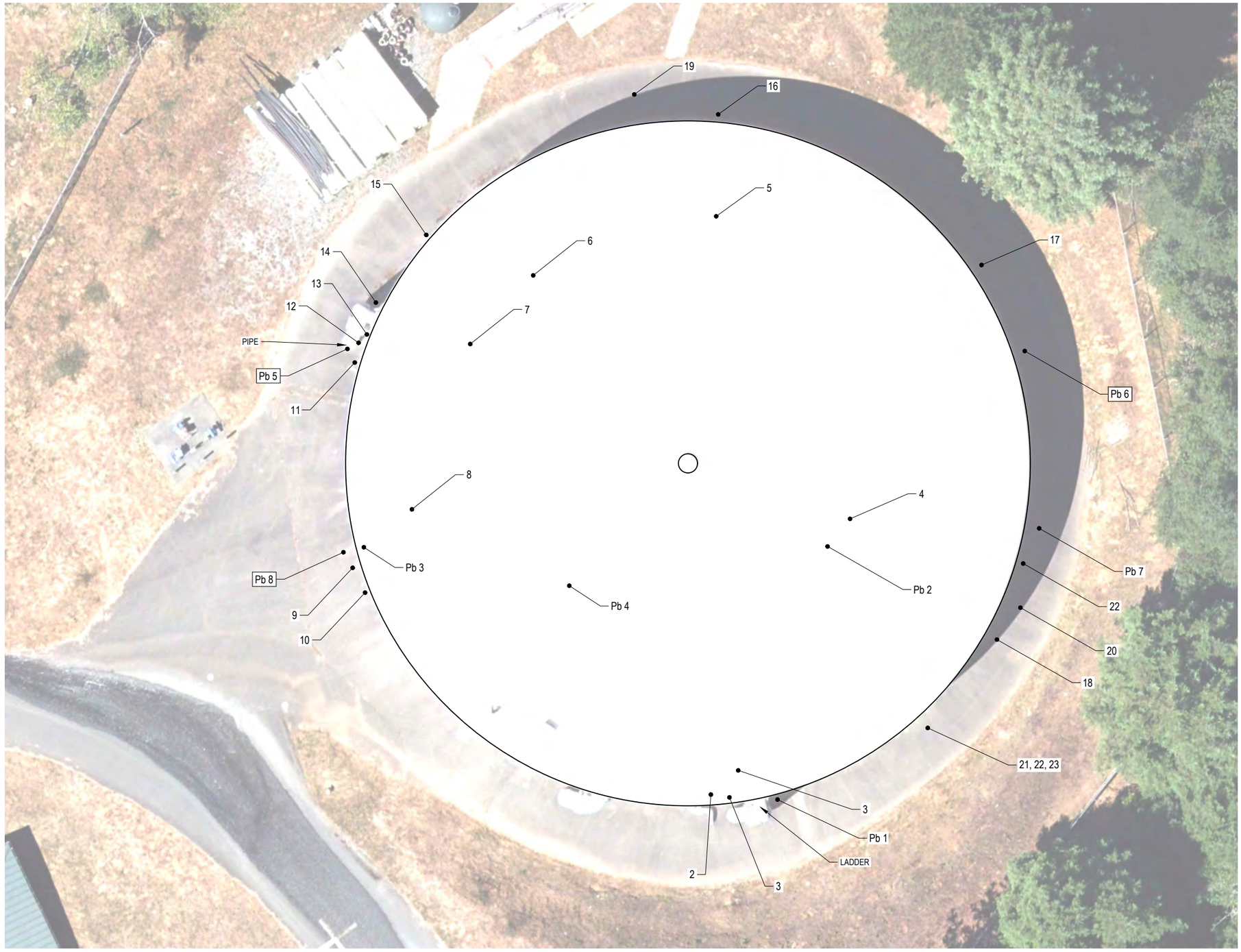
The specific regulatory requirements governing lead work are dependent on the amount of lead reported in a given material. Lead content in paint above 0.009% by weight, or 90 parts per million (ppm), meets the CPSC definition of LCP. Paint reported to contain lead above 0.5% by weight, 5,000 ppm, or 1.0 milligram per square centimeter (mg/cm^2), meets the CDPH and Cal/OSHA definition of LBP. Work impacting known or presumed lead material, including those noted in Table 5.1, triggers compliance with applicable Cal/OSHA regulations, including 8CCR1532.1. It is recommended that loose, peeling and/or flaking surface coatings be stabilized prior to commencing other project construction work.

Title 17, Division 1, Chapter 8, § 35001–36100 enforced by CDPH requires that contractors working on structures built before January 1, 1978 to use lead-safe work practices, including containment and post-work cleaning. Training is required by Cal/OSHA and CDPH for employees impacting lead, including CDPH certification for individuals expected to be exposed above the Permissible Exposure Limit (PEL) in a public building. In addition to Cal/OSHA and CDPH protocols, work at the project site impacting known or presumed lead material is governed by applicable USEPA regulations, including: 40 Code of Federal Regulations (CFR) Part 745, Subpart E.

Appendix A

Figures

Figure(s) Depicting Survey Sample Locations at HBMWD Korblex and Samoa Reservoirs



SHEET GENERAL NOTES

1. ALL LOCATIONS ARE APPROXIMATE.
2. THIS SHEET TRANSMITS GHD SAMPLE LOCATIONS ONLY. NOT TO BE USED FOR CONSTRUCTION WORK.

LEGEND

- # — LOCATION OF BULK SAMPLE COLLECTED FOR ASBESTOS (PLM) ANALYSIS
- # — SAMPLE REPORTED TO CONTAIN ASBESTOS
- Pb # — LOCATION OF BULK SAMPLE COLLECTED FOR LEAD (AAS) ANALYSIS
- Pb # — SAMPLE REPORTED TO CONTAIN LEAD

N

0 10' 20'

FINAL

No.	Issue	Checked	Approved	Date
Author	O. GOODE	Drafting Check	M. TOLLEY	Project Manager
Designer	N/A	Design Check	N/A	Project Director

Bar is one inch on original size sheet
0 1"

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Client: HUMBOLDT BAY MUNICIPAL WATER DISTRICT
Project: RESERVOIRS SEISMIC RETROFIT

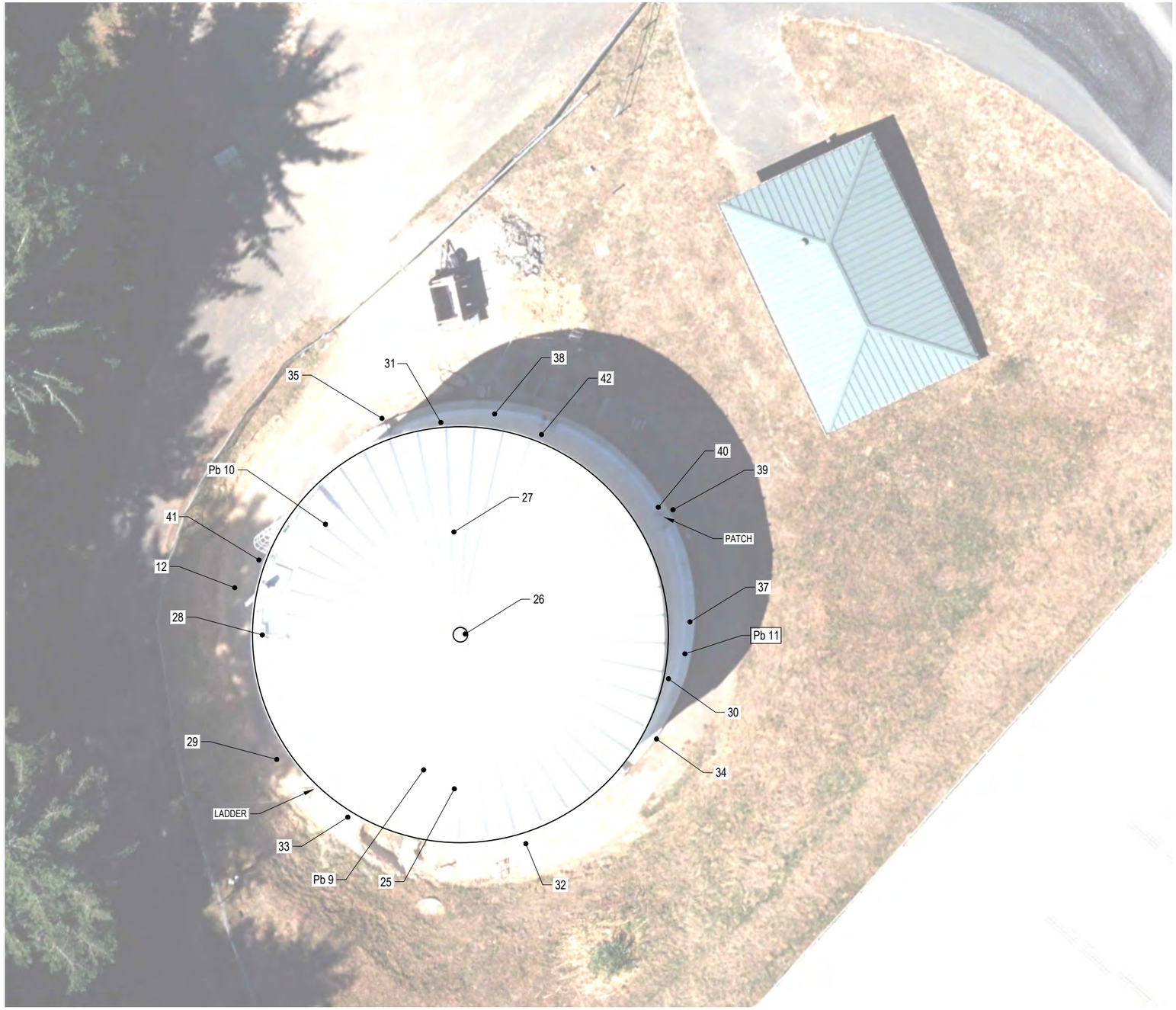
Title: ACM SAMPLE LOCATION MAPS: KORBLEX 2-MG DOMESTIC TANK

Size: ANSI D

Project No.	Date	Scale
11218859	2021-07-27	AS SHOWN

Sheet No.: FIGURE 1

Plot Date: 27 July 2021 - 1:25 PM Plotted By: Owen Goode Path and Filename: \\ghdnet\ghd\US\Eureka\Projects\56\11218859\Digital_Design\ACAD 2020\Figures\11218859-AMC SAMPLE LOCATION MAPS-FIGURES.dwg



SHEET GENERAL NOTES

1. ALL LOCATIONS ARE APPROXIMATE.
2. THIS SHEET TRANSMITS GHD SAMPLE LOCATIONS ONLY. NOT TO BE USED FOR CONSTRUCTION WORK.

LEGEND

— LOCATION OF BULK SAMPLE COLLECTED FOR ASBESTOS (PLM) ANALYSIS

— SAMPLE REPORTED TO CONTAIN ASBESTOS

Pb # — LOCATION OF BULK SAMPLE COLLECTED FOR LEAD (AAS) ANALYSIS

Pb # — SAMPLE REPORTED TO CONTAIN LEAD

N

0 10' 20'

FINAL

No.	Issue	Checked	Approved	Date
Author	O. GOODE	Drafting Check	M. TOLLEY	Project Manager
Designer	N/A	Design Check	N/A	Project Director

Bar is one inch on original size sheet
0 1"

GHD Inc.
718 Third Street
Eureka California 95501 USA
T 1 707 443 8326 F 1 707 444 8330
www.ghd.com

Client: HUMBOLDT BAY MUNICIPAL WATER DISTRICT
Project: RESERVOIRS SEISMIC RETROFIT

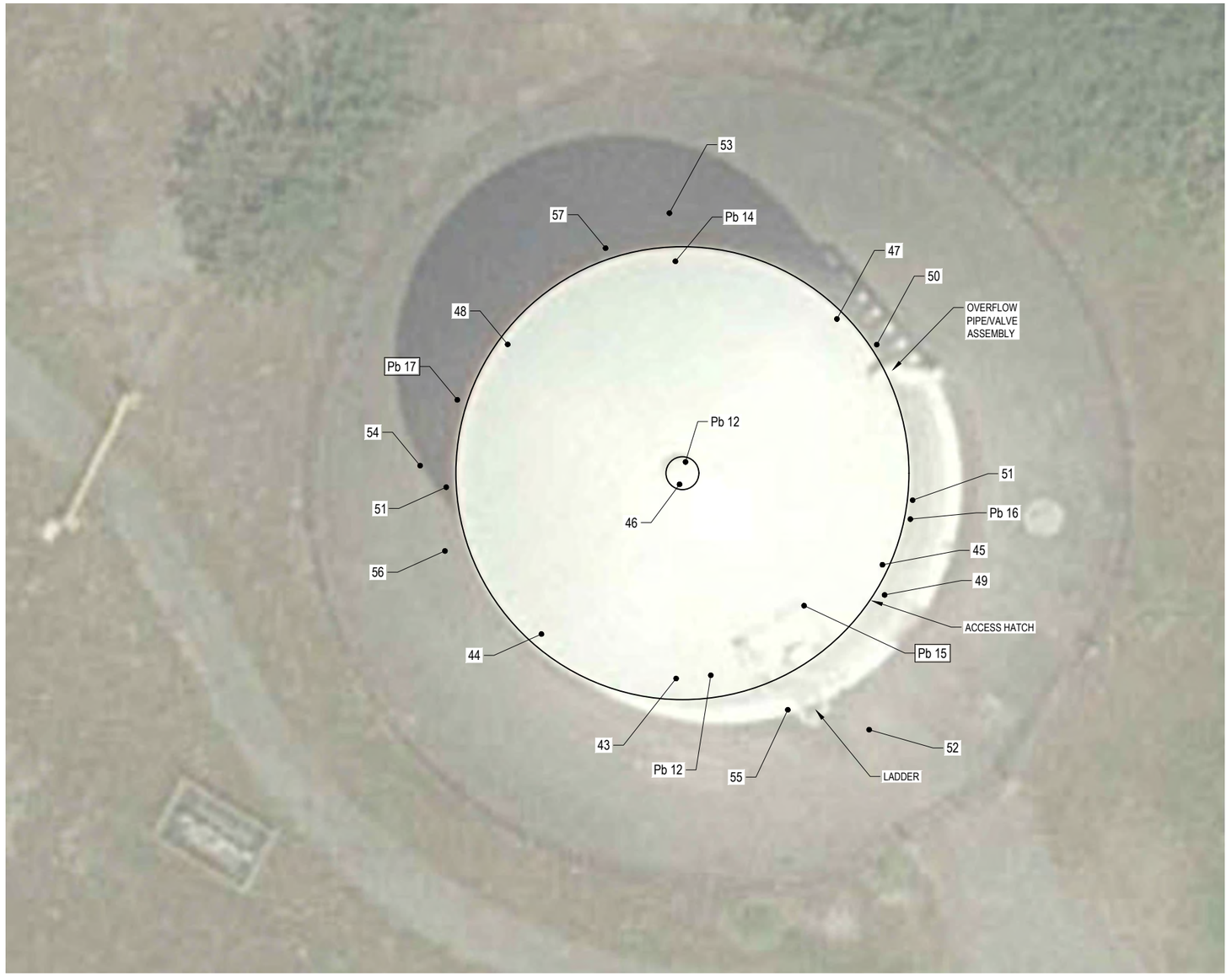
Title: ACM SAMPLE LOCATION MAPS: KORBLEX 1-MG DOMESTIC TANK

Size: ANSI D

Project No.	Date	Scale
11218859	2021-07-27	AS SHOWN

Sheet No.: FIGURE 2

Plot Date: 27 July 2021 - 1:25 PM Plotted By: Owen Goode Path and Filename: \\ghdnet\ghd\US\Eureka\Projects\56\11218859\Digital_Design\ACAD 2020\Figures\11218859-AMC SAMPLE LOCATION MAPS-FIGURES.dwg



SHEET GENERAL NOTES

1. ALL LOCATIONS ARE APPROXIMATE.
2. THIS SHEET TRANSMITS GHD SAMPLE LOCATIONS ONLY. NOT TO BE USED FOR CONSTRUCTION WORK.

LEGEND

- # — LOCATION OF BULK SAMPLE COLLECTED FOR ASBESTOS (PLM) ANALYSIS
- # — SAMPLE REPORTED TO CONTAIN ASBESTOS
- Pb # — LOCATION OF BULK SAMPLE COLLECTED FOR LEAD (AAS) ANALYSIS
- Pb # — SAMPLE REPORTED TO CONTAIN LEAD

N

0 10' 20'

FINAL

No.	Issue	Checked	Approved	Date

Author **O. GOODE** Drafting Check **M. TOLLEY** Project Manager

Designer **N/A** Design Check **N/A** Project Director

Bar is one inch on original size sheet

0 1"

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Client **HUMBOLDT BAY MUNICIPAL WATER DISTRICT**

Project **RESERVOIRS SEISMIC RETROFIT**

Title **ACM SAMPLE LOCATION MAPS: SAMOA 1-MG DOMESTIC TANK**

Size **ANSI D**

Project No.	Date	Scale
11218859	**2021-07-27**	**AS SHOWN**

Sheet No. **FIGURE 3**

Plot Date: 27 July 2021 - 1:26 PM Plotted By: Owen Goode Path and Filename: \\ghdnet\ghd\US\Eureka\Projects\56\11218859\Digital_Design\ACAD 2020\Figures\11218859-AMC SAMPLE LOCATION MAPS-FIGURES.dwg

Appendix B

Photographs

Photographs Generally Depicting the Project Site and Select Sample Locations

Site Photographs

The photographs presented in the following section generally depict the project site, including some of the materials sampled for the survey.

Photograph 1 – Korblex – 2 MG reservoir – View of exterior wall.

Photograph 2 – Korblex – 2 MG reservoir - Exterior at name plate.

Photograph 3 – Korblex – 1 MG reservoir.

Photograph 4 – Samoa – 1 MG reservoir – View of exterior.

Photograph 5 – Korblex – 2 MG reservoir, roof paint and surfacing coating reported to be nondetect for asbestos and lead.

Photograph 6 – Korblex – 2 MG reservoir – West wall at 2' O.D. Flange – Paint (white) reported to contain lead.

Photograph 7 – Korblex – 2 MG reservoir – Asphalt (black) and concrete pad (grey) reported to be nondetect for asbestos

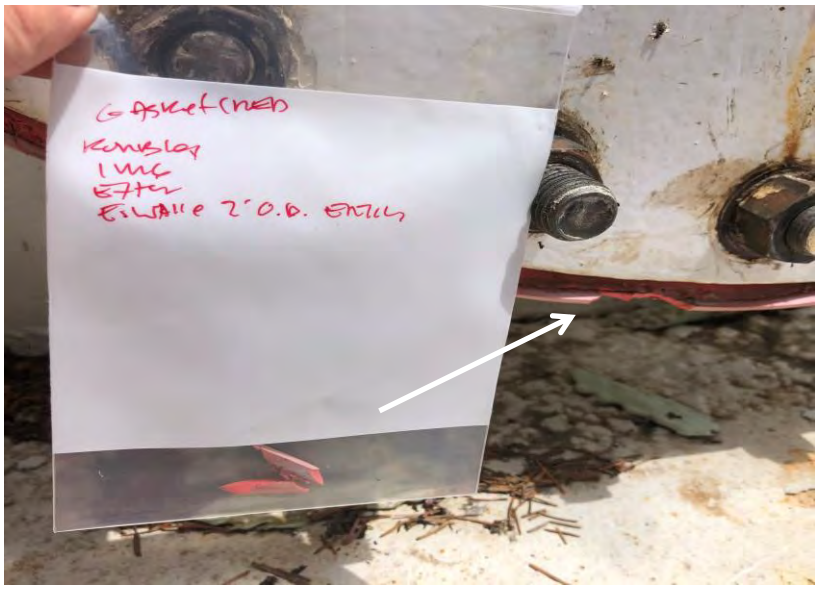
Photograph 8 – Korblex – 1 MG reservoir – Paint (white) reported to be nondetect for asbestos and lead.

Photograph 9 – Korblex – 1 MG reservoir – Paint (white) at pad and tank intersection reported nondetect for asbestos and reported to contain lead. -

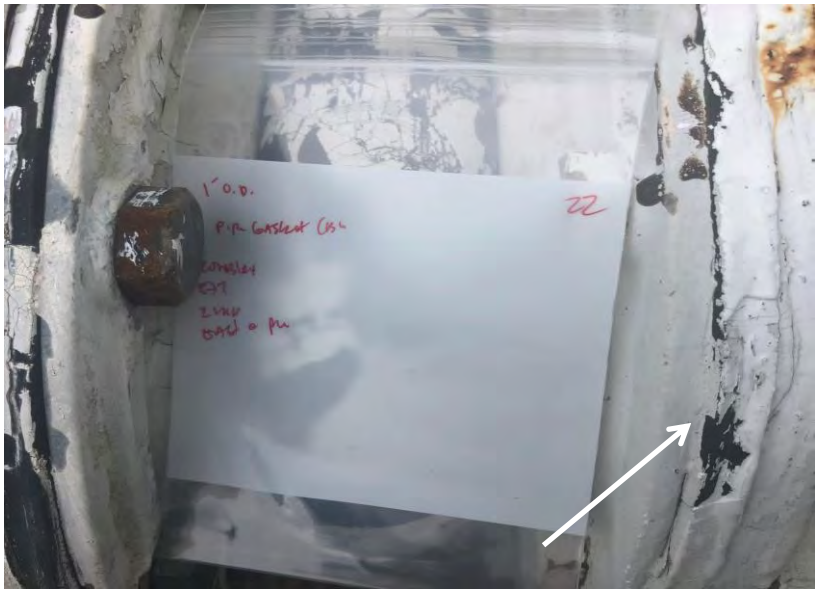
Photograph 10 – Samoa – 1 MG reservoir – Roof exterior paint (white) reported to be nondetect for asbestos and lead.

Photograph 11 – Samoa – 1 MG reservoir – Paint (white) located at roof east handrail reported to contain lead. -

Photograph 12 – Samoa – 1MG reservoir – Asphalt (black) and concrete pad (grey) reported to be nondetect for asbestos.



Photograph 13 – Korblex – 1MG reservoir – Gasket (red) reported nondetect for asbestos.



Photograph 14 – Korblex – 2 MG reservoir – 1’ O.D. gasket (black) reported nondetect for asbestos.

Appendix C

Asbestos Data Summary Table

Table Summarizing All PLM Laboratory Analytical Data

Table C1.8.1 Asbestos PLM Laboratory Data Summary

HBMWD Korblex and Samoa Reservoirs, Arcata and Samoa, California

Sample Number(s)	Material Description	Material Location	Asbestos %/Type	Estimated Quantity[1]	Asbestos Material Category[2]	Cal/OSHA Work Class[3]	Projected Waste Designation[2]
11218859-1	Paint (White) + Paint (Cream)	Korbel Complex (Korblex) - 2 Million Gallon (MG) Water Tank (Tank) - Roof - South Center at Damage	ND	NA	NA	NA	Not Asbestos Waste
11218859-2	Paint (White) + Paint (Cream) + Coating (Beige)	Korblex - 2 MG Tank - Roof - South Center at Hatch Lid	ND	NA	NA	NA	Not Asbestos Waste
11218859-3	Traction Tape (Black) + Adhesive Backing (Clear)	Korblex - 2 MG Tank - Roof - South Center at Hatch	ND	NA	NA	NA	Not Asbestos Waste
11218859-4	Paint (White) + Paint (Cream) + Coating (Beige)	Korblex - 2 MG Tank - Roof - Center East	ND	NA	NA	NA	Not Asbestos Waste
11218859-5	Paint (White) + Paint (Cream) + Paint (Grey) + Coating (Beige)	Korblex - 2 MG Tank - Roof - Center North	ND	NA	NA	NA	Not Asbestos Waste
11218859-6	Paint (White) + Coating (Beige) + Mastic (Grey)	Korblex - 2 MG Tank - Roof - Center North at 6" O.D. Sealed Penetration	ND	NA	NA	NA	Not Asbestos Waste
11218859-7	Paint (White) + Coating (Beige) + Mastic (Grey)	Korblex - 2 MG Tank - Roof - Center Northwest at 6" O.D. Sealed Penetration	ND	NA	NA	NA	Not Asbestos Waste
11218859-8	Paint (White) + Paint (Cream) + Coating (Beige)	Korblex - 2 MG Tank - Roof - Center West	ND	NA	NA	NA	Not Asbestos Waste
11218859-9	Concrete Pad (Grey)	Korblex - 2 MG Tank - Exterior - Center West	ND	NA	NA	NA	Not Asbestos Waste
11218859-10	1" O.D. Pipe Insulation (Foam) (Black)	Korblex - 2 MG Tank - Exterior - West Footing at 1" O.D. Pipe	ND	NA	NA	NA	Not Asbestos Waste
11218859-11	Paint (White) + Paint (Cream) + Coating (Beige)	Korblex - 2 MG Tank - Exterior - West at 2' O.D. Pipe	ND	NA	NA	NA	Not Asbestos Waste
11218859-12	Seam Putty (Grey)	Korblex - 2 MG Tank - Exterior - West at 2' O.D. Pipe at Gasket Seam	ND	NA	NA	NA	Not Asbestos Waste
11218859-13	Paint (White) + Concrete Pedestal (Grey)	Korblex - 2 MG Tank - Exterior - West at 2' O.D. Pipe Footing/Pedestal	ND	NA	NA	NA	Not Asbestos Waste

Table C1.8.1 Asbestos PLM Laboratory Data Summary

HBMWD Korblex and Samoa Reservoirs, Arcata and Samoa, California

Sample Number(s)	Material Description	Material Location	Asbestos %/Type	Estimated Quantity[1]	Asbestos Material Category[2]	Cal/OSHA Work Class[3]	Projected Waste Designation[2]
11218859-14	Asphalt (Black)	Korblex - 2 MG Tank - Exterior - West at 2' O.D. Pipe	ND	NA	NA	NA	Not Asbestos Waste
11218859-15	Paint (White) + Paint (Tan) + Expansion Joint (Grey)	Korblex - 2 MG Tank - Exterior at NW Corner at Pad/Tank Intersection at Base	ND	NA	NA	NA	Not Asbestos Waste
11218859-16	Paint (White) + Paint (Tan) + Expansion Joint (Grey)	Korblex - 2 MG Tank - Exterior - North at Center at Pad/Tank Intersection at Base	ND	NA	NA	NA	Not Asbestos Waste
11218859-17	Paint (White) + Paint (Tan) + Expansion Joint (Grey)	Korblex - 2 MG Tank - Exterior at NE Corner at Pad/Tank Intersection at Base	ND	NA	NA	NA	Not Asbestos Waste
11218859-18	Paint (White) + Paint (Tan) + Expansion Joint (Grey)	Korblex - 2 MG Tank - Exterior at SE Corner at Pad/Tank Intersection at Base	ND	NA	NA	NA	Not Asbestos Waste
11218859-19	Asphalt (Black)	Korblex - 2 MG Tank - Exterior at Center North of Tank	ND	NA	NA	NA	Not Asbestos Waste
11218859-20	Asphalt (Black)	Korblex - 2 MG Tank - Exterior at Center East of Tank	ND	NA	NA	NA	Not Asbestos Waste
11218859-21	Paint (White) + Concrete Pad (Grey)	Korblex - 2 MG Tank - Exterior at SE Corner	ND	NA	NA	NA	Not Asbestos Waste
11218859-22	4" O.D. Pipe Gasket (Black)	Korblex - 2 MG Tank - Exterior - East Wall at 4" O.D. Pipe Flange	ND	NA	NA	NA	Not Asbestos Waste
11218859-23	1' O.D. Pipe Gasket(Black)	Korblex - 2 MG Tank - Exterior - East Wall at 1' O.D. Pipe Flange	ND	NA	NA	NA	Not Asbestos Waste
11218859-24	Paint (White) + Concrete Pad (Grey)	Korblex - 2 MG Tank - Exterior at West at Center	ND	NA	NA	NA	Not Asbestos Waste
			ND	NA	NA	NA	Not Asbestos Waste
11218859-25	Surface Coating (White) + Surface Coating (Grey)	Korblex - 1 MG Tank - Roof - Center South at Fin/Ridge	ND	NA	NA	NA	Not Asbestos Waste
11218859-26	Surface Coating (White) + Surface Coating (Grey)	Korblex - 1 MG Tank - Roof - Center East	ND	NA	NA	NA	Not Asbestos Waste

Table C1.8.1 Asbestos PLM Laboratory Data Summary

HBMWD Korblex and Samoa Reservoirs, Arcata and Samoa, California

Sample Number(s)	Material Description	Material Location	Asbestos %/Type	Estimated Quantity[1]	Asbestos Material Category[2]	Cal/OSHA Work Class[3]	Projected Waste Designation[2]
11218859-27	Surface Coating (White) + Surface Coating (Grey)	Korblex - 1 MG Tank - Roof - Center North	ND	NA	NA	NA	Not Asbestos Waste
11218859-28	Surface Coating (White) + Surface Coating (Grey)	Korblex - 1 MG Tank - Roof - Center West	ND	NA	NA	NA	Not Asbestos Waste
11218859-29	Asphalt (Black)	Korblex - 1 MG Tank - Exterior at SW Corner at Surface	ND	NA	NA	NA	Not Asbestos Waste
11218859-30	Asphalt (Black)	Korblex - 1 MG Tank - Exterior at SE Corner at Surface	ND	NA	NA	NA	Not Asbestos Waste
11218859-31	Asphalt (Black)	Korblex - 1 MG Tank - Exterior at Center North at Surface	ND	NA	NA	NA	Not Asbestos Waste
11218859-32	Surface Coating (White) + Concrete Pad (Grey)	Korblex - 1 MG Tank - Exterior Tank Pad - South Center	ND	NA	NA	NA	Not Asbestos Waste
11218859-33	Surface Coating (White) + Surface Coating (Beige)	Korblex - 1 MG Tank - Exterior Tank Pad - South Center at Ladder Base	ND	NA	NA	NA	Not Asbestos Waste
11218859-34	Surface Coating (White) + Surface Coating (Beige)	Korblex - 1 MG Tank - Exterior Tank Pad at SW Corner	ND	NA	NA	NA	Not Asbestos Waste
11218859-35	Surface Coating (White) + Surface Coating (Beige)	Korblex - 1 MG Tank - Exterior Tank Pad at Center North	ND	NA	NA	NA	Not Asbestos Waste
11218859-36	Surface Coating (White) + Surface Coating (Beige)	Korblex - 1 MG Tank - Exterior Tank Pad at Center West	ND	NA	NA	NA	Not Asbestos Waste
11218859-37	Surface Coating (White) + Concrete Pad (Grey)	Korblex - 1 MG Tank - Exterior Tank Pad at Center East	ND	NA	NA	NA	Not Asbestos Waste
11218859-38	Surface Coating (White) + Concrete Pad (Grey)	Korblex - 1 MG Tank - Exterior Tank Pad at Center North	ND	NA	NA	NA	Not Asbestos Waste
11218859-39	Surface Coating (White) + Cementitious Patch (Grey)	Korblex - 1 MG Tank - Exterior Tank Pad at NE Corner	ND	NA	NA	NA	Not Asbestos Waste

Table C1.8.1 Asbestos PLM Laboratory Data Summary

HBMWD Korblex and Samoa Reservoirs, Arcata and Samoa, California

Sample Number(s)	Material Description	Material Location	Asbestos %/Type	Estimated Quantity[1]	Asbestos Material Category[2]	Cal/OSHA Work Class[3]	Projected Waste Designation[2]
11218859-40	Surface Coating (White) + Cementitious Patch (Grey)	Korblex - 1 MG Tank - Exterior Tank Pad at NE Corner	ND	NA	NA	NA	Not Asbestos Waste
11218859-41	2' O.D. Hatch Gasket (Red)	Korblex - 1 MG Tank - Exterior - East Wall at 2' O.D. Entry Hatch	ND	NA	NA	NA	Not Asbestos Waste
11218859-42	2' O.D. Hatch Gasket (Red)	Korblex - 1 MG Tank - Exterior - North Wall at 2' O.D. Entry Hatch	ND	NA	NA	NA	Not Asbestos Waste
11218859-43	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Roof at Center South	ND	NA	NA	NA	Not Asbestos Waste
11218859-44	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Roof at SW Corner	ND	NA	NA	NA	Not Asbestos Waste
11218859-45	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Roof at East Edge	ND	NA	NA	NA	Not Asbestos Waste
11218859-46	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Roof at Center Vent at Cap	ND	NA	NA	NA	Not Asbestos Waste
11218859-47	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Roof at NE Corner	ND	NA	NA	NA	Not Asbestos Waste
11218859-48	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Roof at NW Corner	ND	NA	NA	NA	Not Asbestos Waste
11218859-49	4' X 8' Hatch Gasket (Black)	Samoa - 1 MG Tank - Exterior at SE Corner at Hatch	ND	NA	NA	NA	Not Asbestos Waste

Table C1.8.1 Asbestos PLM Laboratory Data Summary

HBMWD Korblex and Samoa Reservoirs, Arcata and Samoa, California

Sample Number(s)	Material Description	Material Location	Asbestos %/Type	Estimated Quantity[1]	Asbestos Material Category[2]	Cal/OSHA Work Class[3]	Projected Waste Designation[2]
11218859-50	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Exterior - North Wall at Center	ND	NA	NA	NA	Not Asbestos Waste
11218859-51	Surface Coating (White) + Surface Coating (Beige) + Gasket (Red)	Samoa - 1 MG Tank - Exterior - East Wall at 2' O.D. Vault Lid	ND	NA	NA	NA	Not Asbestos Waste
11218859-52	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Exterior - West Wall at SW Corner	ND	NA	NA	NA	Not Asbestos Waste
11218859-53	Asphalt (Black)	Samoa - 1 MG Tank - Exterior at SE Corner at Surface Level	ND	NA	NA	NA	Not Asbestos Waste
11218859-54	Asphalt (Black)	Samoa - 1 MG Tank - Exterior - Center North at Surface Level	ND	NA	NA	NA	Not Asbestos Waste
11218859-55	Asphalt (Black)	Samoa - 1 MG Tank - Exterior - Center West at Surface Level	ND	NA	NA	NA	Not Asbestos Waste
11218859-56	Concrete Pad (Grey)	Samoa - 1 MG Tank - Exterior - SE Corner at Pad	ND	NA	NA	NA	Not Asbestos Waste
11218859-57	Concrete Pad (Grey)	Samoa - 1 MG Tank - Exterior - Center West at Pad	ND	NA	NA	NA	Not Asbestos Waste
11218859-58	Concrete Pad (Grey)	Samoa - 1 MG Tank - Exterior - Center North at Pad	ND	NA	NA	NA	Not Asbestos Waste

Acronyms:

- ACM = Asbestos Containing Material (>1% asbestos)
- ACCM = Asbestos Containing Construction Material (>0.1% asbestos)
- Cal/OSHA = California Department of Industrial Relations, Division of Occupational Safety and Health
- CH = Chrysotile (serpentine form of asbestos)
- CMU = Concrete Masonry Unit
- NA = Not applicable
- ND = Nondetect, or No Asbestos Detected
- OD = Outside Diameter
- PACM = Presumed Asbestos Containing Material
- RACM = Regulated Asbestos Containing Material
- RCRA = Resource Conservation and Recovery Act
- SF = Square feet
- TSI = Thermal System Insulation
- USEPA = United States Environmental Protection Agency
- VFT = Vinyl Floor Tile
- < = Symbol meaning “less than”
- > = Symbol meaning “greater than”

Table C1.8.1 Asbestos PLM Laboratory Data Summary

HBMWD Korblex and Samoa Reservoirs, Arcata and Samoa, California

Sample Number(s)	Material Description	Material Location	Asbestos %/Type	Estimated Quantity[1]	Asbestos Material Category[2]	Cal/OSHA Work Class[3]	Projected Waste Designation[2]

Annotations:

- [1] = The quantities this table are estimates of the total (cumulative) amount of each homogeneous asbestos material observed at the project site. The above quantities are estimates only. The actual amount of material to be removed should be verified by the contractor prior to bid.
- [2] = Cal/OSHA regulates material containing ANY quantity of asbestos. Cal/OSHA regulates material containing >0.1% asbestos as ACCM and >1% asbestos as ACM. USEPA regulates material containing >1% asbestos, differentiated into two broad ACM categories: friable (RACM) and nonfriable (Category I and II ACM). RACM is a California hazardous waste (non-RCRA hazardous waste). USEPA Category I and II nonfriable ACM that remains nonfriable during removal is characterized as non-hazardous asbestos-containing waste. The non-hazardous waste designation presumes that nonfriable material will not become friable due to contractor removal practices. If nonfriable ACM is rendered friable (e.g., via the use of mechanical removal means, fire damage, etc.), then such material shall be reclassified as RACM and disposed of as a California hazardous waste.
- [3] = Cal/OSHA differentiates asbestos removal operations into five classes (Class I to IV, plus unclassified work). Class I through IV operations include tasks impacting material containing >1% asbestos (ACM). Unclassified work includes tasks impacting material containing <1% asbestos. Work impacting asbestos in any quantity is subject to Cal/OSHA requirements.
    - It is recommended that unclassified work be conducted per Class II work protocols.
    - It is recommended that interior work, regardless of work classification, be conducted within sealed negative pressure containments.
-

Notes:

See Appendix F for further information on the asbestos regulatory environment, including USEPA material categories and Cal/OSHA work classes.

Appendix D

Asbestos Analytical Data

PLM Analytical Reports and Associated Chain of Custody Documentation

EMSL Analytical, Inc.

464 McCormick Street San Leandro, CA 94577

Tel/Fax: (510) 895-3675 / (510) 895-3680

http://www.EMSL.com / sanleandrolab@emsl.com

EMSL Order:	092110670
Customer ID:	WKC50
Customer PO:	
Project ID:	PO 38005320

Attention:	Scott Harris	**Phone:**	(707) 599-6974
	GHD	**Fax:**	(707) 444-8330
	718 Third Street	**Received Date:**	07/12/2021 8:45 AM
	Eureka, CA 95501	**Analysis Date:**	07/17/2021 - 07/19/2021
		Collected Date:	

Project: 11218859.01 - HBMWD RESERVIORS SEISMIC RETRO - 38005320 (PO 38005320)

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-1-Paint 1 *092110670-0001*	PAINT (WHITE) + PAINT (CREAM) - KORBEL COMPLEX (KORBLEX) - 2 MILLION GALLON (MG) WATER TANK (TANK) - ROOF - SOUTH CENTER AT DAMAGE	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-1-Paint 2 *092110670-0001A*	PAINT (WHITE) + PAINT (CREAM) - KORBEL COMPLEX (KORBLEX) - 2 MILLION GALLON (MG) WATER TANK (TANK) - ROOF - SOUTH CENTER AT DAMAGE	Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-2-Paint 1 *092110670-0002*	PAINT (WHITE) + PAINT (CREAM) + COATING (BEIGE) - KORBLEX - 2 MG TANK - ROOF - SOUTH CENTER AT HATCH LID	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-2-Paint 2 *092110670-0002A*	PAINT (WHITE) + PAINT (CREAM) + COATING (BEIGE) - KORBLEX - 2 MG TANK - ROOF - SOUTH CENTER AT HATCH LID	Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-2-Coating *092110670-0002B*	PAINT (WHITE) + PAINT (CREAM) + COATING (BEIGE) - KORBLEX - 2 MG TANK - ROOF - SOUTH CENTER AT HATCH LID	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-3-Traction Tape *092110670-0003*	TRACTION TAPE (BLACK) + ADHESIVE BACKING (CLEAR) - KORBLEX - 2 MG TANK - ROOF - SOUTH CENTER AT HATCH	Gray Non-Fibrous Homogeneous		98% Matrix 2% Non-fibrous (Other)	None Detected

Initial report from: 07/19/2021 13:47:06

EMSL Analytical, Inc.
464 McCormick Street San Leandro, CA 94577
Tel/Fax: (510) 895-3675 / (510) 895-3680
http://www.EMSL.com / sanleandrolab@emsl.com

EMSL Order:	092110670
Customer ID:	WKC50
Customer PO:	
Project ID:	PO 38005320

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-3-Adhesive *092110670-0003A*	TRACTION TAPE (BLACK) + ADHESIVE BACKING (CLEAR) - KORBLEX - 2 MG TANK - ROOF - SOUTH CENTER AT HATCH	Clear Non-Fibrous Homogeneous		10% Quartz 80% Matrix 10% Non-fibrous (Other)	None Detected
Result includes a small amount of inseparable attached material					
112118859-3-Backing *092110670-0003B*	TRACTION TAPE (BLACK) + ADHESIVE BACKING (CLEAR) - KORBLEX - 2 MG TANK - ROOF - SOUTH CENTER AT HATCH	Clear Non-Fibrous Homogeneous		98% Matrix 2% Non-fibrous (Other)	None Detected
112118859-4-Paint 1 *092110670-0004*	PAINT (WHITE) + PAINT (CREAM) + COATING (BEIGE) - KORBLEX - 2 MG TANK - ROOF - CENTER EAST	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-4-Paint 2 *092110670-0004A*	PAINT (WHITE) + PAINT (CREAM) + COATING (BEIGE) - KORBLEX - 2 MG TANK - ROOF - CENTER EAST	Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-4-Paint 3 *092110670-0004B*	PAINT (WHITE) + PAINT (CREAM) + COATING (BEIGE) - KORBLEX - 2 MG TANK - ROOF - CENTER EAST	Gray Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-4-Coating *092110670-0004C*	PAINT (WHITE) + PAINT (CREAM) + COATING (BEIGE) - KORBLEX - 2 MG TANK - ROOF - CENTER EAST	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-5-Paint 1 *092110670-0005*	PAINT (WHITE) + PAINT (CREAM) + PAINT (GREY) + COATING (BEIGE) - KORBLEX - 2 MG TANK - ROOF - CENTER NORTH	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-5-Paint 2 *092110670-0005A*	PAINT (WHITE) + PAINT (CREAM) + PAINT (GREY) + COATING (BEIGE) - KORBLEX - 2 MG TANK - ROOF - CENTER NORTH	Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected

Initial report from: 07/19/2021 13:47:06

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EMSL Order:	092110670
Customer ID:	WKC50
Customer PO:	
Project ID:	PO 38005320

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-5-Paint 3 *092110670-0005B*	PAINT (WHITE) + PAINT (CREAM) + PAINT (GREY) + COATING (BEIGE) - KORBLEX - 2 MG TANK - ROOF - CENTER NORTH	Gray Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-5-Coating *092110670-0005C*	PAINT (WHITE) + PAINT (CREAM) + PAINT (GREY) + COATING (BEIGE) - KORBLEX - 2 MG TANK - ROOF - CENTER NORTH	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-6-Paint *092110670-0006*	PAINT (WHITE) + COATING (BEIGE) + MASTIC (GREY) - KORBLEX - 2 MG TANK - ROOF - CENTER NORTH AT 6" O.D. SEALED PENETRATION	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-6-Coating 1 *092110670-0006A*	PAINT (WHITE) + COATING (BEIGE) + MASTIC (GREY) - KORBLEX - 2 MG TANK - ROOF - CENTER NORTH AT 6" O.D. SEALED PENETRATION	White/Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-6-Coating 2 *092110670-0006B*	PAINT (WHITE) + COATING (BEIGE) + MASTIC (GREY) - KORBLEX - 2 MG TANK - ROOF - CENTER NORTH AT 6" O.D. SEALED PENETRATION	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-6-Sealant *092110670-0006C*	PAINT (WHITE) + COATING (BEIGE) + MASTIC (GREY) - KORBLEX - 2 MG TANK - ROOF - CENTER NORTH AT 6" O.D. SEALED PENETRATION	Gray Non-Fibrous Homogeneous		30% Ca Carbonate 40% Matrix 30% Non-fibrous (Other)	None Detected
112118859-6-Mastic *092110670-0006D*	PAINT (WHITE) + COATING (BEIGE) + MASTIC (GREY) - KORBLEX - 2 MG TANK - ROOF - CENTER NORTH AT 6" O.D. SEALED PENETRATION				Layer Not Present

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			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-7-Paint *092110670-0007*	PAINT (WHITE) + COATING (BEIGE) + MASTIC (GREY) - KORBLEX - 2 MG TANK - ROOF - CENTER NORTHWEST AT 6" O.D. SEALED PENETRATION	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-7-Coating *092110670-0007A*	PAINT (WHITE) + COATING (BEIGE) + MASTIC (GREY) - KORBLEX - 2 MG TANK - ROOF - CENTER NORTHWEST AT 6" O.D. SEALED PENETRATION	White/Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-7-Sealant *092110670-0007B*	PAINT (WHITE) + COATING (BEIGE) + MASTIC (GREY) - KORBLEX - 2 MG TANK - ROOF - CENTER NORTHWEST AT 6" O.D. SEALED PENETRATION	Gray/Black Non-Fibrous Homogeneous		30% Ca Carbonate 40% Matrix 30% Non-fibrous (Other)	None Detected
112118859-7-Mastic *092110670-0007C*	PAINT (WHITE) + COATING (BEIGE) + MASTIC (GREY) - KORBLEX - 2 MG TANK - ROOF - CENTER NORTHWEST AT 6" O.D. SEALED PENETRATION				Layer Not Present
112118859-8-Paint 1 *092110670-0008*	PAINT (WHITE) + PAINT (CREAM) + COATING (BEIGE) - KORBLEX - 2 MG TANK - ROOF - CENTER WEST	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-8-Paint 2 *092110670-0008A*	PAINT (WHITE) + PAINT (CREAM) + COATING (BEIGE) - KORBLEX - 2 MG TANK - ROOF - CENTER WEST	Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-8-Coating *092110670-0008B*	PAINT (WHITE) + PAINT (CREAM) + COATING (BEIGE) - KORBLEX - 2 MG TANK - ROOF - CENTER WEST	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-9 *092110670-0009*	CONCRETE PAD (GREY) - KORBLEX - 2 MG TANK - EXTERIOR - CENTER WEST	Gray/Tan Non-Fibrous Heterogeneous		20% Quartz 50% Ca Carbonate 30% Non-fibrous (Other)	None Detected

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Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-10 *092110670-0010*	1" O.D. PIPE INSULATION (FOAM) (BLACK) - KORBLEX - 2 MG TANK - EXTERIOR - WEST FOOTING AT 1" O.D. PIPE	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
112118859-11-Paint *092110670-0011*	PAINT (WHITE) + PAINT (CREAM) + COATING (BEIGE) - KORBLEX - 2 MG TANK - EXTERIOR - WEST AT 2' O.D. PIPE	Gray Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-11-Coating *092110670-0011A*	PAINT (WHITE) + PAINT (CREAM) + COATING (BEIGE) - KORBLEX - 2 MG TANK - EXTERIOR - WEST AT 2' O.D. PIPE	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-12 *092110670-0012*	SEAM PUTTY (GREY) - KORBLEX - 2 MG TANK - EXTERIOR - WEST AT 2' O.D. PIPE AT GASKET SEAM	Gray/Beige Non-Fibrous Homogeneous	2% Synthetic	5% Quartz 70% Matrix 23% Non-fibrous (Other)	None Detected
Result includes a small amount of inseparable attached material					
112118859-13-Paint *092110670-0013*	PAINT (WHITE) + CONCRETE PEDESTAL (GREY) - KORBLEX - 2 MG TANK - EXTERIOR - WEST AT 2' O.D. PIPE FOOTING / PEDESTAL	Gray/Tan Non-Fibrous Heterogeneous		5% Quartz 80% Matrix 15% Non-fibrous (Other)	None Detected
Result includes a small amount of inseparable attached material					
112118859-13-Concrete *092110670-0013A*	PAINT (WHITE) + CONCRETE PEDESTAL (GREY) - KORBLEX - 2 MG TANK - EXTERIOR - WEST AT 2' O.D. PIPE FOOTING / PEDESTAL	Gray Non-Fibrous Heterogeneous		20% Quartz 50% Ca Carbonate 30% Non-fibrous (Other)	None Detected
112118859-14 *092110670-0014*	ASPHALT (BLACK) - KORBLEX - 2 MG TANK - EXTERIOR - WEST AT 2' O.D. PIPE	Black Non-Fibrous Heterogeneous	2% Cellulose	30% Quartz 40% Matrix 28% Non-fibrous (Other)	None Detected
112118859-15-Paint 1 *092110670-0015*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR AT NW CORNER AT PAD/TANK INTERSECTION AT BASE	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected

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Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-15-Paint 2 *092110670-0015A*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR AT NW CORNER AT PAD/TANK INTERSECTION AT BASE	Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-15-Expansion Joint *092110670-0015B*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR AT NW CORNER AT PAD/TANK INTERSECTION AT BASE	Gray Non-Fibrous Homogeneous		40% Quartz 40% Ca Carbonate 20% Non-fibrous (Other)	None Detected
112118859-15-Mastic *092110670-0015C*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR AT NW CORNER AT PAD/TANK INTERSECTION AT BASE	Gray/Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-16-Paint 1 *092110670-0016*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR - NORTH AT CENTER AT PAD/TANK INTERSECTION AT BASE	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-16-Paint 2 *092110670-0016A*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR - NORTH AT CENTER AT PAD/TANK INTERSECTION AT BASE	Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-16-Silver Paint *092110670-0016B*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR - NORTH AT CENTER AT PAD/TANK INTERSECTION AT BASE	Brown/Silver Non-Fibrous Heterogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected

Result includes a small amount of inseparable attached material

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			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-16-Expansion Joint *092110670-0016C*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR - NORTH AT CENTER AT PAD/TANK INTERSECTION AT BASE	Gray Non-Fibrous Homogeneous		40% Quartz 40% Ca Carbonate 20% Non-fibrous (Other)	None Detected
112118859-16-Mastic *092110670-0016D*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR - NORTH AT CENTER AT PAD/TANK INTERSECTION AT BASE	Gray/Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-16-Coating *092110670-0016E*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR - NORTH AT CENTER AT PAD/TANK INTERSECTION AT BASE	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-17-Paint *092110670-0017*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR AT NE CORNER AT PAD/TANK INTERSECTION AT BASE	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-17-Expansion Joint *092110670-0017A*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR AT NE CORNER AT PAD/TANK INTERSECTION AT BASE	Gray Non-Fibrous Homogeneous		40% Quartz 40% Ca Carbonate 20% Non-fibrous (Other)	None Detected
112118859-17-Mastic *092110670-0017B*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR AT NE CORNER AT PAD/TANK INTERSECTION AT BASE	Gray/Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected

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			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-18-Paint *092110670-0018*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR AT SE CORNER AT PAD/TANK INTERSECTION AT BASE	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-18-Expansion Joint *092110670-0018A*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR AT SE CORNER AT PAD/TANK INTERSECTION AT BASE	Gray Non-Fibrous Homogeneous		45% Quartz 35% Ca Carbonate 20% Non-fibrous (Other)	None Detected
112118859-18-Mastic *092110670-0018B*	PAINT (WHITE) + PAINT (TAN) + EXPANSION JOINT (GREY) - KORBLEX - 2 MG TANK - EXTERIOR AT SE CORNER AT PAD/TANK INTERSECTION AT BASE	Gray Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-19 *092110670-0019*	ASPHALT (BLACK) - KORBLEX - 2 MG TANK - EXTERIOR AT CENTER NORTH OF TANK	Black Non-Fibrous Homogeneous		30% Quartz 15% Matrix 55% Non-fibrous (Other)	None Detected
112118859-20 *092110670-0020*	ASPHALT (BLACK) - KORBLEX - 2 MG TANK - EXTERIOR AT CENTER EAST OF TANK	Black Non-Fibrous Homogeneous		30% Quartz 15% Matrix 55% Non-fibrous (Other)	None Detected
112118859-21-Paint *092110670-0021*	PAINT (WHITE) + CONCRETE PAD (GREY) - KORBLEX - 2 MG TANK - EXTERIOR AT SE CORNER	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-21-Concrete *092110670-0021A*	PAINT (WHITE) + CONCRETE PAD (GREY) - KORBLEX - 2 MG TANK - EXTERIOR AT SE CORNER	Gray Non-Fibrous Homogeneous		40% Quartz 40% Ca Carbonate 20% Non-fibrous (Other)	None Detected
112118859-22 *092110670-0022*	4" O.D. PIPE GASKET (BLACK) - KORBLEX - 2 MG TANK - EXTERIOR - EAST WALL AT 4" O.D. PIPE FLANGE	Black Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected

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			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-23 *092110670-0023*	1' O.D. PIPE GASKET (BLACK) - KORBLEX - 2 MG TANK - EXTERIOR - EAST WALL AT 1' O.D. PIPE FLANGE	Black Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected
112118859-24-Paint *092110670-0024*	PAINT (WHITE) + CONCRETE PAD (GREY) - KORBLEX - 2 MG TANK - EXTERIOR AT WEST AT CENTER	White Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected
112118859-24-Concrete *092110670-0024A*	PAINT (WHITE) + CONCRETE PAD (GREY) - KORBLEX - 2 MG TANK - EXTERIOR AT WEST AT CENTER	Gray Non-Fibrous Homogeneous		40% Quartz 40% Ca Carbonate 20% Non-fibrous (Other)	None Detected
112118859-25-Coating 1 *092110670-0025*	SURFACE COATING (WHITE) + SURFACE COATING (GREY) - KORBLEX - 1 MG TANK - ROOF - CENTER SOUTH AT FIN/RIDGE	Tan/White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
Inseparable paint layer included in analysis					
112118859-25-Coating 2 *092110670-0025A*	SURFACE COATING (WHITE) + SURFACE COATING (GREY) - KORBLEX - 1 MG TANK - ROOF - CENTER SOUTH AT FIN/RIDGE	Gray Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-26-Coating 1 *092110670-0026*	SURFACE COATING (WHITE) + SURFACE COATING (GREY) - KORBLEX - 1 MG TANK - ROOF - CENTER EAST	Tan/White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
Inseparable paint included in analysis					
112118859-26-Coating 2 *092110670-0026A*	SURFACE COATING (WHITE) + SURFACE COATING (GREY) - KORBLEX - 1 MG TANK - ROOF - CENTER EAST	Gray Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-27-Coating 1 *092110670-0027*	SURFACE COATING (WHITE) + SURFACE COATING (GREY) - KORBLEX - 1 MG TANK - ROOF - CENTER NORTH	Tan/White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
Inseparable paint included in analysis					
112118859-27-Coating 2 *092110670-0027A*	SURFACE COATING (WHITE) + SURFACE COATING (GREY) - KORBLEX - 1 MG TANK - ROOF - CENTER NORTH	Gray Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected

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			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-28-Coating 1 *092110670-0028*	SURFACE COATING (WHITE) + SURFACE COATING (GREY) - KORBLEX - 1 MG TANK - ROOF - CENTER WEST	Tan/White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-28-Coating 2 *092110670-0028A*	SURFACE COATING (WHITE) + SURFACE COATING (GREY) - KORBLEX - 1 MG TANK - ROOF - CENTER WEST	Gray Non-Fibrous Homogeneous		5% Quartz 70% Matrix 25% Non-fibrous (Other)	None Detected
112118859-29 *092110670-0029*	ASPHALT (BLACK) - KORBLEX - 1 MG TANK - EXTERIOR AT SW CORNER AT SURFACE	Brown/Black Non-Fibrous Homogeneous		30% Quartz 50% Matrix 20% Non-fibrous (Other)	None Detected
112118859-30 *092110670-0030*	ASPHALT (BLACK) - KORBLEX - 1 MG TANK - EXTERIOR AT SE CORNER AT SURFACE	Brown/Black Non-Fibrous Homogeneous		35% Quartz 50% Matrix 15% Non-fibrous (Other)	None Detected
112118859-31 *092110670-0031*	ASPHALT (BLACK) - KORBLEX - 1 MG TANK - EXTERIOR AT CENTER NORTH AT SURFACE	Brown/Black Non-Fibrous Homogeneous		30% Quartz 50% Matrix 20% Non-fibrous (Other)	None Detected
112118859-32-Coating *092110670-0032*	SURFACE COATING (WHITE) + CONCRETE PAD (GREY) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD - SOUTH CENTER	Tan/White Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected
112118859-32-Concrete *092110670-0032A*	SURFACE COATING (WHITE) + CONCRETE PAD (GREY) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD - SOUTH CENTER	Gray Non-Fibrous Homogeneous		30% Quartz 60% Ca Carbonate 10% Non-fibrous (Other)	None Detected
112118859-33-Coating 1 *092110670-0033*	SURFACE COATING (WHITE) + SURFACE COATING (BEIGE) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD - SOUTH CENTER AT LADDER BASE	Tan/White Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected
112118859-33-Coating 2 *092110670-0033A*	SURFACE COATING (WHITE) + SURFACE COATING (BEIGE) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD - SOUTH CENTER AT LADDER BASE	Tan Non-Fibrous Homogeneous		10% Quartz 50% Matrix 40% Non-fibrous (Other)	None Detected

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			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-34-Coating 1 *092110670-0034*	SURFACE COATING (WHITE) + SURFACE COATING (BEIGE) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD AT SW CORNER	White Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected
112118859-34-Coating 2 *092110670-0034A*	SURFACE COATING (WHITE) + SURFACE COATING (BEIGE) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD AT SW CORNER	Tan Non-Fibrous Homogeneous		10% Quartz 50% Matrix 40% Non-fibrous (Other)	None Detected
112118859-35-Surface Coating 1 *092110670-0035*	SURFACE COATING (WHITE) + SURFACE COATING (BEIGE) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD AT CENTER NORTH	White Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected
112118859-35-Surface Coating 2 *092110670-0035A*	SURFACE COATING (WHITE) + SURFACE COATING (BEIGE) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD AT CENTER NORTH	Beige Non-Fibrous Homogeneous		60% Matrix 40% Non-fibrous (Other)	None Detected
112118859-36-Surface Coating 1 *092110670-0036*	SURFACE COATING (WHITE) + SURFACE COATING (BEIGE) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD AT CENTER WEST	White Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected
112118859-36-Surface Coating 2 *092110670-0036A*	SURFACE COATING (WHITE) + SURFACE COATING (BEIGE) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD AT CENTER WEST	Beige Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected
112118859-37-Surface Coating *092110670-0037*	SURFACE COATING (WHITE) + CONCRETE PAD (GREY) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD AT CENTER EAST	White Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected
112118859-37-Concrete *092110670-0037A*	SURFACE COATING (WHITE) + CONCRETE PAD (GREY) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD AT CENTER EAST	Gray Non-Fibrous Homogeneous		40% Quartz 40% Ca Carbonate 20% Non-fibrous (Other)	None Detected

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EMSL Order:	092110670
Customer ID:	WKC50
Customer PO:	
Project ID:	PO 38005320

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-38-Surface Coating *092110670-0038*	SURFACE COATING (WHITE) + CONCRETE PAD (GREY) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD AT CENTER NORTH	White Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected
112118859-38-Concrete *092110670-0038A*	SURFACE COATING (WHITE) + CONCRETE PAD (GREY) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD AT CENTER NORTH	Gray Non-Fibrous Homogeneous		40% Quartz 40% Ca Carbonate 20% Non-fibrous (Other)	None Detected
112118859-39-Surface Coating *092110670-0039*	SURFACE COATING (WHITE) + CEMENTITIOUS PATCH (GREY) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD AT NE CORNER	White Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected
112118859-39-Cementitious Patch *092110670-0039A*	SURFACE COATING (WHITE) + CEMENTITIOUS PATCH (GREY) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD AT NE CORNER	Gray Non-Fibrous Homogeneous		40% Quartz 40% Ca Carbonate 20% Non-fibrous (Other)	None Detected
112118859-40-Surface Coating *092110670-0040*	SURFACE COATING (WHITE) + CEMENTITIOUS PATCH (GREY) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD AT NE CORNER	White Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected
112118859-40-Cementitious Patch *092110670-0040A*	SURFACE COATING (WHITE) + CEMENTITIOUS PATCH (GREY) - KORBLEX - 1 MG TANK - EXTERIOR TANK PAD AT NE CORNER	Gray Non-Fibrous Homogeneous		40% Quartz 40% Ca Carbonate 20% Non-fibrous (Other)	None Detected
112118859-41 *092110670-0041*	2' O.D. HATCH GASKET (RED) - KORBLEX - 1 MG TANK - EXTERIOR - EAST WALL AT 2' O.D. ENTRY HATCH	Red Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected
112118859-42 *092110670-0042*	2' O.D. HATCH GASKET (RED) - KORBLEX - 1 MG TANK - EXTERIOR - NORTH WALL AT 2' O.D. ENTRY HATCH	Red Non-Fibrous Homogeneous		70% Matrix 30% Non-fibrous (Other)	None Detected

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EMSL Order: 092110670
Customer ID: WKC50
Customer PO:
Project ID: PO 38005320

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-43-Surface Coating 1 *092110670-0043*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT CENTER SOUTH	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-43-Surface Coating 2 *092110670-0043A*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT CENTER SOUTH	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-43-Surface Coating 3 *092110670-0043B*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT CENTER SOUTH	Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-44-Surface Coating 1 *092110670-0044*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT SW CORNER	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-44-Surface Coating 2 *092110670-0044A*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT SW CORNER	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-44-Surface Coating 3 *092110670-0044B*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT SW CORNER	Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-45-Surface Coating 1 *092110670-0045*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT EAST EDGE	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-45-Surface Coating 2 *092110670-0045A*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT EAST EDGE	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected

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EMSL Order: 092110670
Customer ID: WKC50
Customer PO:
Project ID: PO 38005320

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-45-Surface Coating 3 *092110670-0045B*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT EAST EDGE	Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-46-Surface Coating 1 *092110670-0046*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT CENTER VENT AT CAP	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-46-Surface Coating 2 *092110670-0046A*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT CENTER VENT AT CAP	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-46-Surface Coating 3 *092110670-0046B*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT CENTER VENT AT CAP	Beige Non-Fibrous Homogeneous		80% Ca Carbonate 20% Non-fibrous (Other)	None Detected
112118859-47-Surface Coating 1 *092110670-0047*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT NE CORNER	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-47-Surface Coating 2 *092110670-0047A*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT NE CORNER	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-47-Surface Coating 3 *092110670-0047B*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT NE CORNER	Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-48-Surface Coating 1 *092110670-0048*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT NW CORNER	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected

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EMSL Order: 092110670
Customer ID: WKC50
Customer PO:
Project ID: PO 38005320

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-48-Surface Coating 2 *092110670-0048A*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT NW CORNER	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-48-Surface Coating 3 *092110670-0048B*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - ROOF AT NW CORNER	Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-49 *092110670-0049*	4' X 8' HATCH GASKET (BLACK) - SAMOA - 1 MG TANK - EXTERIOR AT SE CORNER AT HATCH	Black Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-50-Surface Coating 1 *092110670-0050*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - EXTERIOR - NORTH WALL AT CENTER	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-50-Surface Coating 2 *092110670-0050A*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - EXTERIOR - NORTH WALL AT CENTER	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-50-Surface Coating 3 *092110670-0050B*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - EXTERIOR - NORTH WALL AT CENTER	Beige Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-51-Surface Coating 1 *092110670-0051*	SURFACE COATING (WHITE) + SURFACE COATING (BEIGE) + GASKET (RED) - SAMOA - 1 MG TANK - EXTERIOR - EAST WALL AT 2' O.D. VAULT LID	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-51-Surface Coating 2 *092110670-0051A*	SURFACE COATING (WHITE) + SURFACE COATING (BEIGE) + GASKET (RED) - SAMOA - 1 MG TANK - EXTERIOR - EAST WALL AT 2' O.D. VAULT LID	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected

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Customer ID: WKC50
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Project ID: PO 38005320

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-51-Gasket *092110670-0051B*	SURFACE COATING (WHITE) + SURFACE COATING (BEIGE) + GASKET (RED) - SAMOA - 1 MG TANK - EXTERIOR - EAST WALL AT 2' O.D. VAULT LID	Red Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-52-Surface Coating 1 *092110670-0052*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - EXTERIOR - WEST WALL AT SW CORNER	White Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-52-Surface Coating 2 *092110670-0052A*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - EXTERIOR - WEST WALL AT SW CORNER	Tan Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-52-Surface Coating 3 *092110670-0052B*	SURFACE COATING (WHITE) + SURFACE COATING (TAN) + SURFACE COATING (BEIGE) - SAMOA - 1 MG TANK - EXTERIOR - WEST WALL AT SW CORNER				Layer Not Present
112118859-53 *092110670-0053*	ASPHALT (BLACK) - SAMOA - 1 MG TANK - EXTERIOR AT SE CORNER AT SURFACE LEVEL	Black Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-54 *092110670-0054*	ASPHALT (BLACK) - SAMOA - 1 MG TANK - EXTERIOR - CENTER NORTH AT SURFACE LEVEL	Black Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-55 *092110670-0055*	ASPHALT (BLACK) - SAMOA - 1 MG TANK - EXTERIOR - CENTER WEST AT SURFACE LEVEL	Black Non-Fibrous Homogeneous		80% Matrix 20% Non-fibrous (Other)	None Detected
112118859-56 *092110670-0056*	CONCRETE PAD (GREY) - SAMOA - 1 MG TANK - EXTERIOR - SE CORNER AT PAD	Gray Non-Fibrous Homogeneous		40% Ca Carbonate 40% Matrix 20% Non-fibrous (Other)	None Detected
112118859-57 *092110670-0057*	CONCRETE PAD (GREY) - SAMOA - 1 MG TANK - EXTERIOR - CENTER WEST AT PAD	Gray Non-Fibrous Homogeneous		40% Ca Carbonate 40% Matrix 20% Non-fibrous (Other)	None Detected

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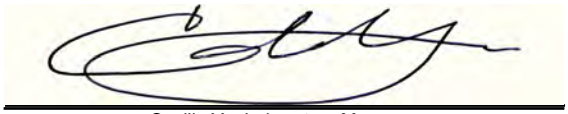
Project ID:	PO 38005320

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
112118859-58	CONCRETE PAD (GREY) - SAMOA - 1	Gray Non-Fibrous		40% Ca Carbonate 40% Matrix	None Detected
092110670-0058	MG TANK - EXTERIOR - CENTER NORTH AT PAD	Homogeneous		20% Non-fibrous (Other)	

Analyst(s)

Brianne Franquelin (3)
Gavin Lee (22)
Jon Abdon (47)
Oscar Merino (11)
William Bradford (33)
Xeena Paul (6)



Cecilia Yu, Laboratory Manager
or Other Approved Signatory

Initial report from: 07/19/2021 13:47:06

092110670

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Contact Name(s):	Scott Harris, Matt Tolley, Alex Crowe		Sample Date(s):	7/8 - 7/9/2021
Contact Email(s):	scott.harris@ghd.com, matthew.tolley@ghd.com, alexander.crowe@ghd.com		Client:	HBMWD
Site Name:	HBMWD RESERVOIRS SEISMIC RETRO		Analysis Method:	PLM (Asbestos)
Project Number:	11218859.01	PO Number: 38005320	Turnaround Time:	7-Day

BULK SAMPLE COLLECTION CHAIN OF CUSTODY

Sample Number	Sample Description	Location	USEPA Material Type	Friability
		Korblex - 2MG H20 Tank		
11218859-1	Paint (White) + Paint (Cream)	Korbel Complex (Korblex) - 2 Million Gallon (MG) Wat Tank (Tank) - Roof - South Center at Damage	MM	NF
11218859-2	Paint (White) + Paint (Cream) + Coating (Beige)	Korblex - 2 MG Tank - Roof - South Center at Hatch L	MM	NF
11218859-3	Traction Tape (Black) + Adhesive Backing (Clear)	Korblex - 2 MG Tank - Roof - South Center at Hatch	MM	NF
11218859-4	Paint (White) + Paint (Cream) + Coating (Beige)	Korblex - 2 MG Tank - Roof - Center East	MM	NF
11218859-5	Paint (White) + Paint (Cream) + Paint (Grey) + Coating (Beige)	Korblex - 2 MG Tank - Roof - Center North	MM	NF
11218859-6	Paint (White) + Coating (Beige) + Mastic (Grey)	Korblex - 2 MG Tank - Roof - Center North at 6" O.D. Sealed Penetration	MM	NF
11218859-7	Paint (White) + Coating (Beige) + Mastic (Grey)	Korblex - 2 MG Tank - Roof - Center Northwest at 6" O.D. Sealed Penetration	MM	NF
11218859-8	Paint (White) + Paint (Cream) + Coating (Beige)	Korblex - 2 MG Tank - Roof - Center West	MM	NF
11218859-9	Concrete Pad (Grey)	Korblex - 2 MG Tank - Exterior - Center West	MM	NF
11218859-10	1" O.D. Pipe Insulation (Foam) (Black)	Korblex - 2 MG Tank - Exterior - West Footing at 1" O.D. Pipe	TSI	F

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092110670

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Contact Name(s):	Scott Harris, Matt Tolley, Alex Crowe		Sample Date(s):	7/8 - 7/9/2021
Contact Email(s):	scott.harris@ghd.com, matthew.tolley@ghd.com, alexander.crowe@ghd.com		Client:	HBMWD
Site Name:	HBMWD RESERVOIRS SEISMIC RETRO		Analysis Method:	PLM (Asbestos)
Project Number:	11218859.01	PO Number: 38005320	Turnaround Time:	7-Day

BULK SAMPLE COLLECTION CHAIN OF CUSTODY

Sample Number	Sample Description	Location	USEPA Material Type	Friability
11218859-11	Paint (White) + Paint (Cream) + Coating (Beige)	Korblex - 2 MG Tank - Exterior - West at 2' O.D. Pipe	MM	NF
11218859-12	Seam Putty (Grey)	Korblex - 2 MG Tank - Exterior - West at 2' O.D. Pipe at Gasket Seam	MM	NF
11218859-13	Paint (White) + Concrete Pedestal (Grey)	Korblex - 2 MG Tank - Exterior - West at 2' O.D. Pipe Footing/Pedestal	MM	NF
11218859-14	Asphalt (Black)	Korblex - 2 MG Tank - Exterior - West at 2' O.D. Pipe	MM	NF
11218859-15	Paint (White) + Paint (Tan) + Expansion Joint (Grey)	Korblex - 2 MG Tank - Exterior at NW Corner at Pad/Tank Intersection at Base	MM	NF
11218859-16	Paint (White) + Paint (Tan) + Expansion Joint (Grey)	Korblex - 2 MG Tank - Exterior - North at Center at Pad/Tank Intersection at Base	MM	NF
11218859-17	Paint (White) + Paint (Tan) + Expansion Joint (Grey)	Korblex - 2 MG Tank - Exterior at NE Corner at Pad/Tank Intersection at Base	MM	NF
11218859-18	Paint (White) + Paint (Tan) + Expansion Joint (Grey)	Korblex - 2 MG Tank - Exterior at SE Corner at Pad/Tank Intersection at Base	MM	NF
11218859-19	Asphalt (Black)	Korblex - 2 MG Tank - Exterior at Center North of Tank	MM	NF
11218859-20	Asphalt (Black)	Korblex - 2 MG Tank - Exterior at Center East of Tank	MM	NF
11218859-21	Paint (White) + Concrete Pad (Grey)	Korblex - 2 MG Tank - Exterior at SE Corner	MM	NF
11218859-22	4" O.D. Pipe Gasket (Black)	Korblex - 2 MG Tank - Exterior - East Wall at 4" O.D. Pipe Flange	MM	NF

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Date/time:

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092110670

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Contact Name(s):	Scott Harris, Matt Tolley, Alex Crowe	**Sample Date(s):**	7/8 - 7/9/2021
Contact Email(s):	scott.harris@ghd.com, matthew.tolley@ghd.com, alexander.crowe@ghd.com	**Client:**	HBMWD
Site Name:	HBMWD RESERVOIRS SEISMIC RETRO	**Analysis Method:**	PLM (Asbestos)
Project Number:	**11218859.01** **PO Number: 38005320**	**Turnaround Time:**	**7-Day**

BULK SAMPLE COLLECTION CHAIN OF CUSTODY

Sample Number	Sample Description	Location	USEPA Material Type	Friability
11218859-23	1' O.D. Pipe Gasket(Black)	Korblex - 2 MG Tank - Exterior - East Wall at 1' O.D. Pipe Flange	MM	NF
11218859-24	Paint (White) + Concrete Pad (Grey)	Korblex - 2 MG Tank - Exterior at West at Center	MM	NF
		Korblex - 1MG H20 Tank		
11218859-25	Surface Coating (White) + Surface Coating (Grey)	Korblex - 1 MG Tank - Roof - Center South at Fin/Ridge	MM	NF
11218859-26	Surface Coating (White) + Surface Coating (Grey)	Korblex - 1 MG Tank - Roof - Center East	MM	NF
11218859-27	Surface Coating (White) + Surface Coating (Grey)	Korblex - 1 MG Tank - Roof - Center North	MM	NF
11218859-28	Surface Coating (White) + Surface Coating (Grey)	Korblex - 1 MG Tank - Roof - Center West	MM	NF
11218859-29	Asphalt (Black)	Korblex - 1 MG Tank - Exterior at SW Corner at Surface	MM	NF
11218859-30	Asphalt (Black)	Korblex - 1 MG Tank - Exterior at SE Corner at Surface	MM	NF
11218859-31	Asphalt (Black)	Korblex - 1 MG Tank - Exterior at Center North at Surface	MM	NF
11218859-32	Surface Coating (White) + Concrete Pad (Grey)	Korblex - 1 MG Tank - Exterior Tank Pad - South Center	MM	NF
11218859-33	Surface Coating (White) + Surface Coating (Beige)	Korblex - 1 MG Tank - Exterior Tank Pad - South Center at Ladder Base	MM	NF

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Date/time:

OrderID: 092110670

092110670

718 3rd Street
Eureka, California
Ph: (707) 443-8326
eureka@ghd.com

Contact Name(s):	Scott Harris, Matt Tolley, Alex Crowe		Sample Date(s):	7/8 - 7/9/2021
Contact Email(s):	scott.harris@ghd.com, matthew.tolley@ghd.com, alexander.crowe@ghd.com		Client:	HBMWD
Site Name:	HBMWD RESERVOIRS SEISMIC RETRO		Analysis Method:	PLM (Asbestos)
Project Number:	11218859.01	PO Number: 38005320	Turnaround Time:	7-Day

BULK SAMPLE COLLECTION CHAIN OF CUSTODY

Sample Number	Sample Description	Location	USEPA Material Type	Friability
11218859-34	Surface Coating (White) + Surface Coating (Beige)	Korblex - 1 MG Tank - Exterior Tank Pad at SW Corner	MM	NF
11218859-35	Surface Coating (White) + Surface Coating (Beige)	Korblex - 1 MG Tank - Exterior Tank Pad at Center North	MM	NF
11218859-36	Surface Coating (White) + Surface Coating (Beige)	Korblex - 1 MG Tank - Exterior Tank Pad at Center West	MM	NF
11218859-37	Surface Coating (White) + Concrete Pad (Grey)	Korblex - 1 MG Tank - Exterior Tank Pad at Center East	MM	NF
11218859-38	Surface Coating (White) + Concrete Pad (Grey)	Korblex - 1 MG Tank - Exterior Tank Pad at Center North	MM	NF
11218859-39	Surface Coating (White) + Cementitious Patch (Grey)	Korblex - 1 MG Tank - Exterior Tank Pad at NE Corner	MM	NF
11218859-40	Surface Coating (White) + Cementitious Patch (Grey)	Korblex - 1 MG Tank - Exterior Tank Pad at NE Corner	MM	NF
11218859-41	2' O.D. Hatch Gasket (Red)	Korblex - 1 MG Tank - Exterior - East Wall at 2' O.D. Entry Hatch	MM	NF
11218859-42	2' O.D. Hatch Gasket (Red)	Korblex - 1 MG Tank - Exterior - North Wall at 2' O.D. Entry Hatch	MM	NF
Samoa 1 MG H20 Tank				
11218859-43	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Roof at Center South	MM	NF
11218859-44	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Roof at SW Corner	MM	NF

Page 4 of 6

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Date/time:

OrderID: 092110670

092110670

718 3rd Street
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Contact Name(s):	Scott Harris, Matt Tolley, Alex Crowe		**Sample Date(s):**	7/8 - 7/9/2021
Contact Email(s):	scott.harris@ghd.com, matthew.tolley@ghd.com, alexander.crowe@ghd.com		**Client:**	HBMWD
Site Name:	HBMWD RESERVOIRS SEISMIC RETRO		**Analysis Method:**	PLM (Asbestos)
Project Number:	**11218859.01**	**PO Number: 38005320**	**Turnaround Time:**	**7-Day**

BULK SAMPLE COLLECTION CHAIN OF CUSTODY

Sample Number	Sample Description	Location	USEPA Material Type	Friability
11218859-45	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Roof at East Edge	MM	NF
11218859-46	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Roof at Center Vent at Cap	MM	NF
11218859-47	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Roof at NE Corner	MM	NF
11218859-48	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Roof at NW Corner	MM	NF
11218859-49	4' X 8' Hatch Gasket (Black)	Samoa - 1 MG Tank - Exterior at SE Corner at Hatch	MM	NF
11218859-50	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Exterior - North Wall at Center	MM	NF
11218859-51	Surface Coating (White) + Surface Coating (Beige) + Gasket (Red)	Samoa - 1 MG Tank - Exterior - East Wall at 2' O.D. Vault Lid	MM	NF
11218859-52	Surface Coating (White) + Surface Coating (Tan) + Surface Coating (Beige)	Samoa - 1 MG Tank - Exterior - West Wall at SW Corner	MM	NF
11218859-53	Asphalt (Black)	Samoa - 1 MG Tank - Exterior at SE Corner at Surface Level	MM	NF
11218859-54	Asphalt (Black)	Samoa - 1 MG Tank - Exterior - Center North at Surface Level	MM	NF
11218859-55	Asphalt (Black)	Samoa - 1 MG Tank - Exterior - Center West at Surface Level	MM	NF
11218859-56	Concrete Pad (Grey)	Samoa - 1 MG Tank - Exterior - SE Corner at Pad	MM	NF

Page 5 of 6

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Date/time:

Received by: ~~TM~~ FX 7-12-21 8:45am FX
Date/time:
Received by:
Date/time:

OrderID: 092110670

092110670

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Contact Name(s):	Scott Harris, Matt Tolley, Alex Crowe	**Sample Date(s):**	7/8 - 7/9/2021
Contact Email(s):	scott.harris@ghd.com, matthew.tolley@ghd.com, alexander.crowe@ghd.com	**Client:**	HBMWD
Site Name:	HBMWD RESERVOIRS SEISMIC RETRO	**Analysis Method:**	PLM (Asbestos)
Project Number:	**11218859.01** **PO Number: 38005320**	**Turnaround Time:**	**7-Day**

BULK SAMPLE COLLECTION CHAIN OF CUSTODY

Sample Number	Sample Description	Location	USEPA Material Type	Friability
11218859-57	Concrete Pad (Grey)	Samoa - 1 MG Tank - Exterior - Center West at Pad	MM	NF
11218859-58	Concrete Pad (Grey)	Samoa - 1 MG Tank - Exterior - Center North at Pad	MM	NF

NOTES: Definitions: SM = Surfacing Material, MM = Manufactured Material, F= Friable, NF = Non-Friable, EXT = Exteri, INT = Interior, NW = Northwest, Bldg. = Building.

MT

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Date/time:
Received by:
Date/time:

Appendix E

Lead Analytical Data

AAS Laboratory Analytical Reports and Associated Chain of Custody Documentation

EMSL Analytical, Inc
464 McCormick Street, San Leandro, CA 94577
Phone/Fax: (510) 895-3675 / (510) 895-3680
http://www.EMSL.com sanleandrolab@emsl.com

EMSL Order:	092110531
CustomerID:	WKC50
CustomerPO:	38005320
ProjectID:	PO 38005320

Attn: **Scott Harris**
GHD
718 Third Street

Eureka, CA 95501

Phone:	(707) 443-8326
Fax:	(707) 444-8330
Received:	7/12/2021 09:00 AM
Collected:	7/8/2021

Project: **11218859.01**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
11218859-PB-1	*092110531-0001*	7/8/2021	7/15/2021	0.252 g	<0.0080 % wt
	Site: KORBLEX 2MG WATER TANK ROOF SOUTH AT LADDER RAILING				
11218859-PB-2	*092110531-0002*	7/8/2021	7/15/2021	0.2788 g	<0.0080 % wt
	Site: KORBLEX 2MG TANK ROOF CENTER WEST				
11218859-PB-3	*092110531-0003*	7/8/2021	7/15/2021	0.2531 g	<0.0080 % wt
	Site: KORBLEX 2MG TAN ROOF CENTER EAST				
11218859-PB-4	*092110531-0004*	7/8/2021	7/15/2021	0.2863 g	<0.0080 % wt
	Site: KORBLEX 2MG TANK ROOF CENTER WEST AT 6" OD PENETRATION CAP				
11218859-PB-5	*092110531-0005*	7/8/2021	7/15/2021	0.2034 g	<0.0098 % wt
	Site: KORBLEX 2MG TANK ROOF AT SOUTH STORAGE BOX				
11218859-PB-6	*092110531-0006*	7/8/2021	7/15/2021	0.1028 g	<0.019 % wt
	Site: KORBLEX 2MG TANK EAST WALL AT NE CORNER				
11218859-PB-7	*092110531-0007*	7/8/2021	7/15/2021	0.2338 g	<0.0086 % wt
	Site: KORBLEX 2MG TANK EAST WALL AT BASE				
11218859-PB-8	*092110531-0008*	7/8/2021	7/15/2021	0.261 g	0.017 % wt
	Site: KORBLEX 2MG TANK WEST WALL AT 2' OD FLANGE				
11218859-PB-9	*092110531-0009*	7/8/2021	7/15/2021	0.2478 g	<0.0081 % wt
	Site: KORBLEX 1MG TANK ROOF AT CENTER SOUTH				
11218859-PB-10	*092110531-0010*	7/8/2021	7/15/2021	0.2815 g	<0.0080 % wt
	Site: KORBLEX 1MG TANK ROOF AT NW CORNER				
11218859-PB-11	*092110531-0011*	7/8/2021	7/15/2021	0.2888 g	0.057 % wt
	Site: KORBLEX 1MG TANK EXTERIOR CENTER EAST AT TANK/PAD INSERTION				
11218859-PB-12	*092110531-0012*	7/8/2021	7/15/2021	0.2543 g	<0.0080 % wt
	Site: SAMOA 1MG TANK ROOF AT CENTER SOUTH				
11218859-PB-13	*092110531-0013*	7/8/2021	7/15/2021	0.2733 g	<0.0080 % wt
	Site: SAMOA 1MG TANK ROOF AT CENTER VENT AT CAP				
11218859-PB-14	*092110531-0014*	7/8/2021	7/15/2021	0.2762 g	<0.0080 % wt
	Site: SAMOA 1MG TANK ROOF AT CENTER NORTH				

Julian Neagu, Lead Laboratory Manager
or other approved signatory

Initial report from 07/15/2021 17:04:15

EMSL Analytical, Inc
464 McCormick Street, San Leandro, CA 94577
Phone/Fax: (510) 895-3675 / (510) 895-3680
http://www.EMSL.com sanleandrolab@emsl.com

EMSL Order:	092110531
CustomerID:	WKC50
CustomerPO:	38005320
ProjectID:	PO 38005320

Attn: **Scott Harris**
GHD
718 Third Street

Eureka, CA 95501

Phone:	(707) 443-8326
Fax:	(707) 444-8330
Received:	7/12/2021 09:00 AM
Collected:	7/8/2021

Project: **11218859.01**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
11218859-PB-15	*092110531-0015*	7/8/2021	7/15/2021	0.252 g	0.0094 % wt
	Site: SAMOA 1MG TANK ROOF AT EAST HAND RAIL				
11218859-PB-16	*092110531-0016*	7/8/2021	7/15/2021	0.2592 g	<0.0080 % wt
	Site: SAMOA 1MG TANK EXTERIOR EAST WALL AT 2' OD VALVE				
11218859-PB-17	*092110531-0017*	7/8/2021	7/15/2021	0.1254 g	<0.016 % wt
	Site: SAMOA 1MG TANK EXTERIOR WEST WALL AT PATCH				

Julian Neagu, Lead Laboratory Manager
or other approved signatory

Initial report from 07/15/2021 17:04:15

~~09216~~ 092110531

718 3rd Street
Eureka, California
Ph: (707) 443-8326
Fax: (707) 444-8330

CONTACT NAME: **Scott Harris, Matt Tolley,** Alex Crowe		DATE: 7/8 - 7/9/2021
CONTACT EMAIL: **scott.harris@ghd.com, matthew.tolley@ghd.com**		
JOB NUMBER: **11218859.01**	PO Number: 38005320	SITE: HBMWD RESERVOIRS SEISMIC RETRO
ANALYSIS METHOD(S): Lead via AAS		TURNAROUND TIME: **Standard**

SURFACE COATING SAMPLE CHAIN OF CUSTODY

SAMPLE NUMBER	SAMPLE LOCATION (Room Equivalent, Building Component)	MATERIAL	SUBSTRATE	Color
11218859-Pb-1	Korblex - 2 Million Gallon (2 MG) Water Tank (Tank) - Roof - South at Ladder Railing	Paint	Metal	White, Tan
11218859-Pb-2	Korblex - 2 MG Tank - Roof - Center West	Paint	Metal	White, Tan
11218859-Pb-3	Korblex - 2 MG Tank - Roof - Center East	Paint	Metal	White
11218859-Pb-4	Korblex - 2 MG Tank - Roof - Center West at 6" O.D. Penetration Cap	Paint, Putty	Metal	White, Tan, Grey
11218859-Pb-5	Korblex - 2 MG Tank - Roof at South Storage Box	Paint	Metal	Red
11218859-Pb-6	Korblex - 2 MG Tank - East Wall at NE Corner	Paint	Metal	White, Tan
11218859-Pb-7	Korblex 2 MG Tank - East Wall at Base	Paint	Metal	White, Tan
11218859-Pb-8	Korblex 2 MG Tank - West Wall at 2' O.D. Flange	Paint	Metal	White
11218859-Pb-9	Korblex 1 MG Tank - Roof at Center South	Paint	Metal	White, Tan, Grey
11218859-Pb-10	Korblex 1 MG Tank - Roof at NW Corner	Paint	Metal	White, Tan, Grey
11218859-Pb-11	Korblex - 1 MG Tank - Exterior - Center East at Tank/Pad Intersection	Paint	Metal	White, Tan
11218859-Pb-12	Samoa - 1 MG Tank - Roof at Center South	Paint	Metal	White, Tan, Beige
11218859-Pb-13	Samoa - 1 MG Tank - Roof at Center Vent at Cap	Paint	Metal	White, Tan, Beige

Page 1 Of 3

Received: MA Fx 7-12-21 8:45am

OrderID: 092110531

11218859-Pb-14	Samoa - 1 MG Tank - Roof at Center North	Paint	Metal	White, Tan, Beige
11218859-Pb-15	Samoa - 1 MG Tank - Roof at East Hand Rail	Paint	Metal	White, Tan, Beige
11218859-Pb-16	Samoa - 1 MG Tank - Exterior East Wall at 2' O.D. Valve	Paint	Metal	White, Beige
11218859-Pb-17	Samoa - 1 MG Tank - Exterior West Wall at Patch	Paint	Metal	White

NOTES: Substrates: Brick, Concrete, Drywall, Metal, Plaster, Wood; Sample Location (Wall ID): Wall at street address side is "A", others = B, C & D (labeled clockwise when facing front of structure)

Relinquished By: Matt Tollef To FEDEX **Date/Time:** 7/9/21 @ 1500	**Received By:** FX 7-12-21 8:45am **Date/Time:**
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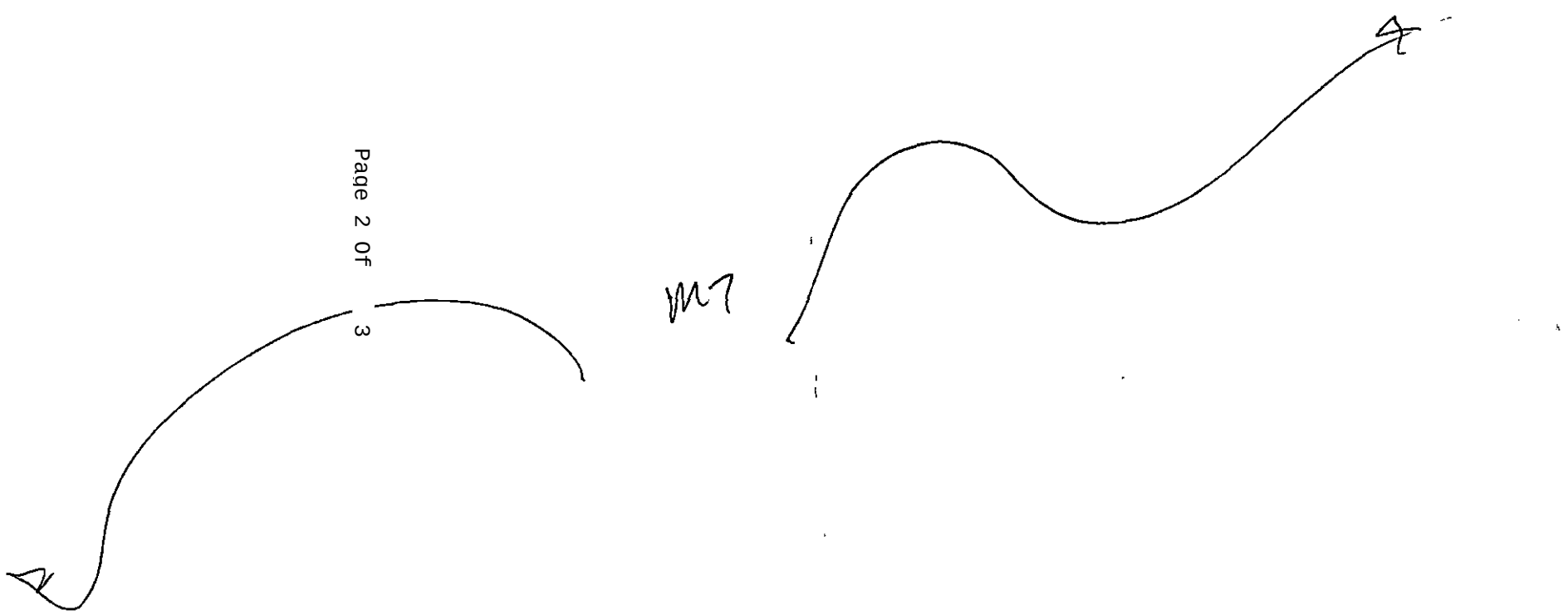

Grijalva, Rebekah

From: Grijalva, Rebekah
Sent: Monday, July 12, 2021 10:53 AM
To: Scott Harris; Matt Tolley; Alex Crowe
Cc: Ahadi, Zulaikha; Orsetti, Kaitlyn; Ludvik, Elizabeth; Lam, Mindy; Tice, Larissa; McMillan, Callum
Subject: 38005320 - HBMWD Reservoirs Seismic Retro - Follow up on phone call
Attachments: WKC50.pdf

Good morning,

Per my phone conversation with Scott just now, we will be proceeding with the above mentioned lead project received today on a 7-day TAT with results due Monday 7/19/21 at 9:00am. The COC is attached for reference.

Thank you and have a good day,

Rebekah Grijalva | *Administrative Assistant*
EMSL Analytical, Inc. | 464 McCormick Street | San Leandro, CA 94577
Phone: 510-895-3675 | Fax: 510-895-3680 | Toll Free: 888-455-3675

Appendix F

Asbestos Regulatory Summary

General Informational Summary of Governmental Rules and Regulations Concerning Asbestos

Appendix F Asbestos Regulations

This appendix section provides a summary of governmental regulations applicable to asbestos in construction work and is applicable to the impaction of the asbestos building materials present at the project site.

F1.1 California Code of Regulations

The following is a summary list of United States governmental regulations concerning asbestos:

1. 29 Code of Federal Regulations (CFR) 1926.1101, Asbestos (including all mandatory appendices)
2. 40 CFR 61, Subpart A and Subpart M USEPA National Emissions Standards for Hazardous Air Pollutants (NESHAP)
3. 40 CFR Parts 261, 265, and 268, Hazardous Waste Management
4. 40 CFR Part 763, Asbestos Emergency Hazard Emergency Response Act (AHERA)
5. 49 CFR Parts 172, 173, 178, 179, Hazardous Material Transportation

F1.2 California Code of Regulations

The following is a summary list of State of California governmental regulations concerning asbestos:

1. 8 CCR Division 1, Chapter 4, Construction Safety Orders
2. 8 CCR Article 2.5, Registration of Asbestos Work, Sections 341.6–341.14
3. 8 CCR Section 1529, Asbestos
4. 8 CCR Section 5144, Respiratory Protection
5. 22 CCR Division 4.5, Environmental Health Standards for Management of Hazardous Waste
6. California Environmental Protection Agency (Cal/EPA), California Air Resource Board (CARB), Final Regulation Order, Section 93105, Asbestos Airborne Toxic Control Measures for Construction, Grading, Quarrying, and Surface Mining Operations

F1.3 Definitions

For the purpose of this report, the following definitions will apply to the discussion of hazardous materials contained herein.

1. Abatement – Hazardous materials related construction undertaken for the purpose of eliminating or reducing existing recognized hazardous materials related hazards as adapted from 29 CFR Part 1903 Inspections, Citation and Proposed Penalties, Standard 1903.19 Abatement Verification (29 CFR 1903.19), Subsection (b)(1).
2. Asbestos Containing Material (ACM) – A material determined to contain greater than one percent (1%) asbestos by weight as defined by the Title 8 California Code of Regulations (CCR), Subchapter 4, Construction Safety Orders, Article 4. Dusts, Fumes, Mists, Vapors, and Gases, Section 1529 (8CCR1529), Subsection (b).
3. Asbestos Containing Construction Material (ACCM) – A construction material determined to contain detectable levels of asbestos fibers in concentrations of greater than 0.1 percent asbestos by weight as defined by Chapter 3.2 of the California Occupational Safety and Health Regulations, Subchapter 2, Regulations of the Division of Occupational Safety and Health, Article 2.5. Registration--Asbestos-Related Work, Section 341.6(c).

4. Containment – Protective physical barriers and associated means and methods used to contain airborne contaminant dust within the abatement work area and prevent contamination of surfaces and grounds below and adjacent to areas where a hazardous material is being disturbed.
5. Hazardous Material – Substance with properties that can cause injury or illness to humans or adversely impact living organisms in the environment under certain conditions. Hazardous materials include both organic and inorganic chemicals and chemical compounds. Includes any substance on the list of hazardous substances prepared by the Director, California Department of Industrial Relations, pursuant to Labor Code Section 6382 and also known as the Director's List. For the project, hazardous materials include, but are not limited to: asbestos, lead and universal waste.
6. Hazardous Waste – Waste material that is listed or meets the criteria for hazardous waste as set forth in CCR, Title 22, Division 4.5 and Article 9. at minimum, with regard to asbestos, the following shall be considered to be hazardous wastes with respect to this section:
    a. Nonfriable Asbestos Containing Material (Category I and II) rendered friable during renovation or renovation
    b. Regulated Asbestos Containing Material

F1.3.1 Nonfriable Asbestos Containing Material

Friability is a qualitative measure of a material's affinity for producing airborne asbestos fibers (dust). A material that, when dry, can be crumbled, pulverized or reduced to powder using hand pressure is classified as friable according to USEPA regulations. Nonfriable materials are those that do not meet the above definition of friable.

Nonfriable materials are classified by the USEPA into the following categories:

1. Category I Nonfriable – Any asbestos containing gasket, packing, resilient floor covering, or asphalt roofing product that contains greater than 1% asbestos as determined by PLM, that, when dry cannot be crumbled, pulverized, or reduced to a powder using hand pressure.
2. Category II Nonfriable – Any material, excluding Category I nonfriable ACM, that contains greater than 1% asbestos as determined by PLM, that, when dry cannot be crumbled, pulverized, or reduced to a powder using hand pressure.

Category I Nonfriable ACM may be left in place during renovation work. Certain Category II Nonfriable ACM may be left in place during renovation or renovation; however, Category II ACM that may become friable (e.g., damaged, brittle and/or cementitious materials) must be removed prior to renovation or renovation. Category I ACM and some Category II ACM may be left in situ during renovation; however, Cal/OSHA will regulate such renovation activities as Class II work, as defined herein.

Note: Cal/OSHA employee protection protocols, including those summarized herein, apply to any disturbance of asbestos material, regardless of the USEPA material category (Category I, Category II, RACM), concentration of asbestos, or quantity of material. As such worker protection protocols per 8CCR1529 apply to work disturbing any asbestos.

If a nonfriable material is impacted with mechanical means (power tools, abrasive mechanical means, etc.) such material shall no longer be classified as nonfriable and shall instead be classified as RACM. A nonfriable material that has been significantly damaged may also be classified as friable, if the damaged material can be reduced to powder or crumbled using hand pressure.

F1.3.2 Regulated Asbestos Containing Material

A material is regulated by the USEPA as RACM if it conforms to one or more of the following:

1. It is a friable ACM
2. It is a Category I or II ACM that has become friable

3. It is a Category I ACM that will be subject to mechanical impaction
4. It is a Category II ACM that has a high probability of becoming friable during the course of renovation or demolition activities that are expected to impact the material

While the USEPA does not regulate material determined by PLM laboratory analysis using point count 400 methodology to contain less than 1% asbestos, some Cal/OSHA regulations apply to material determined to contain any detectable amount of asbestos.

Pursuant to NESHAP regulations, nonfriable materials are not classified as RACM if removed essentially intact using hand methods and not made “friable” during removal. The use of mechanical means to remove or impact nonfriable ACM will render that material friable, thus mechanically impacted materials shall be considered RACM and subject to handling and disposal requirements governing RACM.

Asbestos containing material that meets the USEPA definition of RACM, if present in quantities greater than the North Coast Unified Air Quality Management District(NCUAQMD) quantity thresholds noted in Section 5, must be removed from the Project Site prior to renovation. Additionally, Category I and Category II ACM that is associated with a fire-damaged structure must be classified as RACM, per USEPA regulation. Materials identified in this report as USEPA RACM will require disposal as a non-Resource Conservation and Recovery Act (RCRA) California hazardous asbestos waste, if disposed of in California.

Abatement of RACM that is Thermal System Insulation (TSI) or surfacing material requires Class I abatement methods as defined by the Occupational Safety and Health Administration (OSHA) and Cal/OSHA. RACM that is not TSI or surfacing material requires Class II abatement methods as defined by OSHA and Cal/OSHA. Class I and Class II abatement methods are described below.

F1.4 Cal/OSHA Work Classes

Cal/OSHA regulates material containing asbestos at any detectable level, thus worker protection, material handling, material labelling, and material disposal protocols per California Code of Regulations (CCR), Title 8, Section 1529 (8CCR1529) apply to impaction of any material determined to contain asbestos above the laboratory detection limit. Impaction of material determined to contain asbestos in concentrations of less than 1% by weight (ACCM and <0.1%) is categorized by Cal/OSHA as unclassified work.

Cal/OSHA regulates worker exposure to airborne asbestos by instituting work practice, notification, training, and personal protective equipment requirements for employers and employees. In an effort to mitigate worker exposure to airborne asbestos fibers, Cal/OSHA mandates specific material containerization and work practices when workers impact materials containing asbestos at any detectable level. Cal/OSHA categorizes asbestos related work into four work classes as described below and defined in 8CCR1529.

F1.4.1 Class I Work

Class I asbestos work consists of activities involving the removal of asbestos-containing TSI, asbestos-containing surfacing material, or PACM. TSI includes pipe, pipe fitting, duct, boiler, and flue asbestos-containing insulation. Surfacing material includes sprayed-on or troweled-on asbestos-containing fire proofing, acoustical plaster or decorative plaster. PACM is TSI or surfacing material installed prior to 1981. PACM is presumed to contain asbestos and must be handled according to Class I work protocols unless sampled and determined by PLM analysis to contain no detectable asbestos fibers. Class I abatement work is subject to OSHA and Cal/OSHA regulations. Class I work must be conducted within a regulated negative-pressure containment equipped with a three-stage decontamination chamber that includes an operable shower. Class I work must be performed by properly trained and protected workers using appropriate means and methods as described by 8CCR1529.

F1.4.2 Class II Work

Class II asbestos work means activities involving the impaction and removal of ACM, which is not TSI or surfacing material, and results in more than one bag of waste materials. This includes but is not limited to, the removal of

asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics. Class II work must be conducted within a regulated area containment and must be performed by properly trained and protected workers using appropriate means and methods as described by 8CCR1529.

F1.4.3 Class III Work

Class III asbestos work means activities involving the repair and maintenance operations, where ACM, including TSI, surfacing ACM and/or PACM, is likely to be disturbed. Class III asbestos removal operations are limited to work that generates no more waste than that which can fit into one 60 inch by 60-inch (60” x 60”) waste bag. Class III work must be conducted within a regulated area containment by properly trained and protected workers using appropriate means and methods described by 8CCR1529.

F1.3.4 Class IV Work

Class IV asbestos work means maintenance and custodial activities during which employees contact but do not disturb ACM or PACM and activities to clean up dust, waste and debris resulting from Class I, II, and III activities. Class IV work must be conducted by properly trained and protected workers using appropriate means and methods described by 8CCR1529.

F1.5 Asbestos Containing Construction Material

Materials reported by laboratory analysis to contain detectable concentrations of asbestos fibers of less than 1% by weight are not regulated by the USEPA as ACM or RACM and are not governed by NESHAP regulations. While not regulated by the USEPA, materials containing less than 1% asbestos by weight are regulated by Cal/OSHA as ACCM and are subject to Cal/OSHA employee protection, waste labeling, and handling protocols. Employees impacting materials containing detectable levels of asbestos fibers, but in concentrations less than 1% asbestos by weight, must adhere to work practices and methods of compliance as mandated by Cal/OSHA and described in 8CCR1529.

F1.6 Exposure Limits for Asbestos

Employers must monitor the air their workers are breathing to determine the airborne concentration of asbestos fibers present in the work environment during the various shifts and while performing various tasks. Phase contract microscopy (PCM) sampling cassettes and low-volume air pumps are worn by employees during their work shift, typically for a period of eight hours. The PCM cassettes are analyzed by a laboratory and an exposure is determined, measured in asbestos fibers per cubic centimeter of air (fibers/cc), extrapolated across the eight-hour work shift. The eight-hour exposure is known as a time-weighted average (TWA).

The Contractor should conduct representative breathing zone personal air monitoring of its employees, including a minimum of 25 percent of the crew, once each shift and repeated daily or until a negative exposure assessment (NEA), as derived in accordance with 8CCR1529 (f)(2)(C), can be established. A NEA is documented proof that a given activity will not expose employees to asbestos in concentrations above the PELs noted in Table E.1. A NEA may be established by maintaining initial air monitoring from the beginning of a project that is representative of work employees will be performing during the entire project showing exposure below the PEL or Short-Term Exposure Limit (STEL).

The exposure limits noted in Table F1.8 Cal/OSHA Airborne Exposure Limits for Asbestos (Table F1.8) must be adhered to for employee protection to establish appropriate protective measures and controls when impacting material containing asbestos.

Table F8.2 Cal/OSHA Airborne Exposure Limits for Asbestos

Air Contaminant	Excursion Limit (Short Term Exposure Limit)	Permissible Exposure Limit (PEL) (8-hour TWA)
Asbestos	1.0 fibers/cc over 30 minutes	0.1 fibers/cc over an 8-hour TWA

Notes:

- Permissible Exposure Limit (PEL): Employer must ensure no employee is exposed above this level based on an 8-hour TWA. When employee expose levels meet or exceed the PEL, administrative, engineering and work practice controls must be implemented. Respiratory protection and other protective measures are required pending feasible engineering controls. Additional training, monitoring, and medical surveillance requirements apply to respirator usage and for exposure levels exceeding PEL.
- Short Term Exposure Limit (STEL): Short term exposure is measured over 30 minutes during periods of maximum expected exposure operations and is also known as the Excursion Limit

Workers should wear personal air sampling devices for the full duration of their shift (eight hours). At least one sample should be collected representing each position/job classification in each work area of the Project Site. If exposures are determined to be above the PEL or STEL, appropriate worker protections should be instituted per 8CCR1529. Exposure monitoring should document the source of asbestos emissions.

Until an employee exposure assessment is completed, and it has been determined and documented that the employee is not exposed above the PEL, the Contractor should treat the employee as if the employee were exposed above the PEL and should implement employee protective measures per 8CCR1529. Monitoring should be conducted by an individual experienced and knowledgeable about the methods of air monitoring in compliance with applicable regulatory standards.

F2 Requirements for Asbestos Work

F2.1 Asbestos Administrative Controls

Employers must establish a written hazard communication (HAZCOM) training program and train their employees to the hazards to which they are exposed. A HAZCOM program should be implemented for employees who will impact asbestos. If exposure monitoring shows worker airborne exposure to asbestos above the PEL, or above the excursion limit, then additional training and worker certification is necessary.

Supervisors who oversee asbestos work shall have completed 40 hours of USEPA Asbestos Hazard Emergency Response Act (AHERA)-accredited supervisor training. Employees interacting with asbestos must have a level of training appropriate for the class of asbestos work, ranging from two hours (HAZCOM) to 32 hours (AHERA-accredited Worker). At no time should suspected or known asbestos material be drilled, cut, sanded, scraped, or otherwise disturbed by untrained personnel.

Asbestos disturbance and/or removal operations must be conducted by a Cal/OSHA-registered and State-licensed asbestos removal contractor. Contractor registration with Cal/OSHA is required if greater than 100 square feet of ACM, RACM, or ACCM are disturbed by a contractor within a one-year period of time. Employers whose employees disturb asbestos must file a written Report of Use of Regulated Carcinogens (Report of Use) form with Cal/OSHA. A Report of Use form must be filed with Cal/OSHA by employers whose workers disturb material containing greater than 0.1 percent asbestos. Disturbance of asbestos and/or abatement operations should be supervised by a Competent Person, as defined by 8CCR1529, who is trained, knowledgeable and qualified in the techniques of asbestos abatement.

One or more of the following specialty certifications for asbestos is/are required by the California Contractors' State License Board (CSLB) for contractors who disturb greater than 100 square feet of asbestos in a year (some exceptions for specific materials apply):

1. C-22 – Asbestos abatement

F2.2 Work Practice Controls

Asbestos abatement should be performed by persons trained, qualified, licensed, and equipped to perform asbestos abatement. Employees must never be exposed to airborne asbestos above the PEL, thus specific administrative controls, work practice controls and personal protective equipment (PPE) protocols must be implemented by the employer. Whole-body coverings (including hood and foot-coverings), gloves, and HEPA cartridge-equipped respirators are the standard PPE utilized for asbestos work in most circumstances. The remainder of this section consists of a brief summary of selected work practices required when impacting materials containing asbestos.

A regulated area is required to be established using signage and/or barrier tape around a work area where asbestos is to be impacted if there is a “reasonable possibility” that airborne concentrations of asbestos will exceed the PEL (8CCR1529). A regulated area is also required for all Class I, II and III work. Regulated areas shall be demarcated “in a manner that minimized the number of persons within the area and protects persons outside the area from exposure to airborne asbestos” (8CCR1529). Access to regulated areas shall be limited to properly trained and protected workers.

The use of wet methods (water) to mitigate emissions of airborne dust is required whenever material containing asbestos is disturbed. The goal of using wet methods is to achieve no visible emissions of asbestos-related dust.

Vacuum cleaners equipped with High Efficiency Particulate Filters (HEPA) must be used by employees impacting material containing asbestos in detectable quantities and must also be used to address associated dust and debris. Material containing asbestos in detectable quantities may not be impacted by non-HEPA-equipped sanders, grinders, saws, or other abrasive power tools. Material containing asbestos (including associated dust and debris) may not be addressed using compressed air, dry sweeping, or dry shoveling.

Material containing asbestos in detectable quantities must be “promptly” containerized in leak tight containers. Prompt clean-up generally is understood to mean that material should not be left un-containerized (unpackaged or outside of a sealable disposal container or waste bin) after any work stoppage such as scheduled breaks and the end of any work shift. Waste containers containing ACM or RACM must be labeled in accordance with Cal/OSHA labeling requirements. Waste containers of RACM must be additionally labeled in accordance with USEPA labeling requirements.

F2.3 Asbestos Work Notifications

Notifications are required by regulatory agencies prior to conducting certain types of work which may impact hazardous materials. Pre-work notifications are required for the project by the local USEPA NESHAP delegated authority and Cal/OSHA office with jurisdiction over the Project Site as noted in Table 5.1 located in Section 5.

F2.3.1 Cal/OSHA Temporary Worksite Notification

For Project activities which will involve asbestos-related work in excess of 100 square or linear feet, written notification must be made to Cal/OSHA. Such written notification to Cal/OSHA must be submitted to the nearest Cal/OSHA office exercising regulatory authority over the project at least 24 hours prior to the start of asbestos-related work. In addition, certain unexpected events related to asbestos work, such as employees exposed over the PEL without a respirator, must be reported to Cal/OSHA within 15 days of the incident.

F2.3.2 NESHAP Renovation or Renovation Notification

The USEPA NESHAP regulations are authorized by Section 112 of the Clean Air Act (published in 40 Code of Federal Regulations Parts 61 and 63) and specify work practices for asbestos to be followed during renovations and renovations of all structures meeting the NESHAP definition of a facility. The NESHAP regulations require the owner of the facility, or the facility operator, to notify a USEPA delegated authority at least 10 business days prior to the planned commencement of abatement, renovation, and/or renovation work triggering notification.

A Renovation Notification must be supplied to the MBARD 10 business days before any work meeting one or more of the following criteria:

1. Impaction or removal of RACM in quantities greater than the notification thresholds noted in Section 5
2. Facility renovation, including unweighting or removal of any load-bearing structure
3. Intentional burning for fire training purposes

F2.4 Asbestos Disposal Requirements

Category I and Category II nonfriable ACM should be disposed of as asbestos-containing waste in California. Friable ACM (RACM), including nonfriable material that has become or will be rendered friable, should be disposed of in California as non-Resource Conservation and Recovery Act (non-RCRA) hazardous waste. Impacting nonfriable ACM with mechanical means will render such material friable and reclassify the material as RACM.

If point count laboratory analysis (Point Count 400) shows that a given material contains less than 1% asbestos, then such material is not considered a hazardous waste by USEPA, or the California Department of Toxic Substances Control (DTSC). Asbestos material containing less than 1% asbestos is not subject to Cal/OSHA asbestos waste labeling requirements. Waste materials containing less than 1% asbestos may generally be disposed of as construction debris in many California landfills and at many municipal transfer stations; however, the acceptance criteria of each facility may differ. The waste acceptor should be contacted, and their individual acceptance-criteria abided by, prior to waste transport and disposal.

Appendix G

Lead Regulatory Summary

General Informational Summary of Governmental Lead (Pb) Rules and Regulations

Appendix G Regulatory Overview for Lead

Work at the project site is understood to meet the Cal/OSHA definition of construction work (8CCR1532.1[a]) and includes the planned impaction of known lead containing surface coatings, thus, is subject to regulation by governmental agencies and standards, including those noted in this section.

G1.1 Lead Regulations

G1.1.1 Code of Federal Regulations (CFR)

1. 29 CFR 1926, Construction Standards
2. 40 CFR Parts 261, 265, and 268, Hazardous Waste Management
3. 40 CFR Part 745, Lead: Identification of Dangerous Levels of Lead
4. 40 CFR Part 745, Subpart E Lead Renovation, Repair and Painting Program
5. 49 CFR Parts 172, 173, 178, 179, Hazardous Material Transportation

G1.1.2 California Code of Regulations (CCR)

1. 8 CCR Division 1, Chapter 4, Construction Safety Orders
2. 8CCR1532.1, Lead in Construction
3. 8 CCR 1537, Welding, Cutting, and Heating of Coated Metals
4. 8 CCR 1531, Respiratory Protection
5. 17 CCR Division 1, Chapter 8, Accreditation/Certification, and Work Practices in Lead–Related Construction
6. 22 CCR Division 4.5, Environmental Health Standards for Management of Hazardous Waste

G1.2 Lead Based Paint

The USEPA, CDPH and Cal/OSHA define Lead Based Paint (LBP) as a surface coating containing lead in a concentration of equal to or greater than 0.5 percent by weight, 5,000 milligrams per kilogram (mg/kg), 5,000 ppm, or 1.0 milligram per square centimeter (mg/cm^2). In addition, Cal/OSHA regulates worker impaction of paint containing any detectable quantity of lead, thus such work triggers compliance with applicable regulations, including 8CCR1532.1.

The United States Consumer Product Safety Commission defines lead containing paint (LCP) as a surface coating containing lead in a concentration of equal to or greater than 0.009 percent by weight or 90 ppm (90 mg/kg).

G1.3 Trigger Tasks and Lead Impaction Activities

Specific construction tasks, known as Trigger Tasks, when performed on material(s) known to contain detectable quantities of lead, should be understood to expose employees above the lead PEL and thus necessitate specific employee protection measures per 8CCR1532.1. A Trigger Task or Activity is defined herein as a construction operation, process or task specifically identified by the Cal/OSHA lead standard (8CCR1532.1) as a potential lead exposure hazard requiring certain protective measures to be implemented prior to obtaining the results of an initial exposure assessment.

Performing a Trigger Task should be understood to expose employees above the Permissible Exposure Limit (PEL) and should thus necessitate employee protection measures, including the following: wearing of respirators and protective clothing, action level training (at a minimum) and initial employee biological medical monitoring (blood tests), until personal air sampling proves otherwise. Untrained and/or unprotected workers should not perform trigger tasks. Specific trigger tasks and their expected resultant airborne exposure levels are described below.

G1.3.1 Trigger Task I

The following trigger task I activities are expected to create airborne lead concentrations of 50 to 500 micrograms per cubic meter of air ($\mu g/m^3$):

1. Manual renovation
2. Paint preparation (scraping and sanding)
3. Using heat guns
4. Using HEPA-filtered equipment
5. Debris clean-up

G1.3.2 Trigger Task II

The following trigger task II activities are expected to create airborne lead concentrations of 500 to 2,500 $\mu g/m^3$:

1. Lead mortar work
2. Lead burning
3. Rivet busting
4. Use of non-HEPA-filtered equipment
5. Dry abrasive blast debris clean-up or containment movement

G1.3.3 Trigger Task III

The following trigger task II activities are expected to create airborne lead concentrations of greater than 2,500 $\mu g/m^3$

G1.4 Competent Person Designation

The Contractor shall designate, in writing, one or more individuals as Competent Persons(s) when tasking individuals to perform work at the project site that may impact lead containing surface coatings. Written designation shall certify that each designated Competent Person has the appropriate training and knowledge required of a Competent Person under Article 6 of the construction Safety Orders, Title 8, California Code of Regulations.

G1.5 Personal Air Monitoring

The Contractor should conduct worker breathing zone exposure monitoring (also known as personal air monitoring) to determine the airborne concentration of lead present within the work environment as required by Cal/OSHA per 8CCR1532.1. Air monitoring of Contractor personnel performing lead impaction work is required by Cal/OSHA and is the obligation of the Contractor. The Contractor is responsible for providing daily Cal/OSHA compliance monitoring as per 8CCR1532.1 (Lead). The Contractor shall monitor workers for lead exposure.

Air monitoring should continue for each task for the duration of the project, unless a negative exposure assessment is achieved. The exposure limits noted in G1.5 Cal/OSHA Exposure Limits for Lead (Table G1.5) must be adhered to for employee protection to establish appropriate protective measures and controls when impacting material containing lead.

Table G1.5 Cal/OSHA Airborne Exposure Limits for Lead

Air Contaminant	Action Level (AL) (8-hour TWA)	Permissible Exposure Limit (PEL) (8-hour TWA)
Lead	30 µg/m^3	50 µg/m^3

Notes:

- µg/m^3 = Micrograms per cubic meter of air
- 8-hour TWA = Eight-hour time-weighted average
- Action Limit (AL): When employee exposure levels exceed the AL, specific administrative, engineering and work practice controls must be implemented.
- Permissible Exposure Limit (PEL): Employer must ensure no employee is exposed above this level based on an 8-hour TWA. When employee exposure levels exceed the PEL, all applicable administrative, engineering and work practice controls must be implemented. Respiratory protection and other protective measures are required pending feasible engineering controls. Additional training, monitoring, and medical surveillance requirements apply to respirator usage and for exposure levels exceeding PEL.

Correspondingly to the asbestos air monitoring requirements described in section F1.8 (Appendix F), the Contractor should conduct representative (25% of crew) breathing zone personal air monitoring of its employees once each shift and repeated daily or until a NEA showing airborne lead exposure below the PEL or Action Level (AL), as derived in accordance with and 8CCR1532.1 (d) can be established. Monitoring should be conducted by an individual experienced and knowledgeable about the methods of air monitoring and in accordance with 8CCR1532.1. If exposures are determined to be above the action level, appropriate worker protections should be instituted per 8CCR1532.1. Exposure monitoring should document the source of lead emissions.

Until an employee exposure assessment is completed and it has been determined and documented that the employee is not exposed above the PEL, the Contractor should treat the employee as if the employee were exposed above the PEL and should implement employee protective measures per 8CCR1532.1, if any Trigger Tasks are to be performed.

G1.6 Personnel Training

Individuals engaged in lead-related construction work activities should attend lead hazard training appropriate to their assignments. All training for other lead–related construction activities should be in accordance with the worker training provisions in the Cal/OSHA and CDPH lead regulations.

Employees, including crew leaders, supervisors, and any other Contractor personnel or agents who may be exposed to airborne concentrations of lead must have received at a minimum: lead awareness training (HAZCOM) as required by Cal/OSHA 8CCR1532.1. If air monitoring demonstrates an exposure above the AL or PEL for lead, the Contractor should maintain documentation that employees receiving this exposure level have received Action Level training if exposed above Action Level. The Contractor should maintain documentation affirming that employees have appropriate CDPH lead worker certification if exposed above PEL while working at a public building.

G1.6.1 Hazard Communication Training

All workers should receive lead hazard communication (HAZCOM) training prior to the commencement of work that may disturb painted surfaces known or presumed to contain lead at the project site. Such training should be documented and such documentation retained onsite for review. Training should include, but may not be limited to, the locations and presence of lead containing material at the project site, the potential hazards of lead exposure, the purpose and meaning of warning signage, the isolation (using signage and barrier tape) of identified lead debris, the required procedures and training necessary to impact lead containing material and prohibited practices regarding lead containing material at the project site, the content of 8CCR1532.1, the specific nature of operations which could expose employees to lead above the action level, the proper use of respirators, the purpose and a description of the medical surveillance program, the content of the Contractor Lead Compliance Plan, and the proper use/restrictions on chelating agents.

G1.6.2 Action Level Training

The Action Level (AL) is an established airborne contaminate level that when met or exceeded, certain protective health and safety measures are triggered per 8CCR1532.1 (l) (2). For lead, the AL is an exposure of 30 micrograms per cubic meter of air (µg/m^3) of airborne lead as an 8-hour TWA. The Contractor should provide training for all workers who may be exposed to lead in excess of the AL or PEL in accordance with Title 8CCR1532.1, Subsection (l), Parts (1) and (2) Awareness Training. Contractor should maintain documentation that employees receiving this exposure level have received Action Level training if exposed above Action Level.

The Contractor should itself establish, or have site personnel attend, an Action Level Training program. Such a training program should assure that each employee is trained in the following:

1. The content of 8CCR1532.1 and its appendices.
2. The specific nature of the operations which could result in exposure to lead above the action levels.
3. The purpose, proper selection, fitting, use, and limitations of respirators.
4. The purpose and a description of the medical surveillance program, and the medical removal protection program including information concerning the adverse health effects associated with excessive exposure to lead (with particular attention to the adverse reproductive effects on both males and females and hazards to the fetus and additional precautions for employees who are pregnant).
5. The engineering controls and work practices associated with the employee's job assignment including training of employees.
6. The contents of any compliance plan and the location of regulated areas in effect.
7. Instructions to employees that chelating agents should not routinely be used to remove lead from their bodies and should not be used except under the direction of a licensed physician.
8. The employee's right of access to records under CCR Section 3204.

G1.7 Medical Surveillance Compliance

Use only workers trained and medically qualified for the assigned lead work and respirator usage for trigger tasks or other work known or reasonably expected to generate airborne exposures to lead in excess of the Action Level (AL) or PEL.

Contractor employees shown to be exposed above the AL, PEL, and/or engaged in Trigger Tasks in the absence of a NEA, must be medically qualified to do so and have the appropriate medical examinations as specified in 8CCR1532.1. Medically qualified should mean that the worker who performs trigger tasks, or other lead-related construction tasks likely to exceed the AL or PEL, has received, at minimum, lead biological monitoring and medical evaluation for use of respiratory protection in accordance with 8CCR1532.1(j).

Medical requirement for lead-related construction work compliance should include:

1. Documentation of medical surveillance examination by a licensed medical physician prior to commencement of onsite Lead–Related Construction “trigger task” work. Documentation should include baseline blood lead levels. The baseline blood lead should have been within 30 days in advance of starting work.
2. Documentation from physician that all employees or agents who may be exposed to airborne lead in excess of background levels have received medical examination to determine whether they are physically capable of working while wearing the respirator required without suffering adverse health effects in accordance with 8 CCR 153. Medical exams should have been performed not more than 12 months prior to the completion of Contractor work at the project site. Biological monitoring records documenting employee blood lead level

test results should be kept for 30 years. The Contractor must be aware of and provide information to the examining physician about unusual conditions in the workplace environment (e.g., high temperatures, humidity, chemical contaminants) that may impact on the employee's ability to perform work activities.

3. Documentation that each employee required to wear respirators has passed a respirator fit test within the past 12 months and has been assigned an individual respirator based on the fit test.
4. Methods, procedures and plan for monitoring employee airborne lead exposure as required by Cal/OSHA during lead component removal, clean-up and surface preparation activities. Methods and procedures, at a minimum, should comply with requirements outlined in 8CCR1532.1 Lead. Include Name, address and certification information for laboratory to be used for air sample analysis.

G1.8 Requirements for Lead Impaction

Surface coatings (paint) applied to interior and exterior surfaces at the project site have been reported and/or are assumed to contain lead. Employers whose employees perform impaction of surface coatings at the project site should monitor their employees for airborne lead exposure and institute necessary employee protection precautions per the Cal/OSHA lead standard (8CCR1532.1) when conducting work at the project site.

As required by 8CCR1532.1, employees performing work at the project site, including foreman, supervisor, and any other company personnel or agents who may be exposed to any airborne concentrations of lead, should receive training which includes, at a minimum, Lead Awareness training, also known as lead HAZCOM training.

If air monitoring demonstrates an employee exposure to lead above 30 micrograms per cubic meter of air (µg/m^3), a threshold known as the Cal/OSHA Action Level, or 50 µg/m^3, a threshold known as the PEL, the employer must maintain documentation that employees receiving such exposure(s) have received Action Level training (if exposed above the Action Level or PEL) and have appropriate CDPH certification. It should be noted that CDPH certification is applicable if employees are exposed above the PEL in a building generally accessible to the public as defined by 17 CCR, Division 1, Chapter 8, Article 1.

Employee protection measures are mandated by Cal/OSHA when workers impact lead and the scope and magnitude of these measures are generally dependent on the amount of lead present in the air. At a minimum, work impacting lead must include the following protocols:

1. Establishment of a regulated work area (posting of warning signage)
2. Establishment of hygiene controls (hand washing facilities)
3. Use of wet methods (water) to mitigate airborne dust generation
4. Use of HEPA filter-equipped vacuums and tools
5. Use of PPE, including respirators, as appropriate

G2.1 Lead Waste Disposal

G2.1.2 Waste Segregation and Characterization

The Resource Conservation and Recovery Act (RCRA) gave the USEPA authority to regulate the waste status of demolition and renovation debris, including lead-containing materials. Specific notification and testing requirements are required to be addressed prior to transporting, treating, storing, or disposing of hazardous wastes. Lead containing wastes are considered hazardous waste under RCRA if Toxicity Characteristic Leaching Procedure (TCLP) results exceed five milligrams per liter (mg/l). The USEPA exempts from most RCRA requirements those generators whose combined hazardous waste generation is less than 100 kilograms per month. Site owner or contractor should provide for secure onsite temporary storage for known or suspect hazardous LBP paint chip, dust/debris, and cleanup related waste.

Suspect hazardous waste streams and waste categories listed below should be considered lead hazardous waste until proven otherwise through testing. Suspect hazardous waste should be segregated by the Client or site owner based on potential for exhibiting hazardous waste characteristics. Lead related wastes, at a minimum, are to be segregated into the below listed categories:

1. Category I: Paint removed by chemical stripping, mechanical removal or abrasive media, paint chips, vacuum bags, used cleaning materials. These materials are typically hazardous wastes and should be assumed hazardous unless proven nonhazardous via approved laboratory analysis.
2. Category II: Plastic sheeting and tape, disposable clothing, and equipment. These materials should be non-hazardous if properly cleaned and decontaminated. However, these items are to be considered hazardous wastes subject to testing.
3. Category III: Work dust and debris from lead painted finishes and structures undergoing work are to be considered hazardous waste subject to testing.
4. Composite representative samples should be taken of each waste stream category generated. Samples from a given waste stream category may be composited into one sample for analysis. The site owner and contractor should ensure a sufficient number of representative samples are taken from each category of segregated waste. Waste streams should be tested using the lead testing analytical thresholds for determination of hazardous waste characterization as shown on the following tables, Table G2.1 and Table G2.2.

Table G2.1 Cal/EPA Testing Protocol for Lead

Lead Content Analytical Method	Hazardous Waste Threshold	Waste Characterization
Total Threshold Limit Concentration (TTLC)	≤50 ppm	Non-Hazardous Waste
Total Threshold Limit Concentration (TTLC)	>50 ppm - ≤1,000 ppm	Run STLC
Total Threshold Limit Concentration (TTLC)	>1,000 ppm	California Hazardous Waste, Run TCLP
Soluble Threshold Limit Concentration (STLC)	≤5 mg/L	Non-Hazardous Waste
Soluble Threshold Limit Concentration (STLC)	>5 mg/L	California Hazardous Waste, Run TCLP

Notes:
- > = greater than
- ≤ = less than or equal to
- mg/L = milligrams per liter, laboratory unit of measurement for soluble analytes
- ppm = parts per million, laboratory unit of measurement

Any waste greater than or equal to 1,000 ppm lead using the TTLC analysis method should be considered a lead hazardous waste. If the TTLC result for a waste stream is less than 50 ppm lead, then the waste stream is non-hazardous, and no further testing is required for the sampled waste stream unless the waste changes in character or composition.

Table G2.2 USEPA Testing Protocol for Lead

Lead Content Analytical Method	Hazardous Waste Threshold	Waste Characterization
Toxicity Characteristic Leaching Procedure (TCLP)	>5 mg/L	RCRA Hazardous Waste
Toxicity Characteristic Leaching Procedure (TCLP)	≤5 mg/L	Non-RCRA Hazardous Waste

Notes:

- > = greater than
- ≤ = less than or equal to
- mg/L = milligrams per liter, laboratory unit of measurement for soluble analytes
- RCRA = Resource Conservation and Recovery Act

Based on the above testing protocols, any representative waste stream having a soluble lead concentration greater than or equal to five (5) ppm lead as determined by STLC or TCLP analyses or any waste greater than or equal to 1,000 ppm lead using the TTLC analysis method should be considered a lead hazardous waste.

Each category of suspect hazardous waste should be tested and characterized according to requirements of the selected permitted waste disposal site. If other hazardous constituents are known or suspected to be present, the testing should also include those substances or conditions.

The waste should be packaged, stored, handled, transported and disposed of for each category of waste generated based on the testing results and regulatory protocol. All testing should be performed by a laboratory that complies with and is certified under the Environmental Laboratory Accreditation Program (ELAP) established by the CDPH.

Appendix H

Personnel Certifications

Accreditations and Certifications for Key Project Personnel

Key Project Personnel Asbestos Certifications

State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant

Scott S Harris
Name

Certification No. 11-4713

Expires on 02/16/22

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

State of California
Division of Occupational Safety and Health
Certified Site Surveillance Technician

Matthew A Tolley
Name

Certification No. 17-6073

Expires on 02/14/22

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

Key Project Personnel Lead Certifications

California Department of PublicHealth

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
Scott Harris	Lead Inspector/Assessor	LRC-00004068	11/26/2021
	Lead Project Monitor	LRC-00004067	11/26/2021

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD.

California Department of PublicHealth

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
Matthew Tolley	Lead Sampling Technician	LRC-00001047	10/7/2021

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD.

Appendix I

Laboratory Certifications

Accreditations and Certifications for Laboratories Providing Analytical Data for the project

CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

Interim

CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

CERTIFICATE OF ENVIRONMENTAL ACCREDITATION

Is hereby granted to

EMSL Analytical Inc.

San Leandro, CA

464 McCormick Street

San Leandro, CA 94577

Scope of the certificate is limited to the
"Fields of Testing"
which accompany this Certificate.

Continued accredited status depends on successful completion of on-site inspection, proficiency testing studies, and payment of applicable fees.

This Certificate is granted in accordance with provisions of
Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **1620**

Expiration Date: **6/30/2021**

Effective Date: **7/1/2020**

Sacramento, California
subject to forfeiture or revocation

Christine Sotelo, Chief
Environmental Laboratory Accreditation Program

CALIFORNIA STATE
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing

EMSL Analytical Inc.
San Leandro, CA
464 McCormick Street
San Leandro, CA 94577
Phone: 5108953675

Certificate No. **1620**
Expiration Date **6/30/2021**
INTERIM

Field of Testing: 103 - Toxic Chemical Elements of Drinking Water			
103.300	001	Asbestos	EPA 100.1
103.301	001	Asbestos	EPA 100.2
Field of Testing: 114 - Inorganic Chemistry of Hazardous Waste			
114.130	001	Lead	EPA 7420
Field of Testing: 121 - Bulk Asbestos Analysis of Hazardous Waste			
121.010	001	Bulk Asbestos	EPA 600/M4-82-020

As of 7/1/2020 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 101048-3

EMSL Analytical, Inc.

San Leandro, CA

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Asbestos Fiber Analysis

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2020-07-01 through 2021-06-30

Effective Dates

For the National Voluntary Laboratory Accreditation Program

National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

EMSL Analytical, Inc.
464 McCormick St.
San Leandro, CA 94577
Mr. Michael DeCavallas
Phone: 510-895-3675
Email: mdecavallas@emsl.com
http://www.emsl.com

ASBESTOS FIBER ANALYSIS **NVLAP LAB CODE 101048-3**

Bulk Asbestos Analysis

Code	*Description*
18/A01	EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

Airborne Asbestos Analysis

Code	*Description*
18/A02	U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.

For the National Voluntary Laboratory Accreditation Program

APPENDIX C – FEMA ESA REVIEW FORM FOR USFWS ARCATA-YREKA, JULY 2020

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ESA Review Form for FEMA Funded Projects To be Covered Under the LOC from the Arcata-Yreka FWO Jurisdictions in California (to be submitted to USFWS)

INSTRUCTIONS: This Endangered Species Act (ESA) Review Form is for proposed projects that may be funded under various FEMA grants programs in California and that would be covered under the U.S. Fish and Wildlife Service (USFWS) Programmatic Letter of Concurrence (LOC) from the Arcata and Yreka Fish and Wildlife Offices (FWOs). This form must be filled out by a qualified Biologist[1]. This form provides information for FEMA to make a determination of effects on federally listed species[2] and their Critical Habitat[3] from the Subapplicant's proposed project for compliance with the ESA. For Subapplicant's proposed projects that meet the criteria for coverage under the LOC, FEMA would submit this completed form to the USFWS and request coverage under the LOC from the Arcata-Yreka FWO.

There are five sections and a summary table in this form (check the sections being submitted):

- ☒ **Summary Table,**
- ☒ **Section A:** Information on the proposed project,
- ☒ **Section B:** Determination of effects to federally listed species and/or Critical Habitat protected under the ESA,
- ☒ **Section C:** ESA Review for Not Likely to Adversely Affect (NLAA) determinations for proposed projects,
- ☒ **Section D:** For the Arcata-Yreka FWOs to complete and sign, and
- ☐ **Section E:** For Subapplicant to complete and sign.

[1] A qualified Biologist consists of an environmental professional with at least a Bachelor's degree in Biology, Ecology, Natural Resources, Environmental Sciences, or similar field, and has at least two years of experience working with federally listed species, their habitats, and Endangered Species Act implementation in the State of California.

[2] In this form, the term "federally listed species" includes species listed or proposed to be listed as threatened or endangered under Endangered Species Act.

[3] In this form, the term "Critical Habitat" refers to designated Critical Habitat and proposed Critical Habitat for federally listed species protected under the Endangered Species Act.

After completing all the applicable sections in this form, please fill out the Summary Table below:

Summary Table:
Summary of ESA Effects Determination on Federally Listed Species and Critical Habitat

Site/LOP #	Species Name	ESA Effects Determination	Critical Habitat
FEMA Grant # or Disaster # and Project Worksheet #: Reservoirs Seismic Retrofit Project (Phase 2); HMGP-4344-040-010R (Note: if multiple Grant Projects, PWs, or sites are included in this ESA Review form, list each one separately)			
HMGP-4344-040-010	Western snowy plover (*Charadrius nivosus nivosus*)	May affect, but is not likely to adversely affect (NLAA)	No effect
HMGP-4344-040-010	Beach layia (*Layia carnosa*)	May affect, but is not likely to adversely affect (NLAA)	No effect
Is there a concurrent ESA consultation for this project to address federally listed species <u>not</u> covered under the PBO issued by the Sacramento FWO? ☐ **YES** ☒ **NO** If yes, please refer to the Appendix at the end of this ESA Review Form.			

<u>Note 1</u>: If the Subapplicant's proposed project is under another Federal agency's jurisdiction (e.g., U.S. Forest Service, National Park Service, Bureau of Land Management, Bureau of Reclamation, etc.) or another Federal agency is functioning as the Lead Federal Agency (e.g., U.S. Army Corps of Engineers), then there is no need to prepare this FEMA form.

<u>Note 2</u>: FEMA is not requesting concurrence from the USFWS for sites with a No Effect determination. Instead, FEMA is simply documenting its No Effect determinations for specific sites for internal record-keeping.

Name of Qualified Biologist, Organization, and Date of Preparation:

Erich Schickenberg, SWCA Environmental Consultants, prepared on February 9, 2022

Biologist's Qualifications: Expertise in California special-status flora and fauna surveys, environmental compliance inspection and monitoring, and construction monitoring

Professional Degree: B.S., Botany; San Francisco State University

Years of experience working with federally listed species, their habitats, and Endangered Species Act implementation in the State of California: 8 years

SECTION A. INFORMATION ON PROPOSED PROJECT (press F11 to advance to the next field)

A.1. Name of Subapplicant[4] (Agency Name):

Humboldt Bay Municipal Water District

A.2. Project Name, and FEMA Grant # or Disaster and Project Worksheet (PW) #s:

Reservoirs Seismic Retrofit Project (Phase 2); HMGP-4344-040-010R

A.3. Project Location (street address, latitude/longitude, or UTM and Datum/Zone), and Municipality/County/State:

Project sites are located in unincorporated Humboldt County, California. Below are the latitude and longitude coordinates for each site.

- Korblex Hill (2 MG Water Tank): 40.907762, -124.063656
- Korblex Hill (1 MG Water Tank): 40.907317, -124.064400
- Samoa Peninsula (1 MG Water Tank): 40.805267, -124.199127

A.4. Description of Subapplicant's Proposed Project[5]:

Select the applicable project type(s):

- ☐ **Non-Emergency Debris Removal**
- ☐ **Road and Trail Construction**
- ☐ **Utility Construction**
- ☐ **Rail Line Construction**
- ☐ **Flood Control Activities**
- ☐ **Culvert Construction**
- ☐ **Bridge Construction**
- ☐ **Airport Runway Construction**
- ☒ **Facility Disaster Mitigation Activities**
- ☐ **Building and Facility Construction**
- ☐ **Channelization**
- ☐ **Stormwater Management**
- ☐ **Dam Construction**
- ☐ **Bank Protection, Stabilization, and Erosion Control Activities**
- ☐ **Detention/Retention, or Basin Water Storage Facility Construction**
- ☐ **Linear Water Conveyance Facility Construction**
- ☐ **Shoreline Facilities - Recreational or Maritime Use**
- ☐ **Shoreline Facilities - Protection**
- ☐ **Wildfire Risk Reduction**

Provide a detailed narrative of the project that clearly describes the scope of work at a sufficient level of detail to support all analysis needed for compliance with the ESA (please note, this will likely include additional detail found in project plans, design drawings, site visits, etc.). Please explain construction methods here (e.g., equipment to be used, access routes, construction work areas, construction staging areas, pile driving methods and materials, etc.), and see Section A.6 below to add further details

[4] In the case of a Tribe, the term to be used is "Applicant" or "Subapplicant" depending on the specific grant circumstance.

[5] The term "construction" may include repairing, replacing, relocating, modifying, or demolishing an existing facility or constructing a new facility.

concerning construction duration and timing. Include the Subapplicant's best management practices[6] (BMPs) to be implemented and other Subapplicant-planned measures and post-construction activities, if applicable.

The Humboldt Bay Municipal Water District (HBMWD) proposes to seismically retrofit three welded steel water tanks at two separate sites (Korblex Hill and Samoa Peninsula) with stronger foundations and seismic hold-downs capable of withstanding the design earthquake loads. The Korblex Hill site includes one 1-million-gallon (MG) water tank constructed in 1967 and one 2-MG water tank constructed in 1996. The Samoa Peninsula site includes one 1-MG water tank constructed in 1967. This project is being phased, and Phase 1 (preliminary design and geotechnical investigation) has already been completed. Phase 2 (project implementation) activities are described below.

Phase 2 project activities include finalizing the engineering design plans and implementing structural retrofit activities. Using information from the geotechnical report prepared under Phase 1, the structural retrofit design would be finalized. All three water tank reservoirs would be retrofitted, which would include removing and replacing the existing foundations and anchoring the upper reservoir sections to the new foundations. In addition to the retrofit requirements, additional modifications to the 2-MG Korblex Hill water tank would be performed to reinforce the roof rafters and supports.

Attach project plans, layouts, engineering drawings, if available. Reference those attachments below.

See Attachment C, Site Plans, and Attachment A, Figures, showing project boundaries, work areas, access routes, and staging areas (collectively the project footprints).

Describe the construction equipment: Construction will require a crane, a lift, and delivery trucks.

Describe the access routes: Site access to the Samoa Peninsula site would be entirely from paved roads, including Samoa Road and Vance Avenue. Site access to the Korblex Hill site would be entirely from paved roads, including West End Road, Rebecca Lane, and Pipeline Road.

Describe the construction staging and work areas:

Excavation and grading associated with this project would occur within the already-developed footprints of the existing tanks. The tanks would be lifted and the area under the existing tanks would be excavated to accommodate the new tank foundations. Existing tanks would then be lowered onto new foundations, anchored, and painted. All project work and staging areas have been previously disturbed as part of the original tank construction. All activities and staging would occur on hardscaped and/or previously disturbed areas on HBMWD properties and would not require any land acquisitions, right-of-way, or access easements.

If the Subapplicant's proposed project includes vegetation removal and/or trimming, describe the vegetation type and the extent that would be removed and/or trimmed. Describe the planned revegetation efforts, which should be consistent with the measures described in the LOC from the Arcata-Yreka FWOs.

No vegetation or trimming is required for the project. Excavation and grading associated with this project would occur within the already developed footprints of the existing tanks.

A.5. Description of the Action Area[7]:

Please attach a map(s), aerial image, photographs, GIS data layers, and other information on the Action Area.

The attachments include:

Attachment A. Figures

1. Project Vicinity
2. Action Area [500-foot buffer from footprints]

[6] The BMPs are measures proposed by the Subapplicant, which are different from the general avoidance and minimization measures in FEMA's PBA and species-specific conservation measures required in the LOC from the Arcata-Yreka FWOs.

[7] Action Area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02).

3. CNDDB Plant Records
4. CNDDB Wildlife Records
5. Critical Habitat

Attachment B: Site Photographs

Attachment C: Site Plans

Attachment D: USFWS IPaC Report

Attachment E: Federally Listed Species with Potential to Occur in the Action Area

Briefly describe the project footprint[8], and include the size of the project footprint (acres, square feet, etc.):

Excavation and grading associated with this project would occur within the already-developed footprints of the existing tanks. The tanks would be lifted and the area under the existing tanks would be excavated to accommodate the new tank foundations. All project work and staging areas (total of 1.11 acres) have been previously disturbed as part of the original tank construction and are shown in Attachment A, Site Maps. All activities and staging would occur on hardscaped and/or previously disturbed areas. Project activities are not expected to affect any natural or aquatic habitats or require clearing/grubbing or tree/vegetation removal activities.

Briefly describe the Action Area in a few sentences including the size of the Action Area (acres, square feet, etc.) and explain the buffer or distance from the project footprint used to define the Action Area:

The Action Area, comprised of approximately 55.64 acres, consists of the entirety of both project sites where seismic retrofitting activities would take place (project footprint described above), as well as a 500-foot buffer surrounding the project sites, as shown in Attachment A, Action Area Maps. The 500-foot buffer was used as the potential noise disturbance buffer for nesting western snowy plover (*Charadrius nivosus nivosus*). The project footprints at both sites have been previously disturbed and degraded as part of the original tank construction.

Please include a description of the vegetation communities, aquatic habitats, slope, elevation, ambient noise levels, and any sensitive biological resources in the Action Area.

Vegetation east of the tank at the Samoa Peninsula site, where temporary staging of materials is proposed, consists of degraded dune mat characterized by low relative cover of native dune species and sand stabilization by invasive plants. Vegetation in the vicinity of the Samoa Peninsula site and outside of the project footprint consisted of native-dominated dune mat habitat, degraded dune mat habitat and surrounding development, and a small stand of non-native Monterey cypress (*Hesperocyparis macrocarpa*). No vegetation assessment was completed for the Korblex Hill site because work, staging, and access at that site would be confined to paved and developed areas at that site.

Ambient noise levels in the Action Area (both sites) are anticipated to be between 30 and 50 decibels, consistent with noise levels found in rural ocean front and forested areas. The Action Areas have elevations ranging between approximately 20 and 220 feet.

Are any water bodies including rivers, streams, seasonal wetlands (i.e., vernal pools, ponds, wet meadows, etc.), estuaries, or coastal water bodies located within the Action Area?

☐ **YES** ☒ **NO**

If Yes, will in-water work be needed for completion of the Subapplicant's proposed project?

☐ **YES** ☐ **NO**

If No, how far is the water body from the limits of ground disturbance aud/or vegetation removal?

[8] Project footprint corresponds to all the areas directly disturbed by implementation of the Subapplicant's proposed project, including structures, construction staging areas, access routes, any areas of ground disturbance, etc.

What is the name of the river, stream, estuary, or coastal water body? If the river/stream is a tributary, provide the name of the receiving water body. For seasonal/annual bodies of water, describe the time of year and the duration of time that water is typically preseut. Describe the flow of water (i.e., still, slow moving, swift, etc.) anticipated during the scheduled activities for the proposed project.

A.6. Proposed Project Schedule and Duration:

Please provide start and end dates (including month aud year) of project implementation, number of work days, and uumber of work hours per day (e.g., 5 days of work for 10 hours per day).

Start Date June 2022 (estimated) **End Date** November 2022 (estimated)

Number of work days: 6 months

Number of work hours per day: 8 hours

Will any work activities occur during nighttime? If so, please describe them. Nighttime work is not proposed

A.7. Outside of FEMA's Memorandum of Understanding[9] (MOU) coordination with USACE, has a previous formal or informal ESA consultation or Technical Assistance with the Arcata-Yreka FWOs been initiated or completed for the Subapplicant's proposed project? This may include a larger project by another Federal agency (e.g., Corps 404 permit, Bureau of Reclamation grant funded project, etc.) that encompasses the proposed project.

☐ **YES** ☒ **NO**

If so, please inclnde a copy of this documentation.

SECTION B. DETERMINATION OF EFFECTS TO FEDERALLY LISTED SPECIES AND/OR CRITICAL HABITAT PROTECTED UNDER ESA

B.1. Does the Action Area for the Subapplicant's proposed project have the potential to support federally listed species and/or does it contain Critical Habitat including physical or biological features essential for the conservation of the species? Also, describe the methods and results of any listed species surveys aud/or habitat assessments conducted.

Surveys/Habitat Assessment:

☐ **NO**

It has been determined that the Action Area occurs either:

- ☐ **a) Outside the range of any federally listed species,**
- ☐ **b) Within the range of a federally listed species but outside of occupied or snitable habitat and outside Critical Habitat, or**
- ☐ **c) Within Critical Habitat designation but lacks the physical or biological features essential for the conservation of the species.**

Go to B.2.

☒ **YES. List the federally listed species and Critical Habitat that are present or potentially present in the Action Area of the Subapplicant's proposed project (go to B.2)**

Western snowy plover (*Charadrius nivosus nivosus*) has potential to occur in the Action Area at the Samoa Peninsula site; however, no critical habitat for this species is located within Action Area.

[9] The MOU refers to the 2015 Executed Memorandum of Understanding Regarding National Environmental Policy Act, Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, National Historic Preservation Act, Rivers and Harbors Act Section 10 Permits, and Clean Water Act Section 404 Permits for Federal Emergency Management Agency Projects in California, Nevada, and Arizona (and subsequent annual updates).

Beach layia (*Layia carnosa*) has potential to occur in the Action Area at the Samoa Peninsula site; however, no critical habitat for this species is located within Action Area.

B.2. Could the Subapplicant's proposed project affect federally listed species and/or Critical Habitat (i.e., the physical or biological features essential for the conservation of the species) in the Action Area?

☐ **NO**

No Effect. FEMA has determined that implementation of the proposed project would have no effects on federally listed species and/or Critical Habitat. If a No Effect determination has been made for the proposed project, you do not need to complete this form. No notification to FEMA is required.
No consultation with the USFWS is required under the ESA.

☒ **YES (go to B.3)**

B.3. Briefly describe the species potential to occur onsite, starting with the Information for Planning and Consultation (IPaC) report, and including but not limited to, the closest California Natural Diversity Database (CNDDB) occurrences, suitable habitat, surveys nearby, Recovery Plan Core Areas, etc.

Based on the results of biological reconnaissance surveys conducted by GHD, Inc. biologists Kelsey McDonald and Rose Dana on April 7, June 18, and June 25, 2021, no suitable habitat is present within the project footprint for any of the federally listed species having potential to occur in the project vicinity that were identified during the literature review. However, suitable habitat for the federally threatened western snowy plover and federally endangered beach layia, two species listed in the July 2021 IPaC report, is present adjacent to and within the vicinity of the Samoa Peninsula project site.

High-quality native-dominated dune mat habitat is located adjacent to the Samoa Peninsula site footprint but does not occur within the project footprint. Degraded dune mat habitat, located within the Samoa Peninsula site proposed temporary staging area, offers poor potential habitat for beach layia because of established cover of weedy non-native plants and little to none of the aeolian sand movement that characterizes a natural, functional dune system. Beach layia was not observed within the project footprint during focused, seasonally appropriate rare plant surveys conducted by GHD biologists in 2021. Approximately 1,900 beach layia individuals were observed in the high-quality dune mat habitat located within approximately 100 feet of the Samoa Peninsula project footprint. No rare plants were observed within the Korblex Hill or Samoa Peninsula project footprints during the 2021 rare plant surveys.

Suitable nesting habitat (i.e., sand dunes) for western snowy plover occurs adjacent to, and in the vicinity of, the Samoa Peninsula project footprint. However, suitable habitat for the species is not present within the project footprint. The Samoa Peninsula project footprint is located within the CA-8, Humboldt Bay, North Spit Recovery Unit for western snowy plover. Nesting western snowy plovers have been documented on the Samoa Peninsula North Spit within the Samoa Dunes Recreation Area, approximately 2.5 miles south of the Samoa Peninsula project footprint; however, no recent records of western snowy plover nesting have been documented within 1 mile of the Samoa Peninsula project site.

B.4. Select the federally listed species that may occur in the Action Area, and select the appropriate ESA determination based on the highest level of potential effects as described below:

- **If FEMA has determined that the proposed project May Affect, but is Not Likely to Adversely Affect (NLAA) federally listed species and/or their Critical Habitat, the effects would be insignificant, discountable or wholly beneficial[10]. No adverse effects to listed species, take of individual(s) of a listed species, and/or adverse effects to Critical Habitat will occur. Complete Sections C.1 through C.4 of this form.**

[10] Beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur. (1998 ESA Section 7 Consultation Handbook)

- **If FEMA has determined that the proposed project May Affect, and is Likely to Adversely Affect (LAA) at least one federally listed species and/or their Critical Habitat, the Subapplicant's proposed project does not qualify for coverage under the programmatic LOC from the Arcata-Yreka.**

Federally Listed Species or Critical Habitat	Applicable ESA Determination
☒ Western snowy plover (*Charadrius nivosus nivosus*)	☒ NLAA (only option)
☒ Beach layia (*Layia carnosa*)	☒ NLAA (only option)

SECTION C. ESA REVIEW FOR NLAA DETERMINATIONS FOR PROPOSED PROJECTS

C.1.

a. Briefly describe the potential effects[11] from implementation of the Subapplicant's proposed project(s) in the Action Area. Refer to FEMA's PBA and the LOC from the Arcata-Yreka FWOs for a description of potential effects, and describe additional details as applicable. Please clearly differentiate the appropriate response for each project or project site.

Potential Effects of the Subapplicant's Proposed Project.	Applicable Project or Site(s)	List Species Potentially Affected	Is Critical Habitat Potentially Affected, including Effects on Specific Physical and Biological Features[12]
☒ **Erosion, turbidity, and/or sedimentation** - Effects of sediment and erosion relating to grading activities, although unlikely, may occur based on grading activities in the vicinity of beach layia or suitable nesting habitat for western snowy plover. Effects to beach layia and western snowy plover would be avoided with implementation of GEN AMM-1 Erosion and Sediment Prevention Measures, GEN AMM-8 Equipment Staging, GEN AMM-13 Work Area Designation to Minimize Disturbance, GEN AMM-14 Access Routes and Staging Area, GEN AMM-16 Biological Monitors, and WSP-5 Work Area Designation to Minimize Disturbance.	4344-040-010R Samoa Peninsula site	beach layia western snowy plover	☐ N/A
☐ **Hazardous materials spills** -	N/A	N/A	☐ N/A
☒ **Change in noise, vibration, lighting, dust, or temperature** - Effects to western snowy plover causing disturbance and displacement, although unlikely, may occur if noise is not reduced to the maximum extent practicable and nesting snowy plover are located within 500 feet of the	4344-040-010R Samoa Peninsula site	beach layia western snowy plover	☐ N/A

[11] 'Effects of the action' is defined as all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (50 CFR § 402.17).

[12] Per 81 *FR* 7414, the physical or biological features refer to the features that are present that are essential to the conservation of the species and may require special management considerations or protection, which were formerly referred to as "Primary Constituent Elements."

project. Effects to beach layia and associated suitable habitat in the vicinity of graded areas, although unlikely, may occur if dust generation is not reduced to the maximum extent practicable. Effects to western snowy plover and beach layia would be minimized or avoided with implementation of GEN AMM-3 Dust Control Measures, GEN AMM-13 Work Area Designation to Minimize Disturbance, of GEN AMM-15 Environmental Awareness Training for Construction Personnel, GEN AMM-16 Biological Monitor, GEN AMM-17 Daily Work Hours, and WSP-4 Seasonal Work Windows/Snowy Plover Surveys			
☒ **Introduction of invasive species and pathogens** - Effects including introduction of invasive non-native species and pathogens may occur within beach layia or nesting western snowy plover suitable habitat in the vicinity of disturbance areas if construction equipment, including crew trucks and hand tools, are not free of debris or organic material prior to arriving onsite. Effects to beach layia and western snowy plover would be avoided with implementation of GEN AMM-15 Environmental Awareness Training for Construction Personnel and GEN AMM-16 Biological Monitor	4344-040-010R Samoa Peninsula site	beach layia western snowy plover	☐ N/A
☐ **Dewatering of streams, creeks, or wetlands -**	N/A	N/A	☐ N/A
☐ **Streambed, bank, or shoreline modification, or other alteration of hydrology -**	N/A	N/A	☐ N/A
☐ **Riparian habitat removal or degradation –**	N/A	N/A	☐ N/A
☐ **Riparian habitat modification or fragmentation -**	N/A	N/A	☐ N/A
☐ **Loss or alteration of other suitable habitat for listed species -**	N/A	N/A	☐ N/A
☐ **Barriers to migration and species movement -**	N/A	N/A	☐ N/A
☐ **Herbicide use -**	N/A	N/A	☐ N/A

b. Describe any additional details on the potential effects on federally listed species not discussed above, including beneficial effects.

Retrofitting the HBMWD storage tanks and associated foundations may provide beneficial effects to nearby beach layia and western snowy plover suitable nesting habitat by reducing erosion or collapse of these structures during a seismic event that may otherwise impact suitable habitat for the species.

c. Describe any additional details on the potentials effects on Critical Habitat not discussed above, including beneficial effects. If there are adverse effects, quantify the area (in acres, square feet, etc.) of Critical Habitat affected.

N/A

C.2.

a. Please use the check boxes to select the applicable General *Avoidance and Minimization Measures* (AMMs) from the FEMA PBA used to obtain the LOC from the Arcata-Yreka FWOs and that will be implemented by the Subapplicant to avoid and minimize effects. If any AMMs are not applicable, include a brief justification for exclusion.

General Avoidance and Minimization Measures	Applicable Site(s) or Rationale for AMM Exclusion
☒ GEN AMM-1: Erosion and Sedimentation Prevention Measures	
☐ GEN AMM-2: Bank Stabilization	No bank stabilization required for the project.
☒ GEN AMM-3: Dust Control Measures	
☒ GEN AMM-4: Spill Coutrol Planning	
☒ GEN AMM-5 Spill Prevention and Pollution Control Measures	
☒ GEN AMM-6 Equipment Inspection and Maintenance	
☒ GEN AMM-7 Fueling Activities	
☐ GEN AMM-8: Equipment Staging	No staging will occur in a floodplain
☒ GEN AMM-9: Materials Storage and Disposal	
☒ GEN AMM-10: Fire Prevention	
☒ GEN AMM-11: Waste Management	
☐ GEN AMM-12: Work Involving Boats and Barges	N/A
☒ GEN AMM-13: Work Area Designation to Minimize Disturbance	
☒ GEN AMM-14: Access Routes and Staging Areas	
☒ GEN AMM-15: Environmental Awareness Training for Construction Personnel	
☒ GEN AMM-16: Biological Monitor	
☒ GEN AMM-17: Daily Work Hours	

b. List any additional general AMMs or BMPs developed for the Project(s) that would be iucorporated into the Subapplicant's proposed project(s) to avoid and minimize adverse effects. If there are none, simply put "not applicable" below.

Seasonally appropriate (April–July) preconstruction rare plant surveys will be conducted by a qualified botanist in the season prior to construction to account for any federally listed plant species that may have dispersed into the Samoa Peninsula project footprint since 2021 surveys were conducted. Any new federally listed plant occurrences observed during the preconstruction survey will be flagged for avoidance. Due to a lack of suitable habitat or documented populations of federally listed plants, no additional rare plant surveys are required at the Korblex Hill project site.

C.3. Please use the check boxes to select the species-specific Conservation Measures that are applicable from the LOC from the Arcata-Yreka FWOs, and indicate why implementation of others is not necessary for the Subapplicant's proposed project to avoid and minimize effects. Delete the tables for the species that do not pertain to this project.

☒ **This project has the potential to affect the Western Snowy Plover (WSP), and/or their Critical Habitat. The following Species-Specific Conservation Measures will be implemented in the Subapplicant's proposed project to avoid and minimize effects:**

Species-Specific Conservation Measures Western Snowy Plover	Applicable Site(s) or Rationale for AMM Exclusion
☐ WSP-1: Seasonal Avoidance	Project is not located within suitable nesting habitat for western snowy plover.
☐ WSP-2: Use of Handheld Tools Only	Project is not located within suitable nesting habitat for western snowy plover.
☐ WSP-3: Guidelines for Handheld Tools	Project is not located within suitable nesting habitat for western snowy plover.
☒ WSP-4: Biological Monitor	4344-040-010R Samoa Peninsula site
☒ WSP-5: Flagging	4344-040-010R Samoa Peninsula site
☒ WSP-6: Avoid Placement of Predator Perches	4344-040-010R Samoa Peninsula site
☐ WSP-7: Access Restrictions	Project is not located within suitable nesting habitat for western snowy plover.
☐ WSP-8: Site Restrictions	Project is not located within suitable nesting habitat for western snowy plover.
☐ WSP-9: Restore Contours of Temporarily Disturbed Areas	No project ground disturbance is required other than grading required under existing tank locations.
☒ WSP-10: Waste Management	4344-040-010R Samoa Peninsula site
☒ WSP-11: Prohibition of Pets Onsite	4344-040-010R Samoa Peninsula site

C.4. Summary of FEMA's NLAA Determination for Federally Listed Species and Critical Habitat from implementation of the Subapplicant's proposed project to demonstrate that the Subapplicant's proposed project will have <u>insignificant, discountable, or wholly beneficial effects to federally listed species or their Critical Habitat</u>. List all the federally listed species and/or Critical Habitat covered under this NLAA determination. An ESA determination for each federally listed species and/or Critical Habitat is required. Please clearly differentiate the appropriate response for each project or project site.

Species: Western snowy plover (Covered Species under USFWS-Arcata-Yreka PBO)

Determination Rationale for Species:

This project *may affect, but is not likely to adversely affect (NLAA)* western snowy plover with the implementation of the PBO General Avoidance and Minimization Measures provided in Section C.2 and Species-Specific Conservation Measures (Section C.3) designed to avoid direct and indirect effects to this species during the implementation of the proposed project. Suitable nesting habitat (i.e., sand dunes) for the federally threatened western snowy plover occurs adjacent to, and in the vicinity of, the Samoa Peninsula project footprint. However, suitable habitat for the species is not present within the project footprint. With the implementation of the identified AMMs and western snowy plover species-specific Conservation Measures, the potential adverse effects of the project would be insignificant and discountable.

Determination Rationale for Critical Habitat:

No critical habitat for western snowy plover is located within the Action Area.

Species: Beach layia

Determination Rationale for Species:

This project *may affect, but is not likely to adversely affect (NLAA)* beach layia with implementation of the PBO General Avoidance and Minimization Measures provided in Section C.2 and the additional special-status plant survey and avoidance AMM provided in part b of Section C.2, designed to avoid direct and indirect effects to this species during implementation of the proposed project. Degraded dune mat habitat, located within the project footprint, offers poor potential habitat for beach layia. The species was not observed within the project footprint during the 2021 focused, seasonally appropriate rare plant surveys; however, beach layia occurs in the immediate vicinity of the project footprint and has the potential to wind disperse into the project footprint. With implementation of the identified AMMs, including a seasonally appropriate (April–July) preconstruction rare plant survey and avoidance of beach layia plant occurrences potentially established by wind dispersal, the potential adverse effects of the project would be insignificant and discountable.

Determination Rationale for Critical Habitat:

No critical habitat for beach layia is located within the Action Area.

SECTION D. FOR THE ARCATA-YREKA FWO TO COMPLETE AND SIGN

Project Name: Reservoirs Seismic Retrofit Project (Phase 2)

FEMA Grant # or Disaster and Project Worksheet #s: HMGP-4344-040-010R

I concur with FEMA's determination on federally listed species and critical habitat as described in this ESA Review Form, pursuant to Section 7 of the Endangered Species Act. The proposed projects are covered activities, and the effects to the Federally-listed species presented in this ESA Review Form have been analyzed in the September 7, 2018, Programmatic Letter of Concurrence (LOC) for the Federal Emergency Management Agency's Disaster, Mitigation, and Preparedness Programs within the Arcata or Yreka Fish and Wildlife Office's Jurisdiction (AFWO-18B0109-18I0341).

The proposed projects are appended to the September 7, 2018, programmatic letter of concurrence under the following Service File Number: AFWO-18B0109-18I0341. **Therefore, no further action pursuant to the Act is necessary for the proposed projects unless new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; the action is subseqnently modified in a manner that causes an effect to the listed species or critical habitat that was not considered; or a new species is listed or critical habitat designated that may be affected by the identified action.**

Signature is listed below:

VICKY RYAN Digitally signed by VICKY RYAN Date: 2022.10.06 12:49:05 -07'00'

Ecological Services Program Lead
Arcata/Yreka Fish and Wildlife Office
U.S. Fish and Wildlife Service

Date

SECTION E. FOR SUBAPPLICANT TO COMPLETE AND SIGN

On behalf of
[Humboldt Bay Municipal Water District]
(Subapplicant agency name), I have read the requirements from FEMA's Programmatic Letter of Concurrence (LOC) with the USFWS that are specific to the subject project and plan to implement them accordingly. I understand that failure to implement the required General Avoidance and Minimization Measures and Species-Specific Conservation Measures may jeopardize funding for the subject project. The [Humboldt Bay Municipal Water District **] (Subapplicant agency name) accepts implementation of the required measures described in this ESA Review Form as a stipulation of funding for**
[Reservoirs Seismic Retrofit Project (Phase 2)]
(project name, FEMA Grant # or Disaster and Project Worksheet #s).

Signature is listed below:
Tue Friedenbach, General Manager
John Friedenbach, General Manager — 11/17/22
Print and sign name **Date**

[Humboldt Bay Municipal Water District
(Subapplicant agency name)

APPENDIX D – FEMA PROGRAMMATIC BIOLOGICAL ASSESSMENT, SEPTEMBER 7, 2018

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United States Department of the Interior
FISH AND WILDLIFE SERVICE

Arcata Fish and Wildlife Office
1655 Heindon Road, Arcata, California 95521
Phone: (707) 822-7201 FAX: (707) 822-8411

Yreka Fish and Wildlife Office
1829 South Oregon Street, Yreka, California 96097
Phone: (530) 842-5763 FAX: (707) 842-4517

SEP 0 7 2018

In Reply, Refer To:
AFWO-18B0109-18I0341 (Arcata)
08EYRE00-2018-I-0197 (Yreka)

Mr. Alessandro Amaglio
Federal Emergency Management Agency
Department of Homeland Security
1111 Broadway, Suite 1200
Oakland, California 94607

Subject: Informal Consultation on the Federal Emergency Management Agency's (FEMA) Programmatic Biological Assessment for Disaster, Mitigation, and Preparedness Programs in California for Four Species within the Jurisdictions of the Arcata and Yreka Fish and Wildlife Offices, California

Dear Mr. Amaglio:

We concur with your determinations regarding the Programmatic Biological Assessment (PBA) for Disaster, Mitigation, and Preparedness Programs in California. The Federal Emergency Management Agency (FEMA) requested our concurrence with their determinations under section 7 of the Endangered Species Act (Act) of 1973 (16 U.S.C. 1531 *et seq.*).

We received your request for concurrence and the PBA on June 21, 2018. In part, the PBA addresses four federally listed species under the jurisdictions of the Arcata Fish and Wildlife Office (AFWO) and Yreka Fish and Wildlife Office (YFWO) (Table 1). FEMA determined that adoption of the structured section 7 review processes outlined in the PBA (i.e., the proposed action) "... *may affect, but is not likely to adversely affect* ..." each of the four species and their designated critical habitats (i.e., NLAA determination).

Table 1: Four Species addressed in the PBA under the AFWO's and YFWO's jurisdiction.

Species Name				*FEMA Determinations for ...*		*Location of Conservation Measures in the PBA, and in Attachment 1 of this Correspondence*
Common Name	*Binomial or Trinomial*	*Federal Listing Status*	*Field Office Jurisdiction*	*Individuals or Populations*	*Critical Habitat*	
northern spotted owl	*Strix occidentalis caurina*	Threatened	YFWO	NLAA	NLAA	Appendix K, pages K-1 thru K-3
marbled murrelet	*Brachyramphus marmoratus*	Threatened	AFWO	NLAA	NLAA	Appendix J, pages J-1 and J-2
western snowy plover	*Charadrius nivosus nivosus*	Threatened	AFWO	NLAA	NLAA	Appendix J, page J-3
Point Arena mountain beaver	*Aplodontia rufa nigra*	Endangered	AFWO	NLAA	Not applicable	Appendix J, page J-4

Background and Geographic Scope

Under the Disaster Relief and Emergency Assistance Act of 1988 (Public Law 93-288 §§5121 *et seq.*) (Stafford Act), FEMA is authorized to grant funds to individuals and communities (both are referred to as "subapplicants" in FEMA terminology) who are adversely affected, or potentially affected, by human-caused and natural disasters. Grant programs authorized under the Stafford Act address preparedness, hazard mitigation, and disaster recovery. FEMA's fund-granting decisions are reviewable under section 7 of the Act. The purpose and need of the 2018 PBA is to enable FEMA to establish a structured section 7 review procedure that is specific to affected species, to affected sites, and to individual applications for disaster assistance.

FEMA developed its current PBA in anticipation of a continued increasing trend in the frequency and severity of disaster incidents in California including, but not limited to, severe winter storm events and wildfires. In previous years, FEMA has submitted PBAs in northern California that were linked to specific Disaster Declarations; for example, in the AFWO-YFWO jurisdictional areas, we saw a FEMA PBA following a Disaster Declaration for severe winter storms, 2005-2006. This earlier PBA also established a structured section 7 review process. However, the escalating frequency and severity of disaster incidents over the last decade has made this "single-declaration" approach infeasible. FEMA's 2018 PBA covers all disaster incidents and declarations, throughout California, and will remain in effect for a period of 5 years, with provision for review and extension, as warranted.

Rationale for the Service's Determinations

In the summer of 2017, FEMA solicited early involvement from the Service in the development of their PBA. The process continued through early winter of 2017 with weekly conference calls, frequent electronic communications, and periodic reviews of draft products. These activities tapered-off through spring of 2018 as FEMA approached completion of the PBA. During this time, the Service provided FEMA with our recommended conservation measures for the four species listed in Table 1. These measures (enclosed with this letter) have been incorporated into the PBA and will be implemented by FEMA or their subapplicants; therefore, we concur with FEMA's determinations for the four species within AFWO's and YFWO's jurisdiction.

Conclusion

The Service appreciates FEMA's collaborative approach to developing programmatic guidelines, and its efforts to minimize impacts to protected species. If you have questions about this correspondence, or need more information, please contact Christine Jordan at the Yreka Fish and Wildlife Office, (530) 842-5763; or John Peters at the Arcata Fish and Wildlife Office, (707) 822-7201.

Sincerely,

Dan Everson
Field Supervisor
Arcata Fish and Wildlife Office

Jenny Ericson Gina Glenne
Acting Field Supervisor
Yreka Fish and Wildlife Office

Enclosures
(1) Conservation Measures for Northern Spotted Owl
(2) Conservation Measures for Marbled Murrelet
(3) Conservation Measures for Western Snowy Plover
(4) Conservation Measures for Point Arena Mountain Beaver

cc:
U.S. Fish and Wildlife Service, Region 8, Sacramento CA (Attn: Ms. Ellen McBride)
U.S. Fish and Wildlife Service, Yreka, CA (Attn: Ms. Jenny Ericson and Ms. Christine Jordan)
U.S. Fish and Wildlife Service, Carlsbad, CA (Attn: Mr. G. Mendel Steward)
U.S. Fish and Wildlife Service, Ventura, CA (Attn: Mr. Steve Henry)
U.S. Fish and Wildlife Service, Klamath Falls, OR (Attn: Mr. Todd Luke)
U.S. Fish and Wildlife Service, Bay-Delta FWO, Sacramento, CA (Attn: Ms. Kaylee Allen)
U.S. Fish and Wildlife Service, Sacramento FWO, Sacramento, CA (Attn: Ms. Jennifer Norris)
AECOM, Oakland, CA (Attn: Ms. Lorena Solorzano-Vincent)
NOAA's National Marine Fisheries Service, Sacramento, CA (Attn: Maria Rea, Assistant Regional Administrator)

Enclosures

Conservation Measures for Northern Spotted Owl

Conservation Measures for Marbled Murrelet

Conservation Measures for Western Snowy Plover

Conservation Measures for Point Arena Mountain Beaver

USFWS Conservation Measures for Northern Spotted Owl (For NLAA Coverage Only)

The following Conservation Measures are required for Subapplicant's proposed projects and their interrelated and interdependent activities that may affect the northern spotted owl (NSO). These measures are designed to reduce direct and indirect disturbance to individual NSOs, and habitat effects, to an insignificant and discountable level.

NSO-1: If the Subapplicant's proposed project is located within suitable nesting, roosting or foraging habitat (NRF) for the NSO, and may directly or indirectly affect the NSO or its habitat, contact the USFWS to obtain contact information for local Forest Service, County, or other biologists who can provide NSO survey, Activity Center[1] and habitat suitability data for the Action Area. This step will provide baseline information for the Action Area, and will help determine if and where surveys should be done, or if recent surveys have been completed.

NSO-2: If NSO surveys have not been done, or are not current per the 2012 NSO Survey Protocol guidance (depending on activity), and surveys are planned, conduct them according to the 2012 NSO Survey Protocol and follow the seasonal restrictions described below for 'Surveyed Landscape'. If surveys are not planned or feasible, assume occupancy based on the presence of suitable NRF habitat; adhere to the guidance and seasonal restrictions described below for operating in an 'Un-surveyed Landscape'.

(a) As an option to the full 6-visit protocol surveys described in the 2012 NSO Survey Protocol, three surveys can be conducted in the year of action implementation. If no NSOs are detected within 0.25 mile of the proposed activities, activities may proceed that year without seasonal restrictions.

NSO-3: Surveyed Landscape – If surveys are completed or are current for the Action Area (based on surveys conducted by the applicant/project proponent, or other data provided from other agencies):

(a) Do not conduct activities that result in loud and continuous noise above ambient levels within 0.25 mile (or 1,320 feet) of a nest site between February 1 and July 9.

  (i) This includes activities that generate sound levels 20 or more decibels above ambient sound levels or activities that generate maximum sound levels above 90 decibels, excluding vehicle back-up alarms. Maximum sound levels are the combined ambient and activity-generated sound levels.

(b) Do not conduct any suitable habitat modification or smoke-generating activities within 0.25 mile (or 1,320 feet) of a nest site between February 1 and September 15.

  (i) Suitable habitat includes NSO NRF habitat. Modification includes cutting and removal of large trees, down logs or snags. Tree or limb trimming or pruning, brush trimming or removal, and hazard tree felling may occur as long as the noise levels described above are not exceeded during the critical breeding period of February 1-July 9.

NSO-4: Un-surveyed Landscape – If surveys have not been completed and cannot be done, assume occupancy in the Action Area/portion of it based on the presence of suitable NRF habitat:

(a) Do not conduct activities that result in loud and continuous noise above ambient levels within 0.25 mile (or 1,320 feet) of un-surveyed suitable NRF habitat between February 1 and July 9.

---

[1] An Activity Center represents the 'best of detections' such as a nest tree, an area used by roosting pairs or territorial singles, or an area of concentrated nighttime detections

(i) This includes activities that generate sound levels 20 or more decibels above ambient sound levels or activities that generate maximum sound levels above 90 decibels, excluding vehicle back-up alarms. Maximum sound levels are the combined ambient and activity-generated sound levels.

(b) Do not conduct any suitable habitat modification or smoke-generating activities within 0.25 mile (or 1,320 feet) of un-surveyed suitable NRF habitat between February 1 and September 15.

(i) Suitable habitat includes NSO NRF habitat. Modification includes cutting and removal of large trees, down logs or snags. Tree or limb trimming or pruning, brush trimming or removal, and hazard tree felling may occur as long as the noise levels described above are not exceeded during the critical breeding period of February 1-July 9.

NSO-5: Equipment must be in good working order with standard noise abatement devices attached.

NSO-6: Within all suitable NRF habitat:

(a) Avoid removing or damaging known nest trees and associated screen trees, unless they are a confirmed safety hazard per the guidance documents from the implementing agency or another agency with jurisdiction in the Action Area.

(b) Avoid removing or damaging trees or snags with potential nesting platforms and associated screen trees. These include trees with large flattened tops, large broken topped trees, trees with decadence such as large cavities, mistletoe broom structures, cat faces, or large limbs; or large snags with these similar characteristics).

(c) Avoid removing large (20" diameter at breast height or larger) snags, unless they are a confirmed safety hazard per the implementing agency's guidance documents.

NSO-7: Project activities will not downgrade[2] or remove the function of suitable nesting/roosting habitat:

(a) While habitat elements may be removed, such as individual large trees or snags if they are a confirmed safety hazard, from nesting/roosting habitat, the treatment must not be so extensive as to downgrade or remove the overall function of the habitat.

(b) If the Subapplicant's proposed project would remove or downgrade nesting/roosting habitat function, this PBA is not applicable and a separate ESA consultation is warranted.

NSO-8: Within suitable foraging habitat in NSO cores (0.5 mile radius, or 500-acre area, around an Activity Center) and within suitable foraging habitat in NSO home ranges (1.3 mile radius, including core, or 3,398-acre area around an Activity Center):

(a) Avoid downgrading or removing suitable foraging habitat function.

(b) While habitat elements may be removed, such as individual trees, shrubs, down logs and snags, from foraging habitat, the treatment must not be so extensive as to downgrade or remove the overall function of the habitat in an NSO core or home range below the recommended habitat levels for supporting survival, reproduction and occupancy (USDI-FWS 2009). This level is a combination of 400 acres of suitable NRF habitat in the core. For the home range, the level is 40 percent suitable NRF (approximately 1,336 acres).

(c) If the Subapplicant's proposed project removes or downgrades suitable foraging habitat function in a core and home range to below the recommended levels, this PBA is not applicable and a separate ESA consultation is warranted.

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[2] Treatments/activities that reduce suitable habitat elements to the degree that the habitat does not function in the capacity that existed pre-treatment are considered a 'downgrade' effect (e.g., downgrade from nesting/roosting to foraging); but the treatment/activity does not remove suitable habitat function entirely. Removal of habitat function occurs when treatments//activities reduce habitat elements to the degree that the habitat no longer functions as suitable habitat.

Northern Spotted Owl Critical Habitat

NSO-9: When working in designated critical habitat, adhere to all measures described in NSO-6, NSO-7, and NSO-8 for reducing impacts in suitable nesting/roosting and foraging habitat. This will assure that effects to Physical and Biological Features (PBFs) of PBF-2 (nesting/roosting) and PBF-3 (foraging) are insignificant and discountable.

NSO-10: Adhering to these Conservation Measures (NSO-6, NSO-7, and NSO-8 above) will also assure that effects to PBF-1 and PBF-4 are insignificant and discountable, given the larger scale at which effects to these critical habitat PBFs are to be considered under the 2012 Revised Critical Habitat final rule (77 FR 71876). PBF-1 refers to forest types that may be in early, mid, or late seral stages and that support the NSO across its geographical range. PBF-4 refers to habitat that supports the transience and colonization phases of dispersal.

USFWS Conservation Measures for Marbled Murrelet (For NLAA Coverage Only)

The following Conservation Measures are required for Subapplicant's proposed projects that may affect the marbled murrelet (MAMU) and/or their habitat. These measures are designed to reduce direct and indirect disturbance to individual MAMUs, and habitat effects, to an insignificant and discountable level.

MAMU-1: Occupied Habitat

If marbled murrelet surveys (using the USFWS 2003 survey protocol; Evans Mack *et al.* 2003) determine (*) that the Action Area is occupied **or** if FEMA or the USFWS presumes marbled murrelet occupancy without conducting surveys, the project Subapplicant will adhere to the following Conservation Measures:

(i) Vegetation Removal or Alteration of Known or Potential Nest Trees:

a. No potential marbled murrelet nest trees (**) will be removed during the nesting season (24 March to 15 September).

b. Avoid removing or damaging known or potential nest trees, unless they are a confirmed safety hazard. For sites that have not been surveyed according to 2003 survey protocol, potential habitat is defined as (1) mature (with or without an old-growth component) and old growth coniferous forests; **and** (2) younger coniferous forest that have platforms.

c. Avoid removing or damaging trees with potential nesting platforms. A platform is a relatively flat surface at least 10 cm (4 in) in diameter and 10 m (33 ft) in high in the live crown of a coniferous tree. Platforms can be created by a wide bare branch, moss or lichen covering a branch, mistletoe, witches brooms, or other deformities, or structures such as squirrel nests.

d. Project activities will not remove the function of suitable nesting habitat.

- While habitat elements may be removed, such as individual large trees if they are a confirmed safety hazard, from nesting habitat, the treatment must not be so extensive as to remove the overall function of the nesting habitat, and will be conducted outside of the nesting season.

e. Non-suitable nest trees or limb trimming or pruning, brush trimming or removal, and hazard tree felling within suitable habitat may occur outside of the nesting season, 16 September to 23 March.

(ii) Auditory, Visual, or Other Disturbance:

a. Construction equipment must be in good working order, with emphasis on hydraulic and noise abatement systems. Hydraulic leakage and damaged mufflers (or spark arresters) must be promptly addressed and remedied to the degree practicable.

b. No proposed activity generating sound levels 20 or more decibels above ambient sound levels **or** with maximum sound levels (ambient sound levels plus activity-generated sound levels) above 90 decibels (excluding vehicle back-up alarms) may occur within suitable marbled murrelet nesting habitat during the majority of the murrelet nesting season (*i.e.,* 24 March to 05 August)(USFWS 2006).

c. Between August 06 (date when most marbled murrelets have fledged in coastal northern California) and September 15 (end of marbled murrelet nesting season) of any year, project activities, with adjacent suitable nesting habitat, that will generate sound levels $\geq$10 dB above ambient sound levels will observe a daily work window beginning 2 hours post-sunrise and ending 2 hours pre-sunset. However, prep work that does not generate sound levels above

ambient sound levels, including street sweeping and manual removal of pavement markers, can occur during all hours. The need for this daily work window depends on the distance between suitable nesting habitat and the above-ambient sound generating activity following the USFWS guidelines (USFWS 2006). For example, if above-ambient sound levels generated by proposed activities will become attenuated back down to ambient sound levels prior to reaching suitable nesting habitat, the daily work window would not be necessary. No human activities will occur within visual line-of-sight of 40 m (131 feet) or less from a known nest or suitable nest tree during the nesting season (24 March to 15 September) (USFWS 2006).

MAMU-2: Unoccupied Habitat

(i) If recent protocol surveys determine that all suitable marbled murrelet nesting habitat within the Action Area is considered unoccupied, the auditory, visual, and other disturbance measures listed above under ii) do not apply for habitat determined to be unoccupied.

MAMU-3: Marbled Murrelet Critical Habitat

(i) Ensure that there are no "adverse effects" to designated critical habitat for marbled murrelet within the Action Area. However, the USFWS has no specific quantitative thresholds, above which there would likely be an adverse effect to critical habitat. If a Subapplicant's proposed project encounters this situation, contact the USFWS to determine whether proposed habitat removal within designated critical habitat would constitute an adverse effect. Generally, the removal of a few small trees in unoccupied habitat would not result in "adverse effect" on designated critical habitat.

(ii) When working in designated critical habitat for marbled murrelet, all measures described in MAMU-1 Occupied Habitat, or MAMU-2 Unoccupied Habitat for reducing impacts in suitable habitat will also be implemented. This will help reduce effects, and may result in some instances in effects that are insignificant and discountable.

Footnotes

(*) Surveyors are required to meet or exceed all training recommendations in Evans Mack et al. (2003), and be registered as qualified surveyors on a current USFWS 10(a)1(A) Recovery Permit.
(**) Potential habitat defined by Nelson et al. (2003) as: (1) mature (with or without an old-growth component) and old-growth coniferous forests; and (2) younger coniferous forests that have platforms (relatively flat, at least 4-inch diameter and at least 33 feet above the base of the live crown of a coniferous tree). Platform presence is more important that tree size.

Literature Cited

Evans Mack, D., W. P. Ritchie, S. K. Nelson, E. Kuo-Harrison, P. Harrison, and T. E. Hamer. 2003. Methods for surveying Marbled Murrelets in forests: a revised protocol for land management and research. Pacific Seabird Group unpublished document available at: http://www.pacificseabirdgroup.org.

U.S. Fish and Wildlife Service (USFWS). 2006. Estimating the effects of auditory and visual disturbance to northern spotted owls and marbled murrelets in northwestern California. Available at: http://www.fws.gov/arcata/es/birds/NSO/ns_owl.html.

USFWS Conservation Measures for Western Snowy Plover (For NLAA Coverage Only)

The following Conservation Measures apply to Action Areas within suitable western snowy plover (WSP) nesting habitat and designated critical habitat regardless of whether snowy plovers have been detected during USFWS approved protocol surveys.

WSP-1: Project construction activities in suitable nesting habitat will occur during the species non-breeding season: the period beginning October 1 and continuing through February 28 of the following year; or through February 29 in a leap year.

WSP-2: Project construction activities in suitable nesting habitat will be limited to the use of handheld tools, including handheld motorized implements such as chain saws and power augers. No heavy equipment will be allowed within suitable nesting habitat.

WSP-3: If handheld motorized implements are used, operators will employ best management practices to avoid and minimize soil and water contamination from fuel and lubricants. Measures include: (1) Use spill-resistant fuel and lubricant containers; (2) Consider the use of a portable containment pad for re-fueling in the field; (3) Immediately report petroleum spills to the landowner, or land management agency, and notify appropriate local authorities for advice and action on containment and cleanup of spills; and (4) Clearly mark the location and/or boundaries of the spill site to enable rapid remedial action.

WSP-4: If project construction activities occur in adjacent to, but not within suitable nesting habitat, then project activities should be conducted during the species non-breeding season, if possible. If non-breeding season construction is not possible, then the Subapplicant will employ a Service-approved biologist to conduct weekly western snowy plover surveys. If western snowy plovers are observed, the Service-approved biologist will notify the Service within 1 day of the observation and will monitor all construction activities conducted adjacent to western snowy plovers suitable nesting habitat. The qualified biologist will have the right and responsibility to stop work if adverse effects of nesting western snowy plovers are observed.

WSP-5: When necessary to minimize the area affected by the project, the Subapplicant or their contractors will mark the work site boundaries with flagging or other visible materials, and remove those markers at the conclusion of the project.

WSP-6: Workers will avoid temporary or permanent placement of structures (e.g., posts, railings, tall equipment, or fence lines) that could provide elevated perches for predatory birds.

WSP-7: Access to work sites will be by foot travel only. Motorized vehicles, including all-terrain vehicles, are not permitted on work sites located within suitable nesting habitat.

WSP-8: Vehicles used for transport of personnel will be restricted to existing parking lots or roadside parking areas.

WSP-9: At the conclusion of the project, areas temporarily impacted by project activity will be restored to their pre-project condition (for example, footpaths are to be raked to their original ground contour and cut vegetation is to be removed or piled for future disposal).

WSP-10: Trash, food, food containers, and food waste will be secured at all times by individual workers, or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.

WSP-11: Pets will be prohibited from all work sites.

USFWS Conservation Measures for Point Arena Mountain Beaver
(For NLAA Coverage Only)

The following Conservation Measures are required for Subapplicant's proposed projects that may affect the Point Area mountain beaver (PAMB) and/or their habitat. These measures are designed to reduce direct and indirect disturbance to individual PAMBs, and habitat effects, to an insignificant and discountable level.

PAMB-1: Prior to implementing proposed vegetation-altering or ground-disturbing activities, habitat assessments and surveys for Point Arena mountain beaver must be conducted using Service-approved protocol (USFWS 2005b). Survey and habitat assessment results are valid for 2 years; if conducted within 500 feet of the Action Area. Therefore, if proposed activities do not begin within 2 years of surveys, additional surveys will need to be conducted prior to conducting the work.

PAMB-2: No vegetation removal or ground disturbance in occupied habitat or within unoccupied suitable habitat. However, roadside mowing along road rights-of-way, in occupied habitat or unoccupied suitable habitat using motorized equipment is allowed between July 1 and November 30 (i.e., the non-breeding season), provided a maximum 4-foot horizontal strip of vegetation will be mowed, to a minimum height of 2 feet.

PAMB-3: No motorized equipment with vibrating, or heavy-impact, operating capabilities (for example, vibratory steel-wheeled rollers, hand-operated vibratory compactors, concrete mixer trucks with vibrating chutes, pile-drivers), will be used within 500 feet of occupied suitable habitat during the breeding season (December 1 to June 30), and within 250 feet of occupied suitable habitat during the non-breeding season (July 1 to November 30).

PAMB-4: Night lights should be at least 250 feet from occupied suitable habitat.

PAMB-5: Heavy equipment must remain on the road prism in areas with evidence of Point Arena mountain beaver burrowing or within unoccupied suitable habitat.

PAMB-6: Staging areas will be placed in unsuitable habitat areas only or on the road prism to avoid habitat disturbance. No staging areas are allowed within occupied or unoccupied suitable habitat.

Literature Cited

U.S. Fish and Wildlife Service (USFWS). 2005. Draft guidelines for project related habitat assessments and surveys for Point Arena Mountain Beaver (*Aplodontia rufa nigra*). U.S. Fish and Wildlife Service unpublished document available at: http://www.fws.gov/arcata/es/mammals/mtnBeaver/documents/PAMB_protocol_v2.pdf

APPENDIX E – NOT USED

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APPENDIX F – EONCOAT SURFACE PREPARATION & APPLICATION GUIDE

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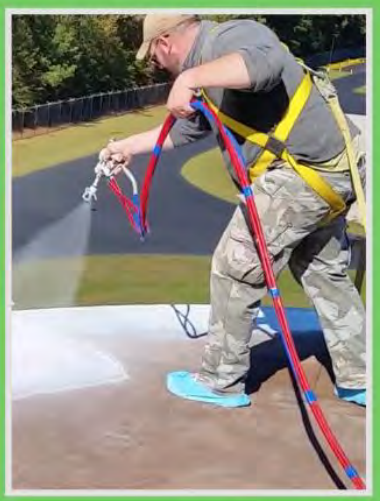

Surface Preparation & Application Guide

EONCOAT™

Tony Collins

Table of Contents

EonCoat, LLC | 3337 Air Park Road, Fuquay-Varina, NC 27526 | P: 754-222-4919 | www.EonCoat.com

Photographic guide of various levels of surface preparation. This is to be used as a guide for what is acceptable.

1.0 INTRODUCTION

The purpose of this guide is to familiarize contractors and applicators with the basic information necessary for properly ordering, storing, and applying EonCoat, a plural component flexible ceramic coating system. Prior to starting work, please read this guide carefully. If you have any questions, don't hesitate to get in touch with your EonCoat representative.

Also, please reference the project specifications and compare them to this guideline and product data sheet.

Overview

EonCoat is an easy technology to apply. You will get outstanding results if you recognize that this is a cementitious product designed to alloy a metal surface with a chemical bond.

Two fundamentals:

1. If you chemically bond a sufficiently soluble phosphate to steel, the metal cannot corrode for as long as the phosphate is there.
2. If you apply an acid phosphate to steel, will chemically bond with that metal unless there is something between the acid and the metal (e.g., oil, dust, standing water, old paint, dry fall material).

Once these two fundamentals are clearly understood, the techniques to get great results become obvious – spray the coating on a clean substrate that is either dry or damp but not covered in standing water. The easiest way to do this is to pressure wash each area just before spraying the coating – then let the water begin to evaporate. On a horizontal surface it may be necessary to vacuum the surface or blow the area off with an air hose.

Keep in mind that this material is a cement. Treat it like any other cement – don't over water it but keep it damp until it cures (about 15 minutes).

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2.0 PRODUCT AND PACKAGING

2.1 EONCOAT TECHNOLOGY

All EonCoat Products are applied at a 1:1 mix ratio and are 95% solids inorganic coating. When applied, EonCoat forms a layer of magnesium iron phosphate that is permanently chemically bonded with the ferrous ions in steel. It also forms a protective outer layer of flexible ceramic. Because the ceramic becomes very dense when it forms, the wet mils will be greater than the dry mil thickness even though the material is 97% solids.

2.2 EONCOAT PRODUCTS

EonCoat Corrosion Protection Coating: Our original formula and is great for atmospheric applications.

EonCoat CUI / High Temperature Coating: This product is perfect for corrosion under insulation or high-temperature applications. This is rated for 450°F (842°C).

EonCoat Weldable Coating: This product is phenomenal for corrosion protection **both** before and after welding. To date, the most popular use for our weldable coating is tank bottoms or steel that requires welding – although the possibilities are endless.

2.3 EONCOAT PACKAGING

EonCoat is available in two (2) separate packaging methods depending on the application method. If you will be using High Pressure Plural Pump with Stainless Steel Lowers, your EonCoat will be packaged in 2, 5-gallon buckets, as pictured next. There will be a total of 9 gallons per kit (4.5 gallons of part A & 4.5 gallons of part B).

If your application method is the Dual Component Cartridge Spray Gun. Then, your EonCoat would come in 600mL Dual Cartridges with 2 static mixtures each. (300mL of part A & 300mL of part B). Pictured Below.

2.4 EONCOAT TYPICAL COVERAGE RATES

	Dry Mils - (Microns)	Wet Mils (Microns)	Sq. Ft./ Gal (m²/ gal.)
EonCoat Corrosion Protection Coating	20.0 (500)	25.0 (635)	70 (6.4)
EonCoat CUI Coating	20.0 (500)	25.0 (635)	70 (6.4)
EonCoat Weldable Coating	40.0 (1000)	40.0 (1000)	35 (3.2)

NOTE: Recommended dry film thickness (DFT) may vary based on substrate condition and system design. Please contact EonCoat for application specific recommendations. Allow for overspray and surface irregularities. Film thickness is rounded to the nearest .5 mils (1 mil = 25.4 microns) and can be achieved in one or multiple passes; however **it is crucial that the entire 20 mils be achieved while the material is still wet.** An application below minimum recommended thickness may adversely affect coating performance.

2.5 EONCOAT STORAGE AND TEMPERATURE

Do not store EonCoat in direct sunlight for a prolonged period of time. The minimum storage temperature is 40ºF (5ºC) and a maximum of 110ºF (43ºC). EonCoat, when stored properly, maintains a shelf life of at least one (1) year if unopened. When opened, containers can be used more than once when lids are tightly sealed after each use. Containers should be used within one month after opening. Temperature will affect the spray-ability of the product. Cooler temperatures increase viscosity, conversely, arm temperatures will decrease viscosity. Therefore, we recommend that you place the product pails indoors at a minimum of 65ºF (18ºC) for 24 hours prior to application to allow them to gradually come to room temperature as a means of making the material easier to pour.

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3.0 SURFACE PREPARATION

While none of the NACE Standards precisely matches the optimal surface preparation for EonCoat, we are going to walk you through it step-by-step. EonCoat is not a barrier coating, but rather a surface treatment analogous to phosphating. To alloy the metal surface, it is not necessary for all iron oxide to be removed, but it is **essential to remove all other surface contamination**. This means removal of old paint, oil, dirt, dust (including the dust from EonCoat's own dry fall), and any other contamination. EonCoat must physically touch the metal in order to alloy it. If you spray over a contaminated surface, the ceramic will not to the metal below.

3.1 PRIOR TO BLASTING

All surfaces shall be cleaned and free from all old paint, grease, dirt, oils, dust or residue that will adversely affect the adhesion of EonCoat to the steel. All loose scale, large deposits, oil, grease, cutting oils, dirt, and other contaminants shall be removed prior to abrasive blasting by washing with detergent and clean water or steam cleaning, followed by thorough rinsing with clean water. You can see our Surface Preparation Page or download our Surface Preparation Checklist.

3.2 SURFACE IRREGULARITIES

Fins, slivers, burred or sharp edges, weld spatter and slag shall be removed prior to surface preparation.

3.3 COATING PREVIOUSLY PAINTED SURFACES

Previously painted surfaces require complete removal of existing paint prior to coating in order for EonCoat to form the molecular bond with the steel.

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3.4 PREPARATION OF STEEL - ABRASIVE BLAST CLEANING

All steel surfaces to be coated may be abrasive blast cleaned similar to SSPC-SP 6 / NACE 3, commercial blast cleaning or better to an anchor profile of at least 3 mils (75 microns). Abrasive media should be equal to MEDIUM grade, BLACK BEAUTY®. Recyclable blast media must be clean and free from dust, oil, grease or any other detrimental matter. Anchor profile is suggested to be measured by using Testex-Replica profile tape, or equivalent, prior to the application of the coating. Once all foreign materials and mill scale are removed, the surface can be allowed to degrade (flash rust). The important issue is that only metal or iron oxide (FeO) remain on the surface during coating. There are examples of surface preparations at the end of this section that are acceptable as well as examples of those that are not.

Abrasive blasting will produce both a cleaning and finishing action. The finishing effect may vary by controlling such factors as hardness of the abrasive, abrasive particle size, velocity of abrasive stream, angle of abrasive gun, distance from the work, method of application and work flow.

It is estimated that the surface area of metal increases as much as ten times as a result of the abrasive impact action.

Pressure

A blast machine is normally operated around 90 PSI at the nozzle. SSPC gives typical blast cleaning rates based on nozzle size and pressures.

The Grit Blast Gun

Abrasive blasting is supposed to be a scrubbing action, not a peening process. Therefore, the gun should always be aimed at a 60° to 45° angle to the surface being cleaned. When the gun is aimed at 90°, peening occurs and, due to the abrasive particles colliding with the abrasive bouncing off the surface, a very high rate of media wear occurs. **A peened surface is not reactive and thus not suitable for applying EonCoat.**

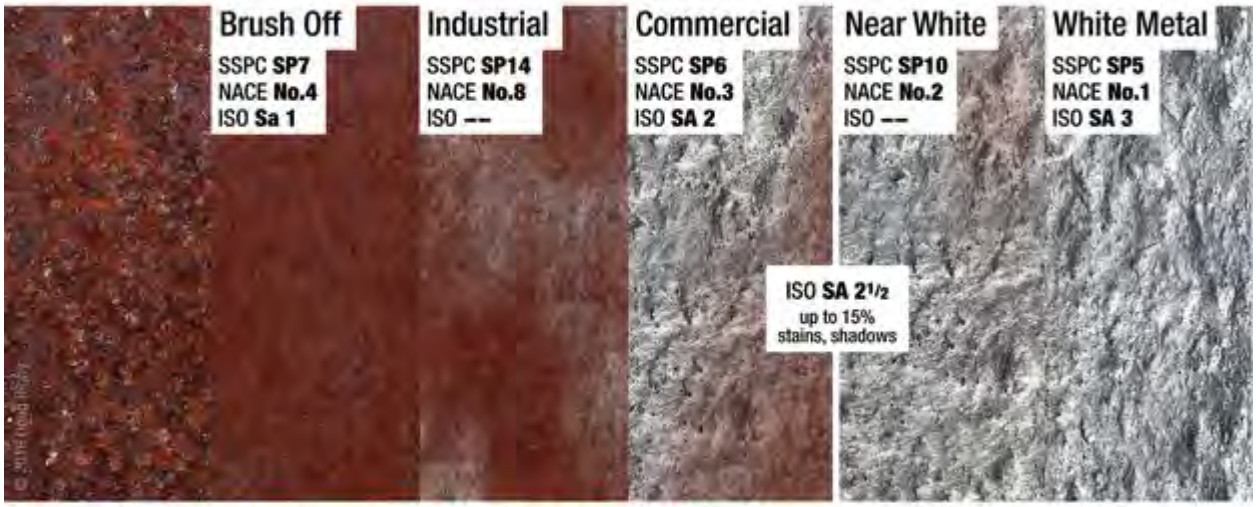
The Gun Nozzle

Nozzles made of tungsten carbide are the best choice. If your compressor cannot keep up with the blaster, chose a smaller nozzle for the gun. If you have plenty of pressure at the gauge, but

don't seem to feel it at the gun, look for an obstruction in the abrasive pickup line or something stuck in the nozzle.

Media

Acceptable abrasives include coal slag (BLACK BEAUTY), aluminum oxide, garnet, silicon carbide, and steel grit.



Loose Material	None	None	None	None	None
Tight Material	100%	up to 10%	None	None	None
Stains, Shadows	100%	100%	up to 33%	up to 5%	None

More detailed information can be found here: http://blastjournal.com/surface-preparation-standards-explained/

NOTE: See the Appendix at the end of this application guide for larger samples of photos that can be used to match to the surface you are preparing.

The compressed air used for blasting should be free from water and oils. Adequate moisture/oil separators should be used to ensure elimination of all contaminants. Cleanliness of the air can be checked by operating the line without abrasive media through a white cloth in accordance with ASTM D4285, Standard Test Method for Indicating Oil or Water in Compressed Air, which describes if any oil or water is found on the cloth, the separators should be cleaned until subsequent 20 second tests prove satisfactory.

EonCoat can be applied over white metal or over flash rusted metal. The cost of blasting steel to white metal – and holding the blast - is far more expensive than performing a basic commercial blast and allowing flash rust to form. There is no reason to blast steel to a white metal finish before applying EonCoat. At the time of coating, the degree of flash rust should be moderate (M), as listed in SSPC WJ standards for a maximum degree of flash rust. Painting over contaminants is not acceptable. **Care should be taken by individuals to avoid hand or clothing contamination on freshly blasted surfaces.**

Remove all blasting residues from the structure/vessel by means of vacuum cleaning plus, as appropriate, shovels, brooms, clean compressed air, vacuum cleaners and other dry extraction methods. Pressure washing should be utilized provided the surface is air dried. Cloths should not be permitted for cleaning due to possible lint contamination.

3.5 PREPARATION OF STEEL - WATER JETTING

The steel surfaces to be coated shall be water jetted utilizing Ultra-High Pressure Water Jetting in accordance with SSPC-SP WJ-2 L/NACE WJ-2/L, “Clean to Bare Substrate”. At the time of the coating, the degree of flash rust should be moderate. Water used should be comparable to potable water and free of oil, acid, alkali or any other detrimental matter.

At the time of the coating, the degree of flash rust should be moderate (M), as listed in SSPC WJ standards above for maximum degree of flash rust. Painting over contaminants or mill scale is not acceptable. Care should be taken by individuals to avoid hand or clothing contamination on freshly blasted surfaces.

4.0 MIXING

4.1 MIXING EONCOAT KITS (APPLIES TO HIGH-PRESSURE PLURAL PUMP)

Mix the entire contents of Part A and Part B separately. Do not mix Part A with Part B. Mix using a rounded edge paddle mixer for each component. During the mixing process, scrape the sides and bottom of the container to ensure that both parts are agitated properly. Agglomerations in the material, whether of globs of either Part A, or globs of Part B, will create small dimples in the

wet coating because the mass of the agglomeration acts like a rock hitting a puddle of water – you get a splash mark.

A drill-operated mix paddle must not have sharp edges because these will scrape plastic shards off the bucket and those end up in the coating.

A bucket mixer can be used to mix product. A bucket mixer with a dispersion blade is ideal for Part A mixing if the mixer is firmly mounted so that it cannot touch the sides of the plastic pails.

Add Part A to the Part A saddlebag/transfer bucket and Part B to Part B saddlebag/transfer bucket located on or near the spray pump. Applicators should be careful not to cross contaminate both parts as the curing reaction will begin to take place.

Further mixing will be achieved by use of an impingement mix gun or static mix block as detailed in the next section.

Watch a video on how to mix & set up EonCoat in a High-Pressure Plural Pump with Stainless Steel Lowers. Click on this link or scan the QR Code with a smartphone.

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5.0 APPLICATION AND EQUIPMENT

The primary concept to understand is that you must apply EonCoat on a clean carbon steel surface. In order to achieve this, each area should be pressure washed before spraying. Pressure washing will remove loose iron oxide as well as overspray from previous passes of EonCoat.

The important thing is for the coating to stay damp until it cures, like all types of cement. You can manage to apply on warmer substrates and in warmer weather, and in higher winds than

are specified in this document, if you wisely use water to keep the surface cool as well as mist water on the ceramic to keep it damp until it is fully cured.

5.1 SURFACE TEMPERATURE

Surface temperature should be a minimum of 40ºF (5ºC) – below 65F (18°C) using the EonCoat Winter formula - and maximum 110ºF (43ºC). There are no dew point restrictions. The maximum relative humidity (RH) at the time of coating should be 98%. Please note that special consideration and application techniques will need to be utilized when spraying at the high end of temperature readings, the low end of humidity readings, and windy conditions (+5mph). It is essential that the ceramic be kept damp for at least 5 minutes and preferably for 15. The surface can be misted to accomplish this. A pressure washer, properly set to mist, is an ideal tool. See troubleshooting (Section 6.0 and the weather graph of this guide) or contact an EonCoat representative for specific details.

5.2 STRIPE COATING

EonCoat does not typically require stripe coating. In the industry, stripe coats are additional coats of paint that are applied locally to welds, fasteners, and external corners. Their function is to build a satisfactory coating thickness at edges and corners where paint has a tendency to contract and thin upon drying. If you need to achieve the required mil thickness in more complex geometric areas, you can stripe EonCoat where required.

5.3 APPLYING EONCOAT WITH HIGH-PRESSURE PLURAL PUMP

When using a high-pressure spray system ideally you will build the full mil thickness in one or two slow passes. You may need to build thickness in some areas with multiple passes if the temperature is low and the material is not curing fast enough.

If weather conditions promote slow curing and the coating is trying to sag, the first pass can be applied as little as 3-4 mils (75-100 microns). You would then wait for a few seconds and apply a second pass at 3-4 mils (75-100 microns). This will allow the coating to be able to hold the

weight of the material and allow for adequate coverage over these areas. **Remember, all chemical reactions go twice as fast with each 10 degrees of temperature.**

5.4 APPLYING EONCOAT WITH A PNEUMATIC DUAL COMPONENT CARTRIDGE SYSTEM

The dual-component cartridge spray gun is a compact, cartridge spray system that utilizes a valve gun and a static mixing tip at low pressure, to apply EonCoat over a substrate. The dual-component cartridge spray gun can be used as a stand-alone spray system or in conjunction with a high-pressure spray system. The dual-component cartridge spray gun can be used for repair or in hard-to-reach areas of a structure or substrate to build optimum mil thickness prior to spraying the structure or substrate with a high-pressure spray system, which might not be able to reach these areas.

When applying EonCoat to such areas with the cartridge system, you must build mil thickness in multiple passes. The first pass (back and forth) can be applied at approximately 10 mils (250 microns), then wait a few seconds and apply a second pass at 10 mils (250 microns). This will allow the coating to be able to hold the weight of the material and allow for adequate coverage over these areas

Setting up a cartridge system is much easier than the plural pump. Watch a video on how this is done. Click on the link or scan the QR code with a smartphone.

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5.5 HIGH PRESSURE PLURAL PUMP EQUIPMENT

A high-pressure plural pump with stainless steel lowers must be used to apply EonCoat. Refer to the chart below for spray pump and equipment recommendations:

Pump Size	15:1 (min)
Spray Gun	Graco G40 spray gun with remote mix manifold
Alternative	Binks 43P spray gun with Graco static mixer
Tip Orifice *	.023 - .045 fan tip Experience indicates that for a large flat horizontal substrate (tank) in 80F weather a 429 tip with pump pressure at 2,500 psi and 250 feet of 1/2” line delivers very good results
Atomization Pressure	700-3500 psi OR until “tails” in spray pattern do not show
Material Hose ID	Attach 50’ lengths of 1/2" hose to pump as needed to reach (A & B Side)
Whip Hose ID	Attach (1) 3’-5’ x 3/16” whip hose from mix manifold to gun with static mixer inside the gun end of the hose. *EonCoat can supply these for additional cost.*

* Specific tip sizes will depend on the nature of each particular application. Select a spray tip that is within the capacity of the high-pressure plural pump. The larger the spray tip, the greater the pressure drop. Long hose length and cold material will decrease material delivery volume and fluid pressure at the spray tip. If the pattern has fingers or pulsates, change the spray tips to reduce the size of the spray orifice. This will decrease the material volume and increase pressure.

The high-pressure plural pump must have a minimum of 1500 psi output pressure rating and adequate delivery volume to support the spray tip orifice gallons per minute rating (GPM). High-

pressure plural pump sprayers with higher maximum pressure capability will allow spray application or using spray hose lengths greater than 300 feet (90 meters). The initial pressure should be set to where the lowest fluid pressure will provide a uniform spray pattern without tails. If greater material coverage is desired, use a larger tip size.

NOTE: Part A is an acidic product and care should be taken when selecting components for use with the Part A side of the spray equipment. Stainless Steel 304/316 is recommended for any part that comes in contact with the Part A component. Do not use any equipment coated with lead, zinc or other reactive material in the supply path for part A.

The temperature will change the viscosity of the product and therefore the mix chamber, insert tips and fan tips may need to change accordingly. The application environment will also be a factor when choosing these components to spray with. Please contact your EonCoat representative for more information.

The recommended film thickness should be achieved in a single coat through multiple passes. Multiple passes can be sprayed while the coating is still wet or tacky. Once the coating has "dried-to-touch", the coating must be allowed to set-up before additional materials can be applied.

NOTE: Every attempt should be made to achieve the recommended thickness while the initial spray is still wet.

5.6 APPLICATION TECHNIQUES

Hold the spray gun perpendicular to the surface. The distance from the substrate is determined by the pressure and tip size. Set up the gun so that "bounce" of the material is kept to a minimum. We want all of the material to go firmly enough onto the substrate to push material into the surface profile, but not have any bounce off. While triggering, move at a rate to produce the desired coating wet mil thickness without thin spots or "holidays". The spray technique should include an overlapping technique where each spray pass is overlapped 20-30% for uniform coverage. **Never flick the wrist at the end of a pass.** The coating is dry fall in 10 feet, even less on hot days. Flicking the wrist at the end of a pass will create dry fall on uncoated

steel. This dry fall then becomes surface contamination that will negatively impact the coating reaching the metal.

Watch a video of how EonCoat Spray Patterns should be and how to measure the thickness while wet. Click on the link to watch or scan the QR code with a smartphone.

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5.7 PUMP MAINTENANCE

At the end of each day of use, the pump should be thoroughly flushed with water. Any material left in the pump will damage the pump and cause spray issues the next day.

Material can be left in the hoses and pump (without pressure) if the job has stopped for less than 8 hours. In this case, pressure must be released from the pump, gun, and hoses. The hoses from the pump must be disassembled.

Also, the hoses should be thoroughly flushed with water until clean water is passing through.

Once a week, all parts of the displacement pumps should be taken apart and thoroughly cleaned. At this time, note any wear that may have occurred while spraying. Refer to the pump manual provided with your equipment for recommended cleaning procedures or contact EonCoat for detailed equipment recommendations.

5.8 GUN MAINTENANCE

At the end of each spray application you must clean all of the coating out of your spray gun or it most certainly will spray poorly the following day. An ideal way to clean the gun is to:

No.	Graco G40 Gun	Binks 43P Gun
1	Clean gun and static mixer whip hose thoroughly with water.	Immediately remove the static mixer and disassemble it. Wash it thoroughly with water.
2.	Disassemble the gun from the whip hose and clean the material build up from the tip and from the gun.	Remove the orifices from both sides of the gun and rinse them out with water.
3.	Clean the mixing block by flushing water from both sides (Part A and Part B, inlets to the mixing block).	Remove the high-pressure water line from the center and connect it to each of the fluid inlets in turn.
4.	If a RAC tip has been used, the material might build up inside the RAC tip holder. Clean it with water and a small screwdriver.	With the water pressure on, squeeze the trigger and let water flush through the non-return valve, the fluid valve, and the mix chamber.
5.		Repeat the process on the other side of the gun.

NOTE: be sure to remove all residual acid or material remaining on or in the parts of the gun. When exposed to air, this can corrode certain parts that have been in contact with the material.

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Watch a video of the Graco G40 being cleaned after use. Click on the link to watch a video or scan the QR code with a smart phone.

flowcode.com/p/Pti3CpGIO?fc=0

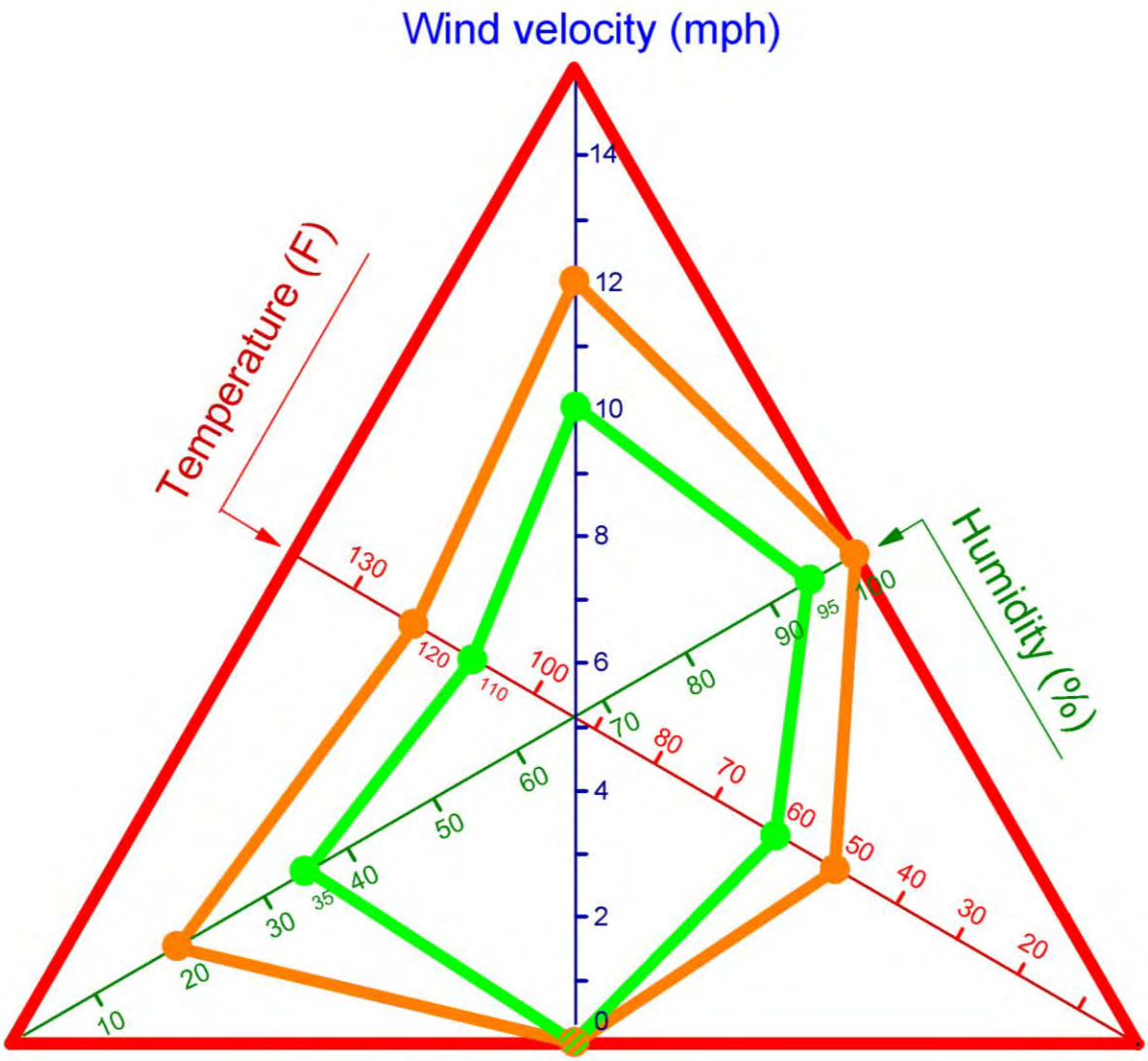
6.0 UNIQUE APPLICATION CONDITIONS

6.1 WHAT IS A UNIQUE APPLICATION CONDITION?

EonCoat is a water-based, rapid cure ceramic coating system. It has many application advantages but also needs special consideration when being applied in conditions near or beyond the recommended limits. Spraying EonCoat outside of ideal conditions is manageable by understanding the environment in which it is to be sprayed. Keeping moisture in the coating during its curing process is an essential part of maintaining EonCoat' s physical properties, specifically during the formation of the ceramic. This is typical of all cementitious materials and keeping the substrate moist is handled in the same way as with concrete or inorganic zinc – mist the surface with water if it is curing so fast that you see surface cracks. The ceramic only needs a few minutes to cure, but it must be damp during that time period.

The combined RH, substrate temperature, and wind velocity must allow for a rate of evaporation in the acceptable range. If ambient or substrate temperature fall outside of given ranges during application, there are application techniques that *may* make it possible to apply EonCoat. For example, proper misting of the ceramic to keep it damp allows a much wider application window.

Please refer to the following chart as temperature ranges can be affected by weather conditions, including humidity.



Using the chart above:

Apply EonCoat if conditions (wind velocity, substrate temperature and humidity) fall inside the green line of the parameters.

Contact EonCoat for advice on how to proceed if conditions fall between the green line and orange line.

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Do not apply EonCoat if conditions fall outside of the orange line (between the orange and red line, or above the red line). Speak with an EonCoat representative.

6.2 HIGH TEMPERATURES (SURFACE TEMPERATURES ABOVE 110F)

Spraying in high temperatures causes EonCoat to “flash” water too quickly thereby not allowing adequate time for the ceramic to form. This causes poor ceramic formation and makes the coating brittle. This can also cause hairline cracks to form in the ceramic.

In order to reduce the amount of water from flashing out too quickly, you may use the following techniques:

- Adjust your spray tip to larger orifices. A larger tip size means larger droplet sizes during atomization, and this will help reduce water loss during spray.
- Use lower pump pressures. The lower pump pressures will also increase droplet sizes during atomization at the spray tip. You should only use the amount of pressure needed to eliminate tails in your spray pattern.
- Apply a mist coat of clean water onto the substrate prior to the application of EonCoat. Evaporation of water will cool the surface to be coated. DO NOT ALLOW STANDING WATER ON THE SUBSTRATE WHILE APPLYING EONCOAT.
- Apply a mist coat of clean water immediately after the application of EonCoat. Water applied over EonCoat will keep the necessary amount of water in the ceramic while it is curing. Any excess water will evaporate after the initial cure is complete.

6.3 LOW TEMPERATURES (SURFACE TEMPERATURES BELOW 40F 4°C)

Spraying a waterborne system in these temperatures keeps the water in the ceramic cold and delays the formation of the ceramic. Delaying the formation can cause runs or sags when the coating is applied, especially in humid environments.

When spraying in colder conditions, use the following techniques:

- Do not mist the coating. Do not wet the substrate before coating. Do not spray on a damp surface.
- Use EonCoat – winter formula product.

6.4 WIND (ABOVE 10 MPH)

Spraying in windy conditions will remove moisture from the coating prematurely. Premature moisture loss will cause the ceramic to become brittle and may also form wrinkles in the coating.

Use the following techniques when spraying in windy conditions:

- Adjust your spray tip to larger orifices. A larger tip size means larger droplet sizes during atomization, and this will help reduce water loss during spray.
- Use lower pump pressures. Lower pump pressures will also increase droplet sizes during atomization at the spray tip. You should only use the amount of pressure needed to eliminate tails in your spray pattern.
- Apply a mist coat of clean water onto the substrate prior to the application of EonCoat. Evaporation of water will cool the surface to be coated. DO NOT ALLOW STANDING WATER ON THE SUBSTRATE WHILE APPLYING EONCOAT.
- Apply a mist coat of clean water immediately after the application of EonCoat. Water applied over EonCoat will keep the necessary amount of water in the ceramic while it is curing. Any excess water will evaporate after the initial cure is complete.
-

6.5 LOW HUMIDITY (BELOW 30%)

Spraying in low humidity conditions will remove moisture from the coating prematurely. Premature moisture loss will cause the ceramic to become brittle and could also form wrinkles in the coating.

Use the following techniques when spraying in low humidity conditions:

- Adjust your spray tip to larger orifices. Larger tip sizes mean larger droplet sizes during atomization, and this will help reduce water loss during spray.
- Use lower pump pressures. Using lower pump pressures will also increase droplet sizes during atomization at the spray tip. Use only use the amount of pressure needed to eliminate tails in your spray pattern.
- Apply a mist coat of clean water onto the substrate prior to the application of EonCoat. Evaporation of water will cool the surface to be coated. DO NOT ALLOW STANDING WATER ON THE SUBSTRATE WHILE APPLYING EONCOAT.

- Apply a mist coat of clean water immediately after the application of EonCoat. Water applied over EonCoat will keep the necessary amount of water in the ceramic while it is curing. Any excess water will evaporate after the initial cure is complete.

7.0 CURING

7.1 KEEP IT DAMP

The recommended thickness of EonCoat can be applied in multiple passes but it should be applied in one application. EonCoat Version 5 dries to the touch in about 5 minutes and is hard dry in about 15 minutes in 70F (21°C) conditions.

Keep the ceramic damp for about 15 minutes while the cement fully cures. Misting with a pressure washer is a handy method of keeping the ceramic damp when spraying in unusually hot or dry conditions.

NOTE: Cure time is dependent on temperature and humidity. Every 10C will affect the rate of reaction by a factor of 2.

8.0 INSPECTION

8.1 WET FILM THICKNESS (WFT)

Due to the nature of the quick curing properties and multiple pass application of spraying EonCoat, a wet film thickness measurement must be utilized immediately after applying in order to achieve the most accurate reading.

8.2 DRY FILM THICKNESS (DFT)

After the coating cures, the dry film thickness of the coating can be measured by conventional dry film gauges in accordance with SSPC-PA2, Procedure for Determining Conformance to Dry Coating Thickness Requirements.

8.3 FINAL INSPECTION

After EonCoat has been applied and cured, it forms a permanent molecular bond with the ferrous ions in the steel. This bond forms an alloy layer on the steel which protects the steel from future corrosion. Pressure washing at a minimum 3000 PSI to clean and prepare the surface for its topcoat also provides a method of verifying that a good bond to the substrate has been obtained. If the ceramic has failed to bond with the substrate, the velocity from a pressure washer will cause the ceramic to disbond. Use a rotary head with an aggressive nozzle

8.4 CERAMIC DISBONDMENT

If the ceramic is not well bonded to the substrate it can crack and disbond. There are three things that can cause the ceramic to have a poor bond. The most common cause is spraying over a contaminated surface. A contaminant will prevent the material from physically touching the metal, and without physical contact, no bond can occur. The ceramic may form but not be attached to the metal. This condition shows up very soon after applying. Cracking of this area is also common. If this occurs the loose ceramic is scraped off and the surrounding area is removed until only tightly bonded ceramic remains. The area can then be repaired with new material using any of the application methods. The edges will easily bond to the existing ceramic because EonCoat chemically bonds to itself.

A second thing that can cause a poor bond is when the acid Side A and alkaline Side B are allowed to begin reacting with each othr prior to reaching the substrate. **Too much residence time in the whip hose can cause this**. When spraying constantly the mixed material only stays in the whip for 2 seconds. However, if the applicator stops momentarily the material will begin reacting. We recommend that if spraying stops for more than 5 seconds that the applicator discharge the 100 ml in the whip hose into a waste bucket before continuing with application. If disbondment is found under these circumstances the loose material should be removed and repaired as discussed above. If a poor passive layer is discovered, the ceramic should be removed and the application repeated.

A third cause of cracks in the ceramic, as well as disbondment, is the spraying off ratio. Particularly spraying too much Part A will result in large cracks forming in the ceramic shortly after application. Watch your pump pressures to be sure you stay on ratio.

8.5 PINPOINT BROWN STAINS

If the coating does not physically touch metal it cannot alloy it. Occasionally there will be blast media that gets imbedded in the profile, or just small bits of contamination, that cause a very small point to be unprotected by a passive layer. This point may bleed rust and cause a stain. In a very short period of time the phosphate that leaches from the ceramic will permanently repair this spot by forming iron phosphate. This is the natural healing mechanism which makes the technology so effective.

9.0 REPAIR

Generally, the pressure washer test (refer to the post application observations in the inspection section above) shows EonCoat to EonCoat disbondment if present. As seen in the image at the end of this document, the topcoat can peel off showing EonCoat to EonCoat disbondment as well.

All areas needing repair shall be masked and repaired by abrading the edge of the coating surface with grit disk paper or other hand tooling method and feathered into the existing coating not needing repair to provide a consistent, uniform finish.

For large repairs (more than 2 sq. ft.) → Wet the EonCoat – Apply additional EonCoat while the surface is damp using a high-pressure plural pump with stainless steel lowers.

For small repairs (less than 2 sq. ft.) → Wet the EonCoat – Apply additional EonCoat while surface is damp using a dual component cartridge spray system (Part A & Part B) along with a static mixing tip.

For very small repairs (less than 5 sq. inches) → Hand mixing and applying EonCoat will work with very small quantities. Mix equal parts A and B in a small bucket with a brush and immediately apply in the location of repair.

The same repair procedure shall be utilized if re-applying with a plural component spray system such as the Predator Spray system or equivalent.

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NOTE: If hand tool or power tool cleaning leaves a polished smooth surface, EonCoat will not bond to such a surface because the surface will inhibit the chemical reaction between EonCoat and steel. To make such steel reactive may require chemical treatment. This chemical treatment can be provided by pouring a salt-peroxide mixture on to the surface (steel). Once flash rust bloom is observed then the steel can be coated with EonCoat.

10.0 HEALTH AND SAFETY

EonCoat is for use in industrial environments by qualified coating application specialists. Although EonCoat is considered non-hazardous, the environment in which it is being applied may be hazardous. Please refer to the material safety data sheets (for Part A and Part B) for more health and safety information prior to using EonCoat or contact your EonCoat representative. For our most up-to-date SDS & Tech Data Sheet please use the following link: https://eoncoat.com/sds-technical-data/ or scan the QR code with your smartphone.

11.0 TOPCOATS AND SEALERS

EonCoat is a cementitious coating. Like all cementitious materials, it is porous, and therefore, will get dirty and stain easily if not sealed. A top coat can be chosen for the desired appearance. For customers desiring to keep with the inorganic nature of EonCoat a polysiloxane sealer is ideal.

Application

When applying any topcoat to EonCoat the surface temperature should be cooling and the application should not take place in direct sunlight. This is because all porous materials outgas, meaning they expel air and moisture from the pores when heating. If you apply a topcoat or

sealer while air is escaping from the ceramic you will get bubbles in the coating and a poor bond with the coating. Work with the natural flow of air and moisture to let it draw coating material into the pores to get a strong bond.

12.0 TROUBLESHOOTING

12.1 Spray Gun- (Graco G40) or Spray Gun- (Binks 43P)

Problems	**Solution**
Trigger won't engage	Material packed out in the needle assembly Remove needle assembly and clean out assembly pieces (entirely) Take-up nut too tight Loosen the take-up nut on the needle assembly to allow for movement
Material leaking through Needle assembly	Tighten the take-up nut to seal the housing
Trigger won't release	Material is packed out in needle assembly Remove needle assembly and clean out assembly pieces (entirely) and resin seat in the fluid block Trigger stuck on purge stem Loosen the spool nuts on the needle assembly where the yolk sits and adjust the yolk to have enough room between the trigger and purge stem
Gun spray pattern shows fingers or tails	Dirty or damaged spray tip Remove tip and clean or replace as needed Spray Pressure too low Raise pressure on the spray pump to alleviate tails
Gun loses pressure while spraying (off-ratio)	(A) or (B) is packed out Clean out needle assembly and resin seat for each side as needed

Gun initially loses pressure, but then pressure levels out	(A) or (B) side resin seat leaking (refer to chart on pg 15 for reading pressure loss) Clean out resin seat or replace

** Check static mixer for cured product and clean as needed to prevent cured material from entering.

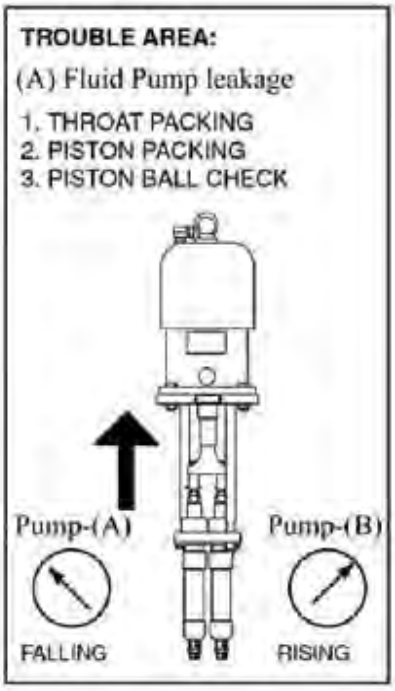
12.2 Spray Pump (Plural (1:1) Spray Pump)

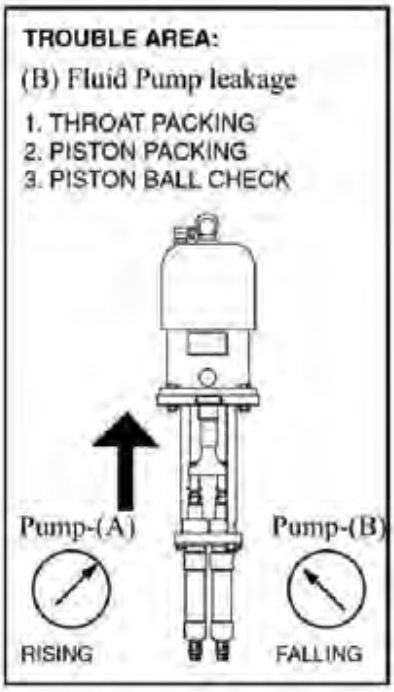
Problem	**Solution**
System stop or will not start	Air Pressure or volume too low Increase; check air compressor Closed or restricted air line or valve Open or clean fluid valves Closed or clogged fluid hose Open, clean or replace Air motor worn or damaged Repair air motor Displacement pump stuck Clean or repair pump
System speeds up or pumps erratically	Fluid containers are empty Check often; keep filled Air in fluid lines - Purge; check connections Displacement pump parts are worn Repair pump
Pump Operates, but (A) fluid output pressure drops on upstroke	Dirty, worn or damaged (A) fluid pump upper ball or valve seat - Clean or repair (A) fluid displacement pump Piston packing - replace
Pump Operates, but (A) fluid output pressure drops on down stroke	Dirty, worn or damaged (A) lower ball, seat or seal Clean or repair (A) fluid pump

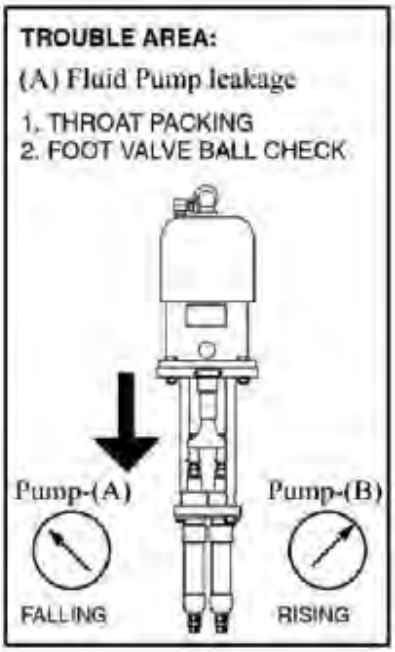
Pump Operates, but (A) fluid output pressure drops on both strokes	(B) fluid pump output restriction - Clean or unplug (B) side Open manifold restrictor Fluid supply low - Refill container
Pump Operates, but (B) fluid output pressure drops on upstroke	Dirty, worn or damaged (B) fluid pump upper ball valve or seat - Clean or repair (**B**) fluid displacement pump Piston packing - replace
Pump Operates, but (B) fluid output pressure drops on down stroke	Dirty, worn or damaged (B) lower ball, seat or seal Clean or repair (B) fluid pump
Pump Operates, but (B) fluid output pressure drops on both strokes	(A) fluid pump output restriction - Clean or unclog (A) side Open manifold restrictor (B) Fluid supply low -- refill container
Fluid leaking in packing nut	Loose packing nut or worn throat packing Tighten packing nut Replace throat packing
Fluid leak under packing nut	Packing cartridge O-ring. Replace O-ring

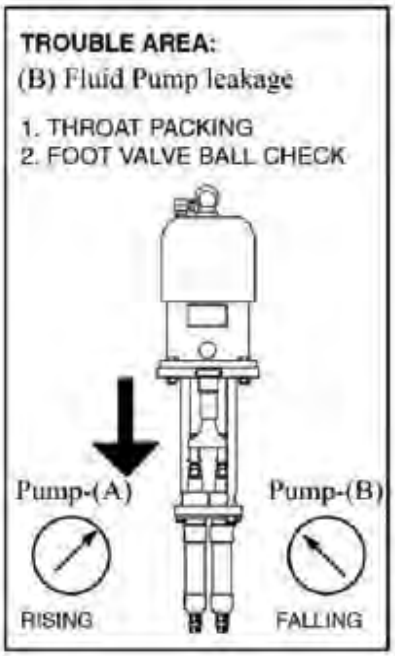
12.3 SPRAY PUMP PRESSURE GAUGE READINGS

The chart on the following page uses the manifold gauges to determine pump malfunctions. Faulty manifold check valves can mask pump cylinder problems. Always keep these valves operating properly. Observe the gauge readings during the stroke direction indicated by the bold arrow, and immediately after closing the manifold.


TROUBLE AREA:
(A) Fluid Pump leakage
1. THROAT PACKING
2. PISTON PACKING
3. PISTON BALL CHECK
Pump-(A)
Pump-(B)
FALLING
RISING


TROUBLE AREA:
(B) Fluid Pump leakage
1. THROAT PACKING
2. PISTON PACKING
3. PISTON BALL CHECK
Pump-(A)
Pump-(B)
RISING
FALLING


TROUBLE AREA:
(A) Fluid Pump leakage
1. THROAT PACKING
2. FOOT VALVE BALL CHECK
Pump-(A)
Pump-(B)
FALLING
RISING


TROUBLE AREA:
(B) Fluid Pump leakage
1. THROAT PACKING
2. FOOT VALVE BALL CHECK
Pump-(A)
Pump-(B)
RISING
FALLING

APPENDIX

Following are photos of various levels of surface preparation.

Use these as a guide to what is, and is not, acceptable.

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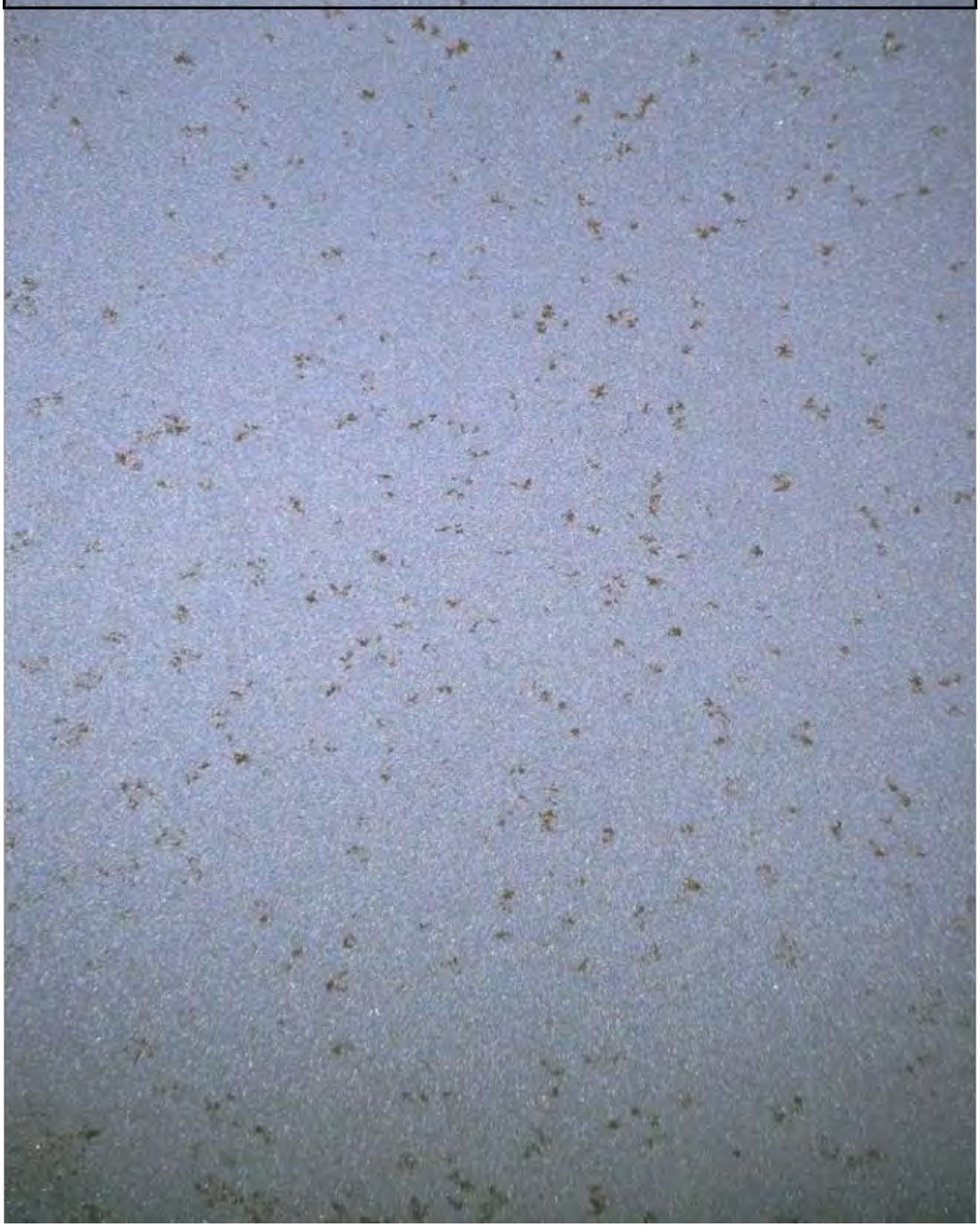
ACCEPTABLE
This surface is NACE 2


ACCEPTABLE
This is flash rusting of a NACE 2 surface


ACCEPTABLE
This is a typical flash rusted surface

ACCEPTABLE

This surface has small amounts of rust on an otherwise well prepared surface. EonCoat will convert the small rust spots to iron phosphate



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NOT ACCEPTABLE
This surface has a shop primer applied

ACCEPTABLE IF LOOSE MATERIAL IS REMOVED

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ACCEPTABLE

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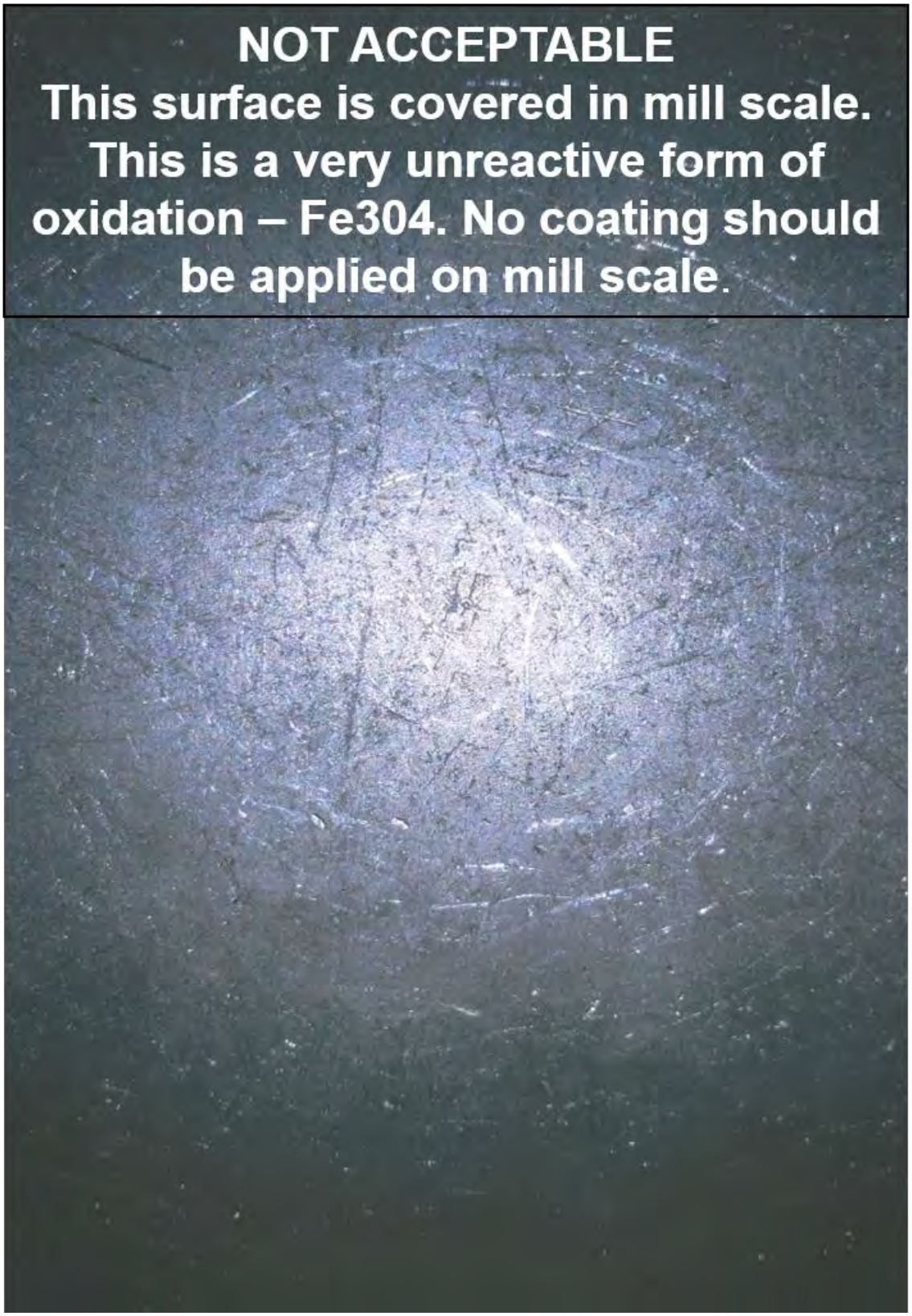
NOT ACCEPTABLE
This surface is covered in mill scale. This is a very unreactive form of oxidation – Fe304. No coating should be applied on mill scale.

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